Asia-Pacific
Economic Cooperation

Report for Workshop on Satellite Data Application for Sustainable Fishery Support in APEC

APEC Fisheries Working Group
November 2011

ROSCOSMOS

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Preface

The workshop “Application of Satellite Data for Sustainable Fishery Support in APEC” was held at Ramada Bintang Bali Resort, Kuta – Indonesia at June 10, 2011 under the heading of Federal Space Agency. This workshop provided a forum for various stakeholders involved in Fishery and Marine Resource Conservation and Remote Sensing experts to discuss and review use of satellite imagery for sustainable fishery support and marine biodiversity protection.

The workshop was organized by Russian Federal Space Agency and RDC SCANEX with support of Russian Ministry of Economical Development and Federal Agency for Fisheries, Indonesian Ministry of Marine Affairs and Fishery, and APEC-Fisheries Working Group. Event was largely devoted to examining the best available instruments and approaches for implementing best practice in application of satellite data for sustainable fishery support, marine biodiversity conservation and recognition of interaction between climate change and fishery.

Participants included experienced academicians, business actors, governmental officials, International NGOs, and representatives of 8 economies. The workshop consisted of 3 plenary sessions, invited presentations, breakout session, comprehensive discussions leading to a number of follow-up recommendations that were accepted by all participants.

We thank all participants for the contribution and energy. Particular thanks to the facilitator and break-out facilitators as well as speakers and all those who sent comments to the draft write-up. We would also like to thank Ms Sitti Hamdiyah from Indonesian Ministry of Marine Affairs and Fishery and Mr. Alan L. Deniega from the APEC Secretariat who has guided and supported us in delivering this project.

We fully anticipate that the outcomes of the workshop will be beneficial in supporting of overall objectives of the APEC Fisheries Working Group.

Project Overseer

Alexey Korostelev
International Cooperation Department Director
Federal Space Agency

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Workshop Summary and Recommendations

Delegates from 8 APEC economies (Chinese Taipei, Indonesia, Korea, Malaysia, Russia, Thailand, USA, Viet Nam) met in Bali, Indonesia during June 10 to participate in the workshop on Application of Satellite Data for Sustainable Fishery Support in APEC. The workshop was conducted as key element of Russian Self-funding APEC Project # FWG 01/2011S. The workshop was co-organized by Russian Federal Space Agency and Federal Agency for Fisheries, Ministry for Economical Development of Russia, Research and Development Center SCANEX and supported by the Ministry of Marine Affairs and Fishery of Indonesia (MMAF) and Asia Pacific Economic Cooperation (APEC) Fisheries Working Group.

The workshop attended by 38 delegates, saw experts in satellite Remote Sensing (RS) technologies, officials/experts in Fishery and Marine Resource Conservation and representatives from Environmental NGOs sharing experience and best practices in application of satellite data for sustainable fishery support, marine biodiversity conservation and recognition of interaction between climate change and fishery.

RS persons presented information about past and perspectives of satellite technologies development; implementation of satellite data for fisheries in Pacific, particularly in Indonesian waters; operational satellite solutions for sustainable ocean resources management; role of RS data for sustainable fishery management; application of satellite data for maritime services, oil spills monitoring and combat, coastal resources management and internet based technologies for visualization of space monitoring results.

Academia persons presented reports on implementation of satellite technologies for fishery; mapping of marine resources; satellite derived oceanic and atmospheric phenomena for fisheries application. Official persons presented information about problems of IUU fishing in North Pacific. NGO representatives demonstrated presentations about fishery challenges in North Pacific; impact of climate change on fishery and marine biodiversity in Coral Triangle; application of satellite data for environmental projects.

The overarching recommended solutions include:

Institutional

- The time has come to turn from pilot projects of remote monitoring to operational work on international and global scale. And the discussion between all responsible organizations within APEC should go further to establish legal foundation for such programs.
- It is advisable to develop as APEC project an internationally recognized complex system for detection, special services alerting, obtaining evidence facts and punishment of vessels,

involved in IUU fishing. The system needs interaction of fishing companies and government agencies.

Economical

- For further development of remote sensing programs and increasing their effectiveness the chain: satellite/constellation proprietor – data distributor – end user should be optimized to get the data faster and cheaper.
- Economical estimation of expenditure and returns is needed for investing in development of remote methods for sustainable fishing support.

Information

- To keep all responsible parties informed about new technological solutions and the latest approaches in Remote Sensing against IUU fishing it is crucial to arrange close interaction between Fishery Agencies of APEC Economies and research centers to share new knowledge and outcomes.
- The informational interchange should be improved in the practical aspect, too, to make remote imagery and analytical results accessible for different responsible organizations (fishing companies, official Fishery Agencies), and special attention should be put to a question of transboundary data transfer.
- To protect marine resources from pouching special measures should be developed and taken to keep secure important information about Potential Fishing Zones, received from satellite images.

Technology

- For monitoring of legal and illegal shipping it is vital to detect unlicensed vessels, carrying no VMS onboard.

Transboundary issues

- Remote sensing is essential for effective monitoring of vessels and control of transboundary shipping, as well as close interaction and exchange of acquired data between APEC economies.

Scientific

- Remote sensing is perspective for Blue Carbon projects, say, for basic mapping of coastal zones (mangroves, seagrass).
- Remote sensing is important for better understanding of connections between fish stocks' protection and productivity (control of spawning etc.)

The full report on this workshop will be available in December 2011 to the delegates. A summary of the recommendations and Project Progress Report will be presented by the Russian delegation to the APEC Ocean & Fishery Working Group during 2012 annual meeting.

WELCOMING REMARKS

Dr. Jaya Wijaya, Deputy Director for Foreign Market Development
Ministry of Marine Relations and Fishery, Indonesia

- Honorable Representative of Russian Fishery Agency and Russian Federal Space Agency (Roscosmos)
- Facilitators and Speakers;
- Ladies and gentlemen

Very Good Morning,

First of all, on behalf of the Host Economy, I would like thank Russia for implementing the workshop held in Bali — Indonesia. I am very delighted to welcome all of you to the workshop on Satellite Data Application for Sustainable Fisheries Support in APEC. I would like also thank participants of APEC annual working group meeting who extend their stay to participate in this workshop.

As we are aware that remote sensing technology through Satellite Data Application provides a powerful organizational and analytical tool for sustainable development decision-making. To day many methods and approaches involving remote sensing application for sustainable fishery support are developed and advanced. So, the workshop is very relevant to bridge capacity gap between developed economies and developing economies to support sustainable fisheries management in APEC Region through the application of remote sensing. We recognize the importance of the objective of the workshop which is to improve the capacity of APEC developing economies in application of satellite data for sustainable fishery support, marine biodiversity conservation and recognition of interaction between climate change and fishery.

Ladies and gentlemen,

From 6 until 9 June on the previous days - in the same venue, we have witnessed that the 10th joint session meeting of APEC Fisheries Working Group and Marine Resource Conservation Working Group has produced the important outcomes with regard to establishment of the new structure of working group and the future issues and challenges of the single body of working group. In this regard, the outcomes of this workshop will be important in addressing, the issues, amongst others, the role of ocean in food security or impact of climate changes in food security.

Ladies and gentlemen,

Remote sensing provides us with a window into the ocean ecosystem on synoptic scales and provides essential information for the governance of ocean ecosystems on global and regional

scales. Various environmental properties that influence fish distribution, abundance and migration could also be studied by the application of the remote sensing. With regard to the Satellite imagery contributes to a better understanding of the linkages between climate change and the state of fisheries resources.

We wish that workshop on Satellite Data Application for Sustainable Fisheries Support in APEC could provide a platform for deliberations on the latest developments in this field and highlight case studies using earth observation data. We expect that the outcomes of the workshop will come up with the recommendation to address the current and future challenges in APEC Region.

Finally, I would like to express our appreciation to all participants for coming here today. I wish you all fruitful, open, and intellectually stimulating discussions on the one day workshop. Thank you.

Opening Remarks

Victor A. Nazarov
Federal Agency for Fisheries, Russia

Thank you very much! Distinguished guests, ladies and gentlemen! On behalf of head of Roscosmos agency I would like to welcome all the attendees of the workshop. We are delighted and honored to host the workshop “Application of satellite data for sustainable fishery support”. This workshop is sponsored by the Russian Federation, the Federal Space Agency (Roscosmos), the Ministry of Economic Development of the RF, in cooperation with Federal Agency for Fisheries. It is co-sponsored by APEC economies of Indonesia and Philippines, and supported by APEC Fisheries working group and APEC Marine Resource Conservation working group. On this opportunity I would like to acknowledge specifically the assistance of Indonesia as a hosting country for the recent meetings giving us a helping hand preparing and arranging this important workshop. The workshop is prepared and organized by our national leading company in Earth observation technologies Research and Development Center ScanEx. L&G, we recognize that the fishery, marine resource conservation and eco-culture are very important for the most of economies in APEC region and it is a part of food security issues and we are aware that this is a very complex issue. We also suppose that some kind of space technology really could help to solve some problems shown during last meetings of both working groups “Fishery” and “Marine Resource Conservation” merged now into one. In this regard cooperation between ocean-related institution, fisheries and space technologies centers in the field of specific user of observation technologies — it is the main goal should be pursued in this workshop.

L&G, there is a full of content program waiting for your attention. I do hope that through your participation and discussion we’ll share knowledge and sites from your expertise and experiences. I also hope that this workshop would yield recommendation and improvements on the Earth observation technologies application in APEC Ocean and Fisheries working groups. Thank you very much for your attention. Let’s go on.

Opening Remarks

Vasily Gudnov, International Cooperation Department,
Russian Federal Space Agency (Roscosmos)

Thank you very much! Distinguished guests, ladies and gentlemen! On behalf of head of Roscosmos agency I would like to welcome all the attendees of the workshop. We are delighted and honored to host the workshop “Application of satellite data for sustainable fishery support”. This workshop is sponsored by the Russian Federation, the Federal Space Agency (Roscosmos), the Ministry of Economic Development of the RF, in cooperation with Federal Agency for Fisheries. It is co-sponsored by APEC economies of Indonesia and Philippines, and supported by APEC Fisheries working group and APEC Marine Resource Conservation working group. On this opportunity I would like to acknowledge specifically the assistance of Indonesia as a hosting country for the recent meetings giving us a helping hand preparing and arranging this important workshop. The workshop is prepared and organized by our national leading company in Earth observation technologies Research and Development Center ScanEx. L&G, we recognize that the fishery, marine resource conservation and eco-culture are very important for the most of economies in APEC region and it is a part of food security issues and we are aware that this is a very complex issue. We also suppose that some kind of space technology really could help to solve some problems shown during last meetings of both working groups “Fishery” and “Marine Resource Conservation” merged now into one. In this regard cooperation between ocean-related institution, fisheries and space technologies centers in the field of specific user of observation technologies — it is the main goal should be pursued in this workshop.

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Workshop Agenda

07:00-08:30 Breakfast

08:30–09:00 Registration

Session 1: 09:00 – 10:00

09:00–09:10 Welcoming Remarks from Host Economy Indonesia – Dr. Jaya Wijaya, Ministry for Marine Affairs and Fisheries

09:10–09:15 Opening Remarks – Victor Nazarov, Russian Fishery Agency

09:15–09:20 Opening Remarks – Vasily Gudnov, International Cooperation Department, Russian Federal Space Agency (Roscosmos)

09:20–10:00 Photo Session – GROUP PHOTO, Coffee Break

Session 2: 10:00 – 12:00

1. Seminar Overview – Oganes Targulyan, Seminar Facilitator
2. Dr. Vladimir Gershenzon, General Director, RDC Scanex, Russia Remote Sensing – Past, Present and Future Development"
3. Dr. Nani Hendiarti, Center of Technology for Natural Resources Inventory Agency for Assessment and application of Technology (BPPT), Indonesia "Application of Satellite Data using Knowledge-Based Expert System Model for Fisheries in Indonesian Waters"
4. Victor Nazarov, Fishery Agency, Russia "Problems of IUU fishing in North Pacific"
5. Dr. Leonid Mitnik, Head of Satellite Oceanology Department, Pacific Oceanological Institute, Russian Academy of Science "Satellite-derived oceanic and atmospheric phenomena for fisheries applications".
6. Dr. Philippe Courrouyan, President, Pt CLS IndonesiaIntegrated Operational Satellite Solutions for Sustainable Ocean resources"
7. Dr. Konstantin Zgurovsky, Marine Programme Coordinator, WWF-Russia "Sustaining Russian fisheries in the western part of the Bering and Barents Seas Ecoregions: problems& prospective"

8. Dr. Dewayany Sutrisno, Indonesian Society For Remote Sensing"The Role of Remote Sensing Data for Supporting the Sustainable Management of Capture Fisheries"
9. Questions and Answers

12:00-13:00 Lunch Break

Session 3: 13:00 – 15:30

1. Ekaterina Tsybikova, "Transparent World" (NGO), Russia
   "Application of Satellite Data for Environmental Projects"
2. Ash Elena, RDC Scanex, Unit Head, Marketing, Russia
   "Remote Sensing Data and Coastal Resources Management"
3. Dr. Geoffrey Muldoon, Strategy Leader, WWF Coral Triangle Program, Indonesia
   "Impact of Climate Change on Fishery and Marine Biodiversity"
4. Dr. B. Realino, Institute for Marine Research and Observation, Bali, Indonesia
   "Utilization of Remote Sensing Data to Improve Capture Fisheries Production in Indonesian Waters".
5. Dr. Ku Kassim bin Ku Yaacob, Fisheries Research Institute, Malaysia
   "The Application of Remote Sensing Technology to Fisheries in Malaysia".
6. Anna Antonyuk, RDC Scanex, Russia
   "Commercial Satellite Imagery for Maritime Services"
7. Ruslan Kravchenko, Sales Director, Shore-Based Systems, TRANSAS MARINE PACIFIC PTE LTD (Russia/Singapore)
   "Use of Satellite Data and associated tools for Oil Spill Monitoring and Combat".
8. Dr. Kongkiat Kittiwattanawong, Phuket Marine Biological Center, Thailand
   "Mapping of marine resources and utilization based on interview information"
9. Georgy Potapov, Kosmosnimki Unit, RDC Scanex, Russia
   "Internet Based Technologies and Geoportals for Visualization of Satellite Monitoring Results"
10. Questions and Answers
11. Seminar Facilitator – Break-out Group instructions - Expectations, Objectives, Outcome

15:30-15:45 Tea Break

Session 4: **15:45 – 18:00**

15.45 – 16.45 1. Break-out Group Session

1.1 Group 1 “Remote Sensing and Sea Oil Pollution”

Facilitator: Vladimir Gershenzon (RDC Scanex, Russia)

1.2 Group 2 “Remote Sensing and IUU fishing”

Facilitator: Dr. Konstantin Zgurovsky (WWF Russia)

1.3 Group 3 “Remote Sensing and Climate Change Impact on Fishery and Marine Biodiversity”

Facilitator: Geoffrey Muldoon (WWF Indonesia)

16.45 – 17.00 2. Break-out Group Session Reports Back

2.1 Group 1 Discussion Results Report Back

2.2 Group 2 Discussion Results Report Back

2.3 Group 3 Discussion Results Report Back

17.00 – 17.10 3. Questions and Answers

17.10– 17.20 4. Seminar Workshop Summary Paper Discussion

17.20 – 17.40 5. Final Conclusions and Recommendations

17.40 – 17.50 6. Presentations of Appreciations to Speakers

17-50 – 18.00 7. Wrap up and Closing Remarks

19:00 - 21:00 Workshop Dinner – Seafood Barbeque - Ramada Bintang Bali Resort, Pool Side discussion on future cooperation

LIST OF PARTICIPANTS

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Remote Sensing — Past, Present and Future Development

Dr. Vladimir Gershenzon, General Director, RDC Scanex, Russia

Thanks for all organizers for the invitation to take part and to make the first report in this session. It'll be separated into two parts: the first part is the introduction and the second part will report about RDC ScanEx activity. As soon as not all of the participants are familiar with this technology — just several words about how it works.

Earth Remote Sensing (ERS) means collecting information about the Earth surface without in-situ measurements. It doesn't mean that it is not necessary to provide any contact measurements, especially for calibration or validation of RS data — it is necessary and the real information system combines all types of data bases, in-situ management, RS data. But RS technology permits to acquire operational data for huge territories simultaneously. From this point of view it is one of the challenges of nowadays, like global information technology, with geoportals, internet, with navigation as well. So it is one of the new tools and one of the new possibilities that can be utilized in every-day practice for many applications. So the main principle of operation is detecting of the emission reflection radiation from the Earth surface in different ranges: optical, infrared, radar. It enables to investigate different types of phenomena on the earth surface. How does it work principally? There is the space segment and usually the combination of satellite orbit and the Earth rotation allows acquiring data globally. There are some ground technologies that permit to provide housekeeping of the satellite and to control the payload operation. Then the data are available for end users. They try to understand how to provide the application, how to do with this. Historically it was sharing between military, civil and commercial applications. Military field of application includes intelligence, topography, precise topography, missiles launches. And civil and commercial — hydrometeorology, oceanology, ecology, nature resource management, cartography etc. Change in development was connected with precise cartography, military aspects at the beginning of this technology, creation and implementation. It was not so operational; it was more concentrated on military tasks. And during last years, monitoring and control, flexibility and productivity of different space missions become more and more realistic and close to end users' needs.

In any case such kind of approach means a compromise between spatial, spectral, radiometric resolution. It means sensitivity of the detectors that we use in RS. And the image itself

means the number of pixels, rows and columns of pixels, with specific brightness in each pixel of the image. The larger is the image, the lower is the resolution. It is the main principal of obtaining these images. So this is the choice of the program, the choice of the user — what kind of detectors, what kind of programs has to be combined in one project to optimize the final result, economic expen

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In any case such kind of approach means a compromise between spatial, spectral, radiometric resolution. It means sensitivity of the detectors that we use in RS. And the image itself means the number of pixels, rows and columns of pixels, with specific brightness in each pixel of the image. The larger is the image, the lower is the resolution. It is the main principal of obtaining these images. So this is the choice of the program, the choice of the user – what kind of detectors,

what kind of programs has to be combined in one project to optimize the final result, economic expenditures and efficiency of utilization of this method. Now we are in the understanding of the results of 50 years of progress in these methods. Spatial increased resolution from 10 to 0.3 meters in commercial programs. The number of spectral channels increased from several to several hundred (including UV and IR). Productivity and radiometric quality of the data improved. I'd like to make an example. 50 years ago the first military US satellite provided the image of the Chukchi Sea. Now the commercial high-resolution image of the same territory is available all over the world. And this is the result of operation of one of the leading American company GeoEye.

There are a lot of low, middle, high, super-high resolution programs available in many receiving centers, through the distribution channels. So there are a lot of possibilities to investigate, to obtain data, to fulfill projects with the help of these data. Many dozens of programs are now in space, and the data can be received and processed for specific needs. It is necessary to mention that the data license policy for different programs is very important. There are several copyright free programs. Among them are TERRA/AQUA, MODIS, NOAA. Due to the US government policy LANDSAT is also copyright free, as well as some others like CBERS (Brasilia/China), Sentinel (European). There are some possibilities to obtain data especially for science and education needs from ALOS, Envisat programs. But the most part of the middle resolution and high-resolution data are only commercially available. And the better is the resolution — the higher is the price for 1 sq km.

And now let's turn to applications. Mexican Gulf disaster, Indian Ocean tsunami, hurricane in the US, Earth Quakes in Japan and Haiti – all major disasters are highlighted by efficient space programs. There are serious changes of ice cover in the Arctic Region — this is one of the reasons that lead to the sea level rise. Some other problems are connected with deforestation, degradation of forest cover and forest fires. And you see – this is the problem for the whole territory, not only the Far East of Russia, but Indonesia, Australia, too, and so on. I should also mention here sand storms, greenhouse gas, and of course land use and land cover change all over the planet. And one of the main programs that allow getting these data is LANDSAT. Like MODIS in low resolution, LANDSAT — is the common base for land cover changes monitoring in middle resolution. It enables to cover the whole Earth on regular base and to get these mosaics, to get this global coverage available via geoportals like Google, Microsoft Virtual Earth, some other projects — we will talk about them later today.

Now I would like to say a couple of words about the activity of our Center. On the Russian territory we have 4 receiving centers in Moscow, Siberia and the Far East. And we've been in this business for more than 20 years, preparing different types of technology: not only hardware for data acquisition and processing, but also the whole chain of software for processing, including thematic processing, like ScanEx Image Processor. And we develop geoportals as well. Our own website has a name "Kosmosnimki.ru" (Space Images in English), and Georgy Potapov will tell

more about this technology. So for more than 20 years we are in these applications, and we try to do everything for simplification, acceleration, and the access to these technologies and data and trying to simplify the implementation of the results of such kind of programs into everyday practice. Our technology is automatically operating in different regions of Russia under control of our central facility in Moscow. We work with many world leading programs, like French, Canadian, American, Israeli, trying to combine in the most effective way different types of data. I've already mentioned the global land cover project, and you see the productivity of operational centers in mid–decade, and 2010 projects, when we delivered tenth of thousand scenes per year for the global availability through USGS and for the Russian customers as well in near real-time mode.

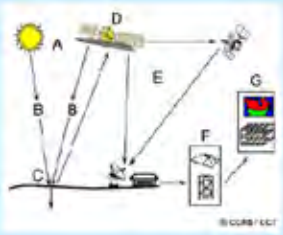
Now we have more than 60 stations in operation in hands of many universities, regional administrations. And we'll be glad to share our knowledge and our experience how to use there technologies in more simple and more effective way. Two of our stations have passed through the RADARSAT SAR mission certification procedure — very serious one, and two of them have already passed through the certification procedure for RADARSAT-2 program. On the base of this technology we have created ScanNet multi-mission multi-satellite operational network. And for the demonstration we prefer to use geoportal like one of the most innovative and most effective tools.

I would like to finalize with the conclusion that this technology came into everyday life — monitoring of many aspects and disasters, industrial needs. The number of applications is rapidly growing. Historically military competition was the source of implementation, but the rapid growth permits business to offer more economically effective and innovative solutions. And international network of universities can play significant role. OK, thank you!

1

Remote Sensing of the Earth

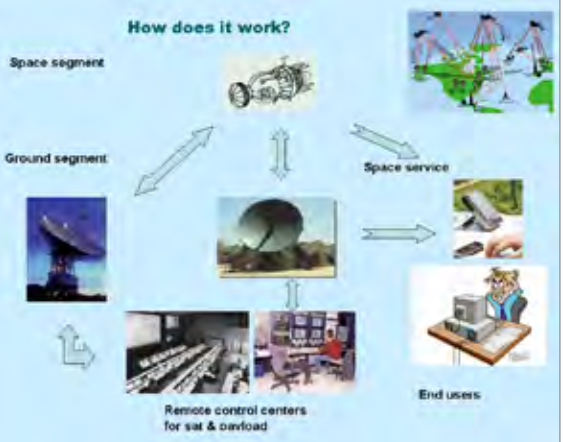
- permits to receive information about Earth surface without in-situ measurements



A – sources of radiation
B – atmosphere
C – reflection
D – receiving/registration
E –data transmission
F – thematic interpretation
G – application

2

How does it work?



3

"Sharing" applications

- Military

  Intelligence, topography, missiles launches ..

- Civil & Commercial

  Hidrometeorology, Oceanology, Ecology, Natural resources management, Cartography ..

4

"Sharing" applications

- Military

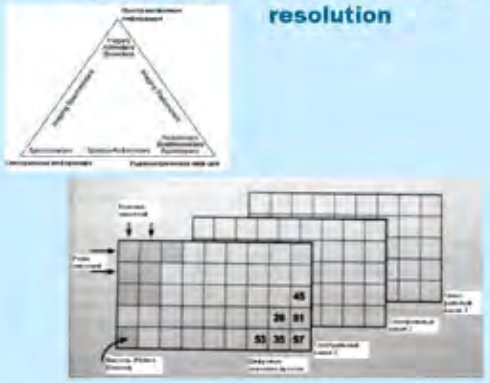
  Intelligence, topography, missiles launches ..

- Civil & Commercial

  Hidrometeorology, Oceanology, Ecology, Natural resources management, Cartography ..

5

Spatial – spectral – radiometry resolution



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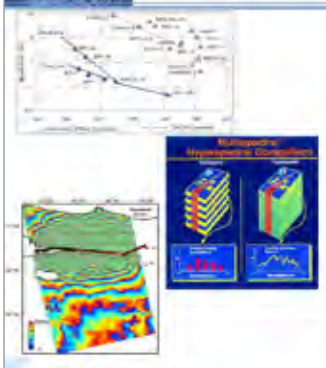
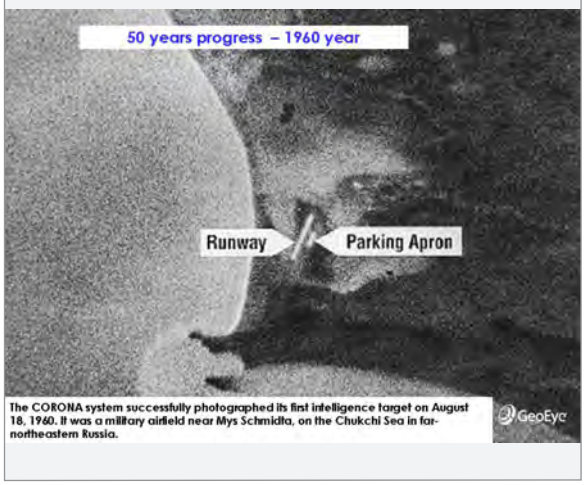
50 years progress in RS



- spatial resolution from 10 m to 0.3 m
- number of spectral channels from 2-3 to 100-200, including UV & IR; radar & SAR..
- sensitivity, productivity etc.

7



The CORONA system successfully photographed its first intelligence target on August 18, 1960. It was a military airfield near Mys Schmidta, on the Chukchi Sea in far-northeastern Russia.

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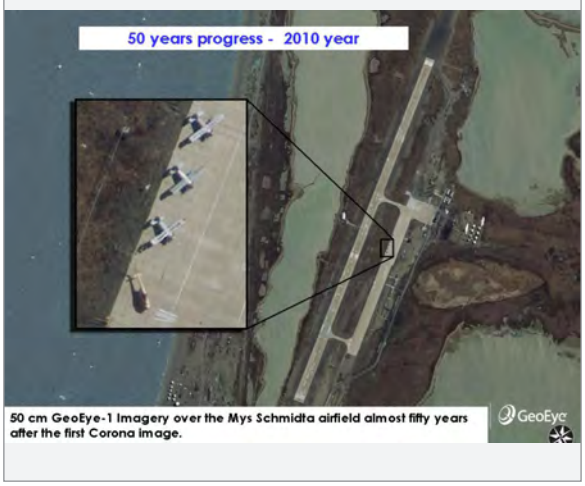


50 cm GeoEye-1 imagery over the Mys Schmidta airfield almost fifty years after the first Corona image.

9

Number of national & international program increase

Spatial resolution	Pixel size	Programs/cameras
Low Res	250 m ... 1-4 km	Noaa/AVHRR, Terra/MODIS, Aqua/MODIS, SPOT/VGT, Envisat/Meris...
Mid Res	10 m ... 250 m	IRS/LISS-3, IRS/AWIFS, SPOT-4, Radarsat-1, Landsat-5,-7, Envisat/ASAR, UK-DMC-2, Delmos-1, Mereop-M №1...
High Res	1 m ... 10 m	IRS/PAN, IRS-P5, EROS-A, SPOT-5, Formosat-2, Ресурс-ДК1, TerraSAR-X, COSMO-1/2/3/4...
Super High Res	0,5 (0,33) m ... 1m	QuickBird, Ikonos, WorldView-1/2, EROS-B, GeoEye-1, Cartosat-2/2A/2B, Kompsat-2

10

Different data license policy

Copyright free – low res & mid res programs (Terra, Aqua/MODIS, Noaa/AVHRR, Landsat, CBERS, Sentinel);

Nominal price for science & education (ALOS, ENVISAT, ...);

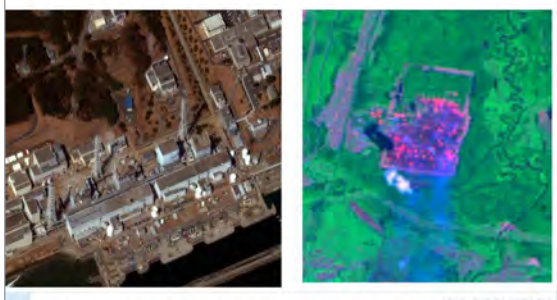
Commercial license – the most part of High Res & SHR RS program (IRS, SPOT, GeoEye-1, WorldView-1/2, ...).

Spatial resolution	LR (> 250 m)	MR (250…10 m)	HR (10…>1 m)	SHR (<1m)
Price	Free – 0,01 $/km²	0,001 ... 1 $/km²	0,2 ... 10 $/km²	10 ... 40 $/km²

11

RS role in our days

Mitigation of natural & anthropogenic disasters



АЭС Фукусима-1, 18.3.2011, WorldView-2, (DigitalGlobe, 2011) Пожар на складе Пугачев, Удмуртия, 3.6.2011 (Landsat-5).

12

Monitoring of Disasters

Space & Major Disasters, UN-SPIDER, UNITAR/UNOSAT, DMC, ...

:

- Indian Ocean 2004;
- Rita & Katrina in USA 2005
- Haiti 2010;
- Mexican Gulf in 2010;
- Japan in 2011..

Катастрофический разлив нефти в Мексиканском заливе в 2010 году, ENVISAT/ASAR (ESA, 2010)

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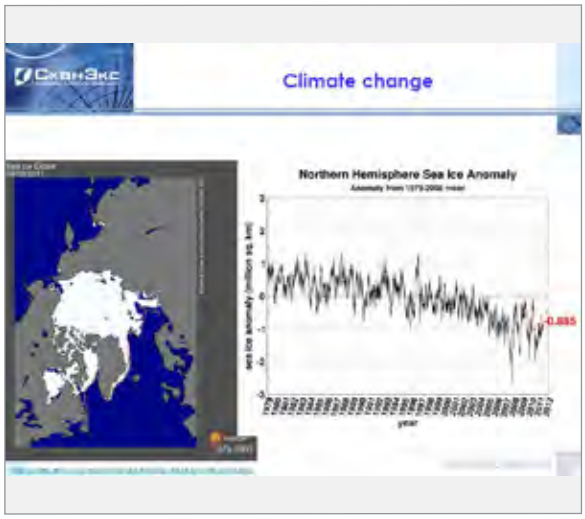

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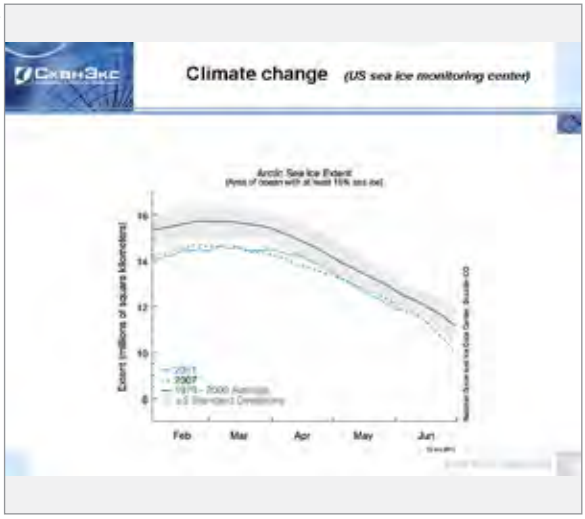

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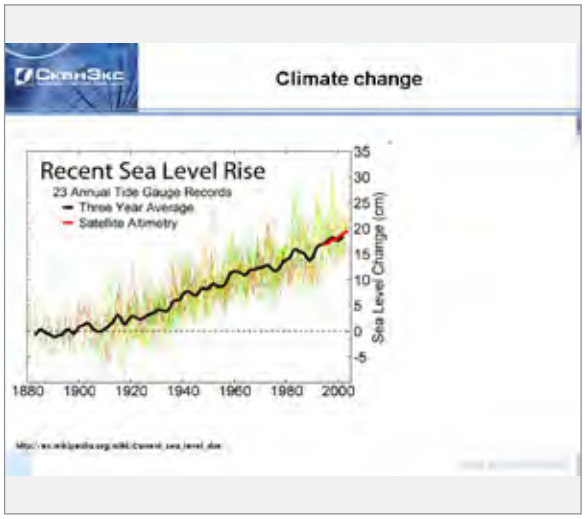

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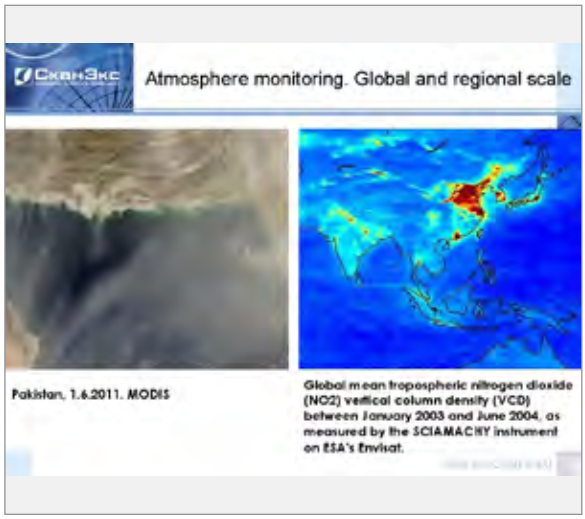

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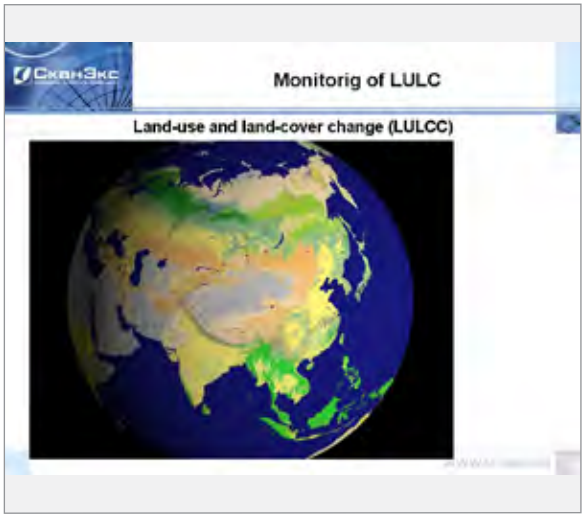

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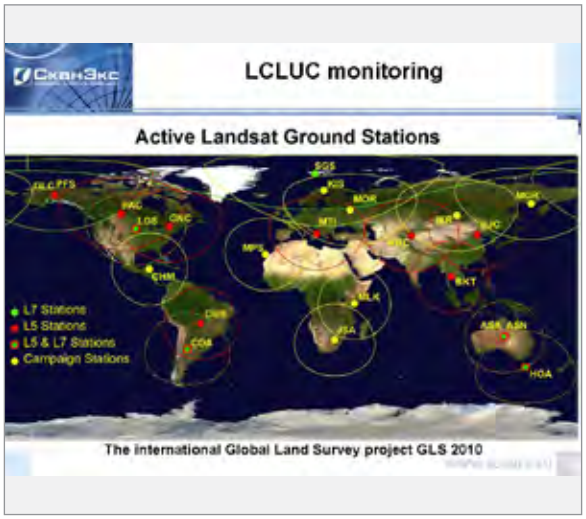

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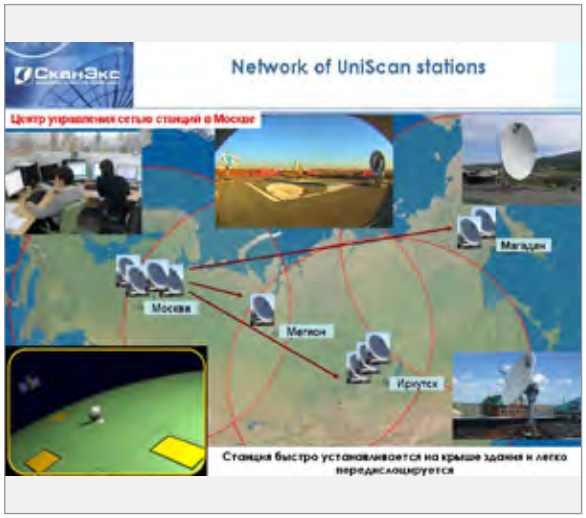

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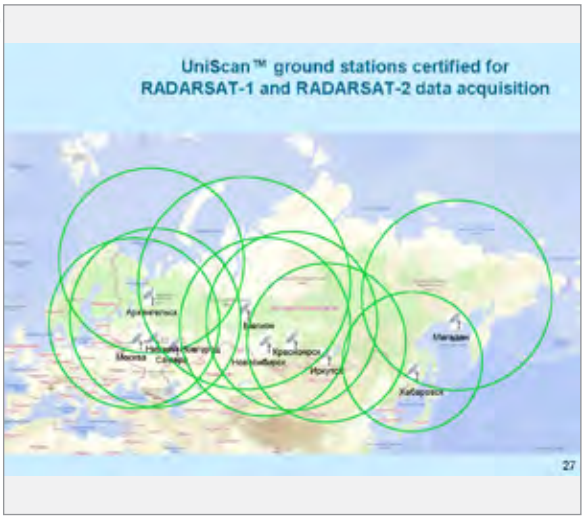

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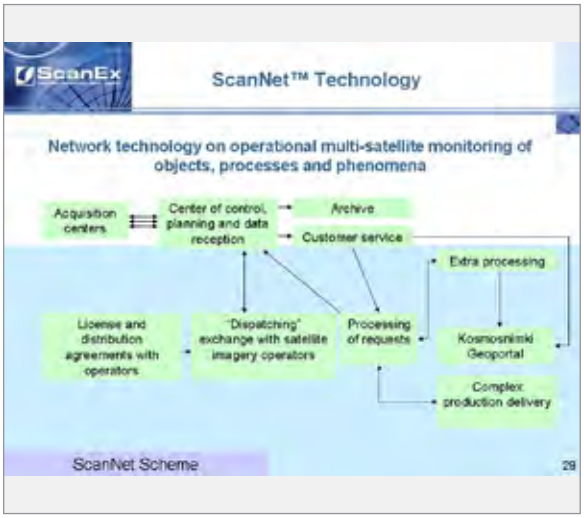

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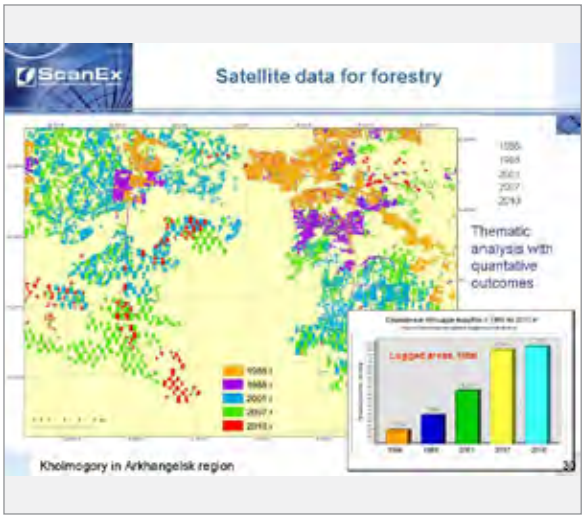

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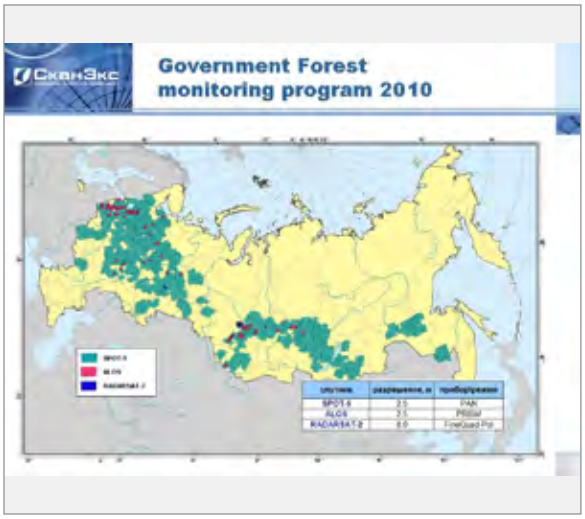

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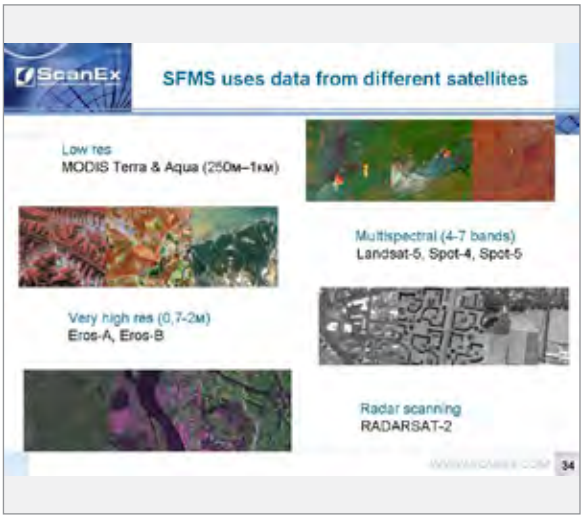

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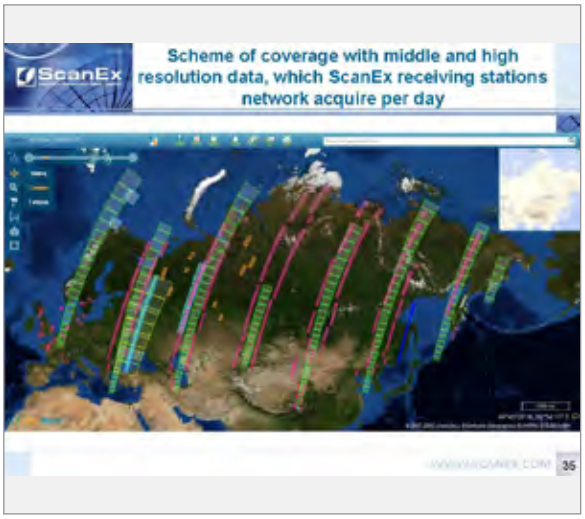

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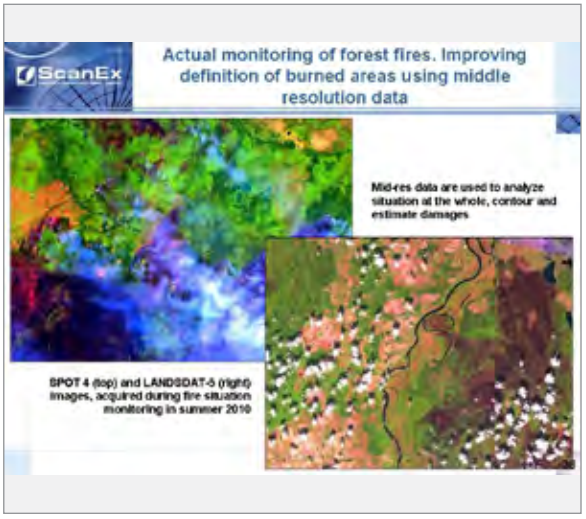

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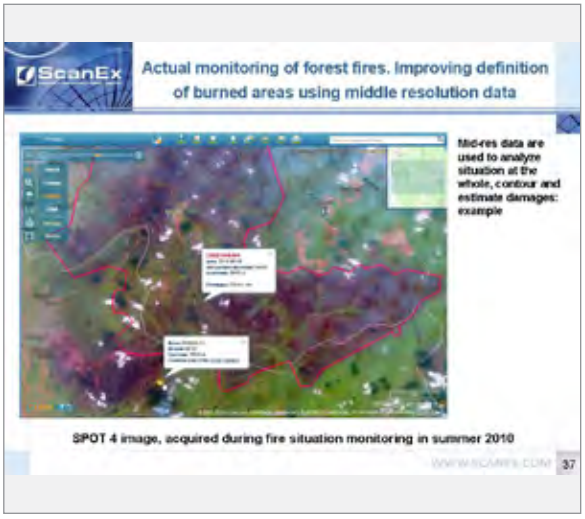

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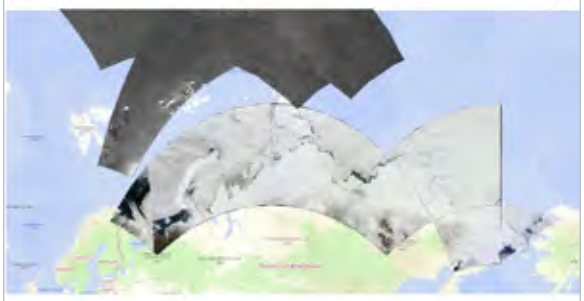
Geoportal Interface: Grounded Ice Hummocks Monitoring



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Educational X-band UniScan™ network

1. Belgorod State University, Belgorod, Russia
2. Kazakhstan-British Technical University, Almaty, Republic of Kazakhstan
3. Satpaev Kazakh National Technical University, Almaty, Republic of Kazakhstan
4. Lomonosov Moscow State University, Moscow, Russia
5. Bauman Moscow State Technical University, Moscow, Russia
6. Korolev Samara State Aerospace University, Samara, Russia
7. University of Valencia, Valencia, Spain
8. Ufa State aviation and technical university (UGATU), Ufa, Bashkortostan, Russia
9. Siberian Federal University, Krasnoyarsk, Russia
10. Tyumen State University, Tyumen, Russia
11. Southern Federal University, Rostov-on-Don, Russia
12. Nizhniy Novgorod Academy of Architecture, N.Novgorod, Russia
13. Altai State University, Barnaul, Russia
14. University of Valladolid, Laboratory of Remote Sensing (LATUV), Valladolid, Spain
15. Astrakhan State University, Astrakhan, Russia

Educational UniScan™ network
15 ground stations

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Unique ScanEx offer for Universities

NEW!

1. UniScan™ -24 ground station for Terra, Aqua data acquisition – 257,000 Euro EXW-Moscow (Incoterms-2000).
2. UniScan™ -24 ground station for Terra, Aqua, EROS A data acquisition including cost of 100 scenes of EROS A for the first year of operation – 400,000 Euro EXW-Moscow (Incoterms-2000).
3. UniScan™ -24 ground station for Terra, Aqua, IRS-1D data including cost of 600 minutes of IRS-1D telemetry for the first year of operation – 360,000 Euro EXW-Moscow (Incoterms-2000).
4. UniScan™ -24 ground station for Terra, Aqua, SPOT 4 data acquisition including cost of SPOT 4 telemetry for the first year of station operation (all passes within footprint of ground station) – 590,000 Euro EXW-Moscow (Incoterms-2000).
5. UniScan™ -24 ground station for Terra, Aqua, RADARSAT-1 data acquisition including cost of 50 scenes of RADARSAT-1 for the first year of station operation– 550,000 Euro EXW-Moscow (Incoterms-2000).

Combinations of mentioned satellites are possible!

40

Contemporary remote sensing center at a university allows to:

- Turn the university into one of the world's leading education institutions equipped with cutting-edge technology and software for Earth observation
- Carry out training and advanced preparation of specialists in remote sensing and GIS
- Monitor territories and submit data in support of decision-making to regions and sub-regions

41

Conclusions

RS technologies came into everyday life

Monitoring of climate change/variability impact, prediction & mitigation of disasters, industrial needs (transport, agriculture, forestry, mining, fishery…), education, science & ecology etc, etc - rapidly growing number of applications of RS data & technology nowadays

Historically military competition was the source of RS technology implementation. Rapid growth of RS industry permits business to offer more economically effective and innovative solutions..

International networking of University's RS centers can play significant role in new applications.

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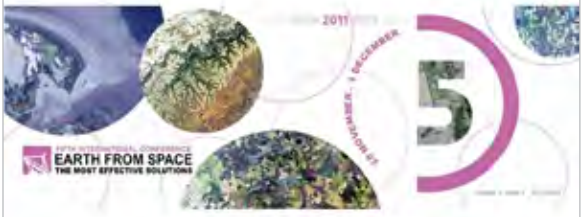
Thank you and welcome to our Conference in Moscow!



Application of Satellite Data using Knowledge-Based Expert System Model for Fisheries in Indonesian Waters

Dr. Nani Hendiarti, Center of Technology for Natural Resources Inventory
Agency for Assessment and application of Technology (BPPT), Indonesia

Distinguished guests, Ladies and Gentlemen, good morning! This time I am here as a representative from Indonesian society of Remote Sensing, besides I have been working with ocean remote sensing at BPPT since 1993. We would like to talk about the application of the satellite data using Knowledge–Based Expert System model for fisheries in Indonesian water. This kind of assessment has been done by many researchers in Indonesia in the RS society. As the background we know that the climate impacts to fisheries such as the migration of tuna in the Western Pacific Region beside this climate phenomena also given impact to changes of marine environmental condition also in Indonesian water. For an example here during 'El Nino' period in November 2007 gave this much higher concentration of chlorophyll a compare to the other years if you see in November 1998, for instance. So this is marine environmental parameter beside chlorophyll, the temporal changes of sea surface temperature, that we can see here the dynamic in Indonesian waters. Since Indonesian water covers too large areas for managing the fishery activities then it has been divided into 11 fishery management zones called WPP based on the different characteristic of the water also the fisheries. I'll not explain more detailed about WPP here. Next I would give an example how we assess the fishing ground and also the correlation with coastal and ocean process in the areas around Java Islands. There are four sides: the North, South, East, West — and each side has different characteristics. The circle one shows the fishing ground location for pelagic species. We compile the pelagic fish catch data and also we analyze data from satellite images for many years regarding the marine environmental parameters like chlorophyll a and sea surface temperature as well as water turbidity and others. Then we did a combine analysis then finally we'll get this recognition regarding the characteristic of the fishes especially in pelagic species and also the ocean phenomena that occur in the area. We can see for instance here — the fourth side has different ocean phenomena and also they have dominant pelagic species and we can also know from the fishery database and from the environmental parameter derived from satellite about their characteristics. Then we can estimate when the fishes will appear also which ocean phenomena will influence those sites.

The next example is the main topic, if we see here in Indonesian water we can see the pelagic fish migration in the open seas influenced by coastal and marine environmental condition. There are many researches on this topic, and based on the previous results we do further work on development and implementation of Rule-Based Expert System. You see the satellite and RS data have been utilized for predicting the fishing ground location. We made the software called SIKBES IKAN — it is basically an integrated software consisting of Knowledge-Based Expert System, RS data and GIS (Geographic Information System). We have a copyright of this software which we called it the Intelligent Fish Tracker Software – provides strategic data information about the Fishing ground location, also we can use it to maintaining the activities for supporting the sustainable fishery concept. Basically this system is an integrated between expert system, GS and RS. RS and GIS will support the database and in parallel we develop the expert system – we compile all information knowledge about the fishery specifically for each species and we produce this knowledge expert system based on the rules. So we combine three components into one system. Then this is an example delivered from the knowledge based, so we define it, then we called it the ontology of the rule-based expert system – this is specific, we do this assessment not for the whole region but for every WPP or Fishery Management Zone, because there are different characteristics for each WPP in Indonesia. We produce this ontology based on the parameter input that we can get from the satellite. Of course, we need to do a research on the data validation using in situ measurements to know the accuracy of the satellite information which we use as an input system. This is the scheme of the model that we have – so we actually do this observation to the next step for analysis and interpretation, to get Pattern Recognition for Fishing Ground or non Fishing Ground besides the information on Ocean Physical Condition. From the data interpretation, we can also get Fishing Ground or non Fishing Ground proportion as well as acreage of Fishing Ground and their Productivity. For the last step, the prediction model of Fishing Ground produced as final results. We applied this approach of the cycling model. This is a prototype assessment for mapping the potential fishing ground in the Tomini Bay – In these areas, we have many in-situ data as well as satellite data such as chlorophyll, turbidity and sea surface temperature for the input of model system. The accuracy of fishing ground information derived from this KBES model is about 85% in the Bone, Makassar Strait and Tomini Bay. This system is also used for economic valuation of fishery activities. Furthermore, as a conclusion, we recognize that the monsoonal system in the archipelago plays a great role in determining the variability of fish catch and by using the knowledge based expert system the prediction of fishing ground automatically would be more easy and accurate.

Application of Satellite Data using Knowledge-Based
Expert Sys tem Model for Fisheries in Indonesian Waters

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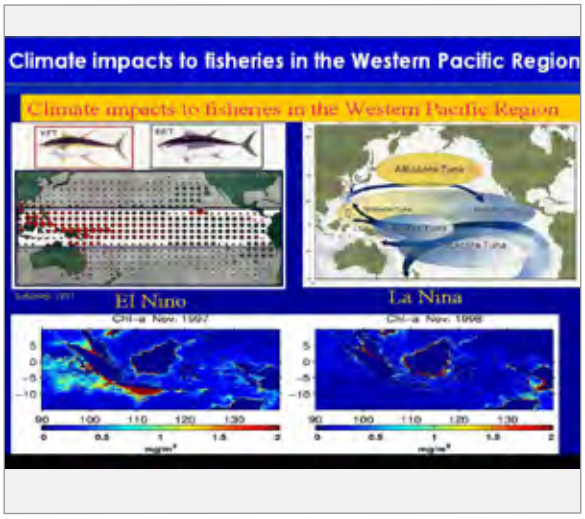

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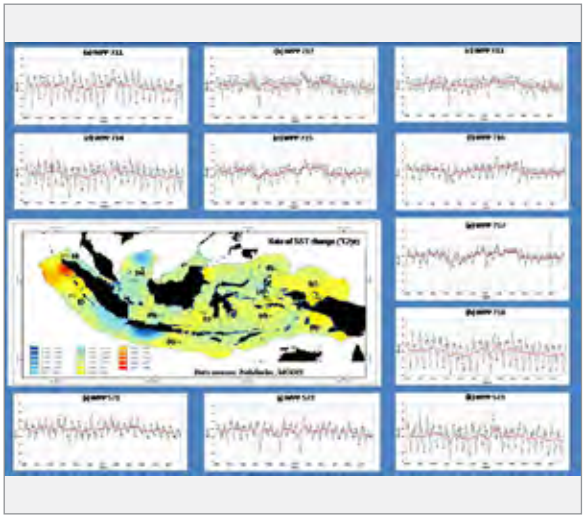

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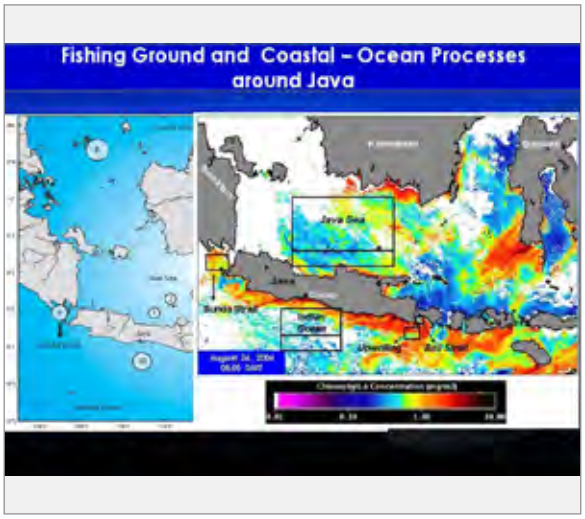

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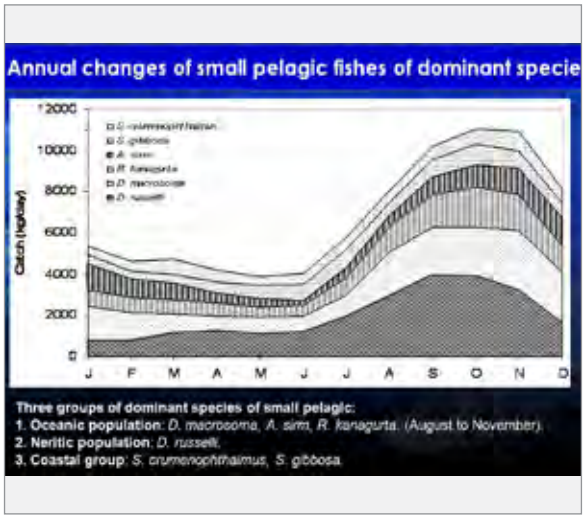

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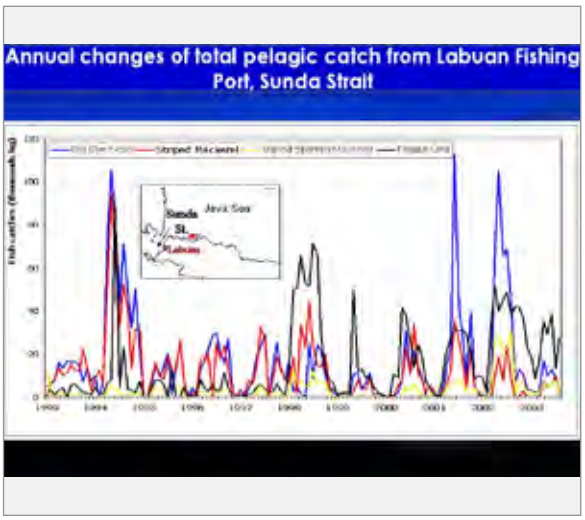

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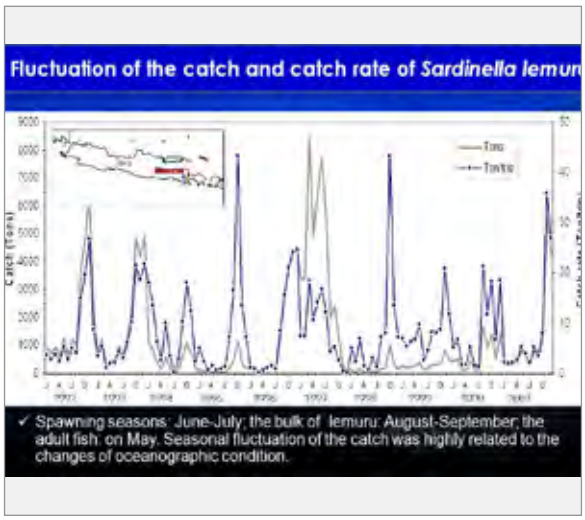

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Characteristics of pelagic species and ocean phenomena

Regions	Dominant pelagic species	Characteristic (when appear)	Ocean phenomena
Java Sea	Small pelagic: a) oceanic: *D. macrosoma, A. sirm, R. kanagurta*; b) neritic: *D. russelli*; c) coastal: *S. crumenophthalmus, S. gibbosa*	Max.: Sept – Nov (SE monsoon)	Warm and rich surface current,
		Min.: March – April	-
Sunda Strait	- Small pelagic: *Sardinella spp., Rastrelliger spp., Selaroides leptolepis, Decapterus spp.* - Big pelagic: *Auxis thazard, Scomberomorus spp.*	Max.: June (SE monsoon)	Surface water and upwelling
		Min.: December	-
Indian Ocean	Big pelagic	Max.: June – Sept.(SEmonsoon)	Upwelling
		Min.: Nov – Jan	-
Bali Strait	Small pelagic: *S. lemuru*	Max.: Sept.- Nov. (SE monsoon)	Influenced by indirect upwelling
		Min.: March – Apr	-

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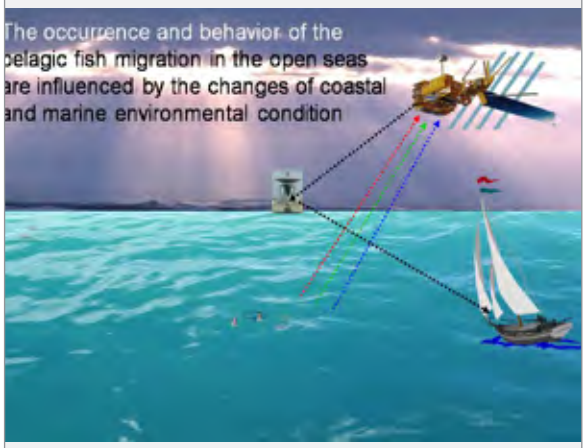


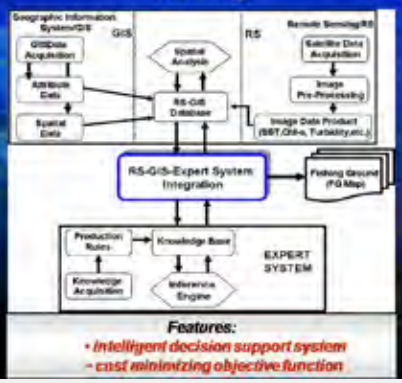
9

The Development and Implementation of Rule Based Expert System Based on Remote Sensing Data for Fishing Ground Prediction: A Management Tool for Marine Resources

- An integrated software consisting of Knowledge-Based Expert system, Remote Sensing and Geographic Information System.
- To provide strategic data and information on highly potential fishing ground location while maintaining balance to prevent overfishing.

10

Integrated of Expert System, GIS and Remote Sensing



Features:
- *Intelligent decision support system*
- *cost minimizing objective function*

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Structure (Ontology) of Rule-Based Expert System for Fishing Ground Prediction

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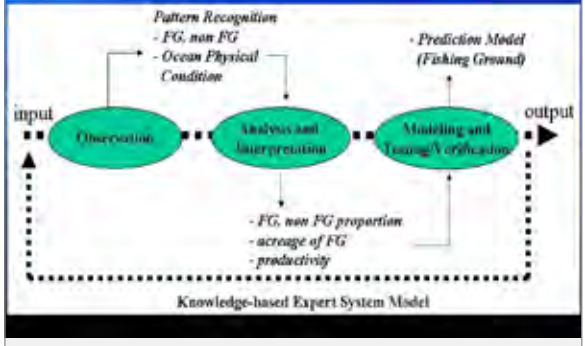
Fishing Ground Prediction model: An approach of cycling model



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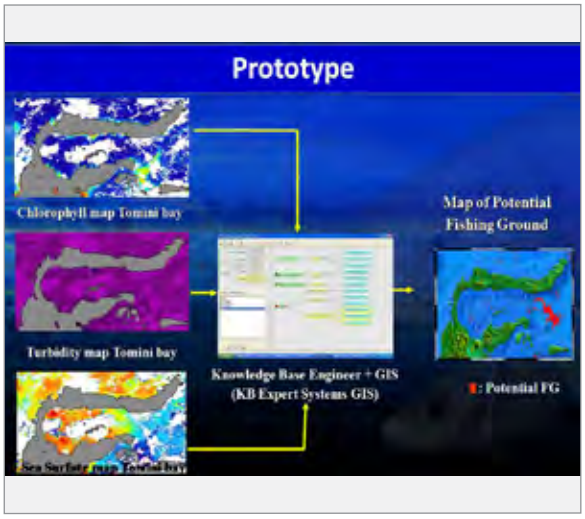

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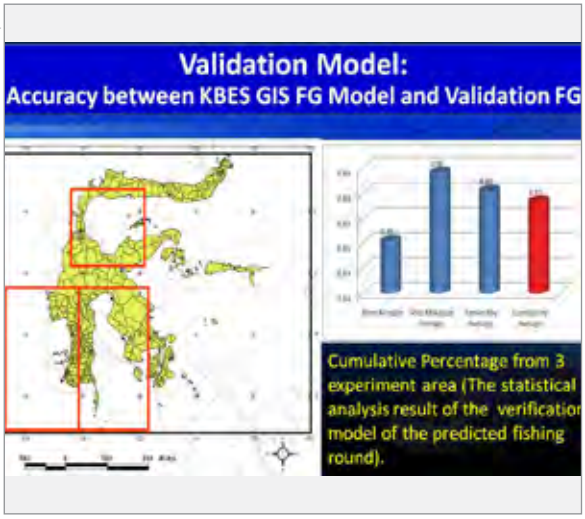

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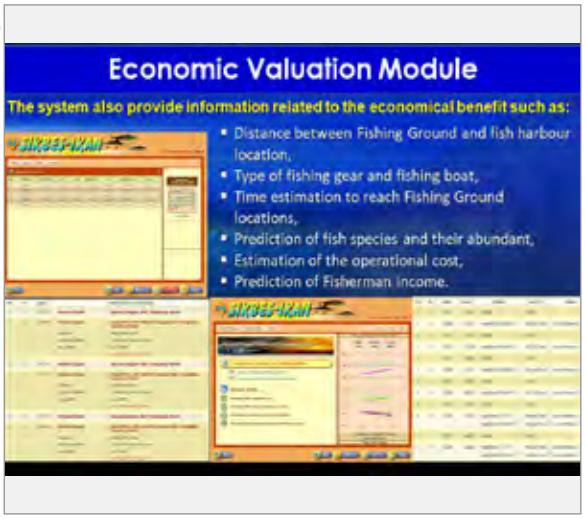

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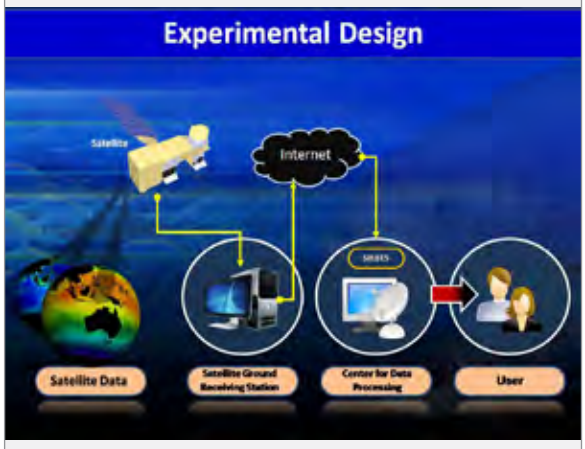

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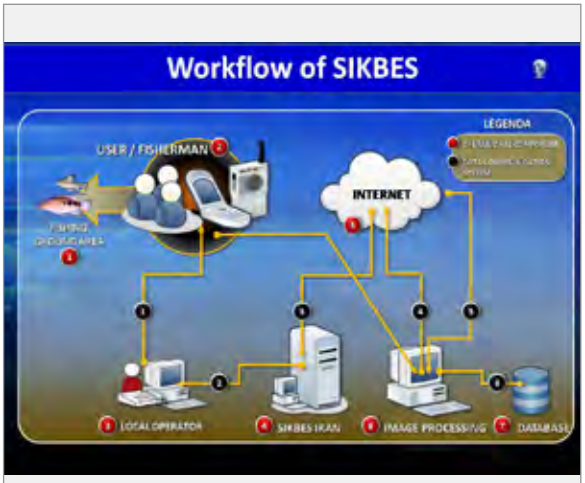

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Limitation

Problems	Possibly Solution
Limited data due to cloud cover	Need to improve the capability to merge the optical data with microwave cloud free data
Existing spatial resolution of the images (data input)	Need higher resolution for covering the coastal areas
Behaviour of pelagic fish (migration)	Need to update an info frequently

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Conclusion

- The development of phytoplankton in the specific regions is related to the occurrence of coastal and ocean processes, which influences the variability of the fish distribution.
- The monsoonal system in the archipelago plays a great role in determining the variability of fish catch.
- By using the knowledge base expert system, the prediction of fishing ground automatically would be more easy and accurate.

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Thank you

IUU-fishing problems in North Pacific

Victor A. Nazarov, Federal Agency for Fisheries of Russia

Dear hosts! Dear APEC economies' representatives!
Dear participants! Ladies & Gentlemen!

It's well-known that since 1982 the international community focuses especially to the illegal, unreported and unregulated fishing matter (downward abbreviated (acronymic) as IUU–fishing).

In 1995 UN FAO Code of Conduct for Responsible Fisheries was accepted (acronymic as CCRF).

On June, 2001 UN FAO International Plan of Action (acronymic as IPOA) to Prevent, Deter and Eliminate IUU–Fishing was approved by consensus.

Following to the IPOA each country was must accept the National Plan of Action (acronymic as NPOA) to Prevent, Deter and Eliminate IUU–fishing no later than current three years after date of IPOA approving.

Regretfully, to this time in North Pacific only three countries (economies) have their NPOA. Its are Canada (NPOA was adopted on March, 2005), USA (of January, 2006) and Republic of Korea (of May, 2006).

Now it's preparing the Russian NPOA for IUU-fishing to be adopted on September or October, 2011.

On November, 2009 accordingly to the IPOA IUU–Fishing the Draft of FAO Agreement for Port of State Measures concerning IUU-fishing was adopted by all FAO Member states. But this Agreement will be entered into force tt signing by 25th FAO Member state.

On June, 2010 Russia was the 16th state to sign and join to the upmentioned FAO Agreement.

In accordance with 2008 APEC Secretariat special report the IUU-fishing problem remains very important is as destructive and hazardous for all economies.

Despite to upmentioned international measures last two decades Russia has encounted with challenges concerning IUU–fishing very seriously.

For example, for last two years accordingly to official statistics of the General State Customs Bureau of China the general value of Russian seafood products were imported to the Zhongguo in 2009 was more than 1,24 billion US$. Simultaneously, the Russian Federal Customs Service fixed that hydrobiont products export value to China was less than 678 million US$ for the same

period. Resultly, twice cost balance approximately for Russia was detected as illegal or “the grey” in Russian terms.

In 2010, accordingly to the data of Chinese State Customs from Russia to China was imported the aqua bioresources’ products in total for assume value more than 1,36 billion US$. In time, the Russian Federal Customs informed that the 2010 exported aquaproduction value to the China was reached almost 940 million US$. The delta points were consisted near 420 millions US$. In comparison with 2009 “the grey” aquaresources’ import to the China was reduced at percentage indexes for 50% approximately.

Probably that the progress was achieved because on September 27, 2010 the “Memorandum of Understanding between the Federal Agency for Fisheries of the Russian Federation and the Ministry of Agriculture of the People’s Republic of China in preventing illegal, unreported and unregulated fishing of living marine resources” was signed!

For success developing two economies agree to develop bilateral intergovernmental agreement to prevent, deter and eliminate IUU-fishing. Draft of this agreement is ready and job of both of economies’ experts was started on April this year.

The single North Pacific economy has the bilateral intergovernmental agreement with Russia concerning IUU-fishing is the Republic of Korea. The agreement was signed on December, 2009.

Memoranda on Understanding regarding IUU-fishing Russia were signed with Japan on 2009, Canada on 2010 and DPRK (Democratic People’s Republic of Korea) on April, 2011.

Besides, this year it’s planning that intergovernmental agreements on IUU-fishing Russia to be signed with three North Pacific economies are Canada, USA and DPRK.

The next very important Asia-Pacific fishery economy for signing of bilateral agreement to prevent, deter and eliminate IUU-fishing with Russia will be Japan.

Also, Russia has the idea to all North-Western Pacific economies conclude and sign the convention concerning IUU-fishing at earliest time.

If all efforts of North Pacific economies regarding to the IUU-fishing opposition will be supported by satellite monitoring data and applied technologies there are no doubts for accelerating dissolves this complicated matter.

Thank you!

Satellite-derived oceanic and atmospheric phenomena for fisheries applications

Dr. Leonid Mitnik, Head of Satellite Oceanology Department, V.I. Il'ichev Pacific Oceanological Institute, Far Eastern Branch, Russian Academy of Science

I am from Vladivostok, from Pacific Oceanological Institute. There are 9 departments in my Institute. One of these departments is Department of Satellite Oceanography. We study the Ocean, mainly Pacific Ocean, mainly North-Western part of the Pacific Ocean using satellite information to solve various, in particular, environmental problems. I would like to present you some results of possible applications of Remote Sensing data to fishery. First of all you see on this slide where we are: Bali and Nusa Penida Islands, we visited small island yesterday, and very bright manifestation of flow from the Pacific Ocean into the Indian Ocean. Also you see the dark features associated probably with upwelling phenomena important for fishery especially behind Nusa Penida Island. Next slide show you variability of the processes we detected here. Yesterday we saw the alternating bands of smooth water and water with the increased sea surface roughness associated probably with propagation of internal waves. You can see these images also on this poster. Here you see a ship travelling across the Lombok Strait and ship wake a dark band caused by oil pollution. Then you can observe direction change in of the dark band. Probably it is due to surface current. Thus it is possible to use ship wakes to detect sea surface current and sometimes to estimate its velocity and direction. Other areas of increased brightness, bright features are oceanic some fronts, sometimes they are very bright. One more example demonstrating correlation of upwelling (dark tone area) with ocean color data (increased chlorophill a concentration). So it is very useful to compare ocean color and radar images obtained simultaneously or in different time since radar images of the ocean surface can be taken independent on cloud conditions.

So first of all - satellites for fisheries. Satellite observations characterize environmental factors. As emphasized Dr. Nani – they impact fish habitat, environmental parameters, that are well measured by data from recent and current orbital instrument – include surface temperature, ocean color, wind, sea level and current data. So I would like to emphasize that RS data is used to derive information about chlorophyll concentration, primary productivity by optical properties of coastal and estuary regions, ocean circulation features, ice condition. And then one more important – a long time series of oceanographic and fish population data are very important in deterw-

ment of the success of satellite oceanography applied to fishery management, so data collected in our archive may be very useful to use in fishery applications.

So now you see very short table demonstrating applications of different sensors. Active and passive macrowave to determine parameters important for fishery, such as: sea surface temperature, monitoring of pollution, ship and ship wake detection. So sometimes it is necessary to use not direct measurements, but some correlation. For example correlation between normalize radar cross-section and sea surface temperature. So we use mainly microwave data but definitely in correlation with data obtained in visible and infrared spectral bands, data, obtained with different resolution. Radar, you see here, Envisat, Radarsat, also ALOS finished normal operation. And then I would like to show you two websites – important for the users of synthetic aperture radar data. One of them – this, obtained more then 10 years ago with many good examples, demonstrating applications of SAR data. And now – operating website devoted to oil spill monitoring by RS. About 100 SAR images with annotation with much additional important information associated with oil pollution.

Now let us consider correlation between the sea surface temperature and radar backscattering. Here you see radar images and infrared images. Infrared images demonstrate the variability of sea surface temperature. There is very good correspondence between the location of radar signatures and boundaries of eddies and currents where sea surface temperature gradients are maximum. Using different software it is possible to estimate sea surface temperature gradients. Their location is important for many applications, especially for the fishery. This slide shows the change of position of sea surface temperature gradients in three days and again their high correlation with radar signatures which are clearly revealed on synthetic aperture radar image. Now I would like to show you a very good paper by Belkin and O'Reilly published in 2009 in Journal of Marine Systems devoted to algorithm description for oceanic front detection in chlorophyll and SST satellite imagery and its application. Developed algorithm allows us to compute gradient amplitude and study correlation between sea surface temperature and chlorophyll data.

Next example demonstrates correlation between visible and infrared images or that is to say between ocean color data and sea surface temperature. These Landsat images were acquired over the Taiwan Strait and it is easy to compare them. Landsat satellites collected a very good volume of data in more than 20 years and these images are very valuable source of information for fishery. Let us consider one more example demonstrating application of satellite data to fishery. Here you see synoptic scale eddies to the East from Japan in Kuroshio-Oyashio convergence zone: as they appear in fields of sea surface temperature, radar backscattering and ocean color. When we compare these images with the fishery boats reports we can make conclusion that the most intense fishery catch is near the long filaments which are reliably detected in all three images. This conclusion is a very good for application of radar imagery since the region under consideration is covered with clouds very frequently. The same is applicable for other areas.

One more example of the use of satellite data important for fishery is indication of current. Correlation of the sea surface temperature and radar backscattering can be high as it evident from the Soya Warm Current images acquired by synthetic aperture radar and TERRA/MODIS. Soya Warm Current flows along the Northeastern Hokkaido coast.

Current boundary and the area of increased bioproductivity can be delineated on SAR images, especially on full resolution images (see increased image of this small rectangle). Bright dots are the ships, and dark bands and patches are probably resulted from fishery processing. These areas are not oil spills and their dark tone is due to damping of the small scale sea surface roughness. The same features we observe on the visible image. We can compare two images but at night and under cloudiness we can detect these features using only SAR independently on sun illumination and cloudiness.

Upwelling phenomena is always important. Next slides show SAR images of the Taiwan Strait around Penghu Island and area to the North from Taiwan the area of interaction of the Kuroshio Current with shelf where there are good fishery grounds. You see a very good example of upwelling, manifesting itself on SAR images as a large dark are. Low sea surface temperature in the upwelling area increases stability the marine boundary layer of the atmosphere that in turn decreases wind tension and sea surface roughness. Upwelling near Vietnam coast also appear as dark features covering relatively small areas they are seen on full resolution SAR images. Additionally you can see on these high resolution images oil spills and surface manifestations of oceanic internal waves. There are many ships, ship wakes and oil spills on these recent (November, 2010). The last example is very large oil spill in the Timor Strait. Almost everyone knows about the Mexican Bay oil spill, but another catastrophic spill was happen in August, 2009. You see the boundary synthetic aperture radar and associated dark features on ALOS PALSAR image. PALSAR operates at wavelength of 23 cm (L-band) and thus damping of the small scale roughness is not so effective as at C-band. However L-band data can be used too. The PALSAR image was obtained at a day when the underwater hole – source of oil discharge - was closed, but there are large area covered by oil.

The location of the coastal fronts is important information for fishery. They are also influence on oil spills propagation. Intensive fishery is typical for the area to the North of Java coast. But to know where the fish is, the small scale variability associated with surface wind speed should be known. So local environmental conditions should be known including typical and exceptional situations. For example SAR image detected multiple oil spills in the Java Sea. Recently (May 7, 2010) there were many oil spills. What to do? How to estimate polluted area, how to collect oil from the sea surface? Or the origin of dark features is different? There are many coastal fronts near the China coast. Sometimes interpretation is not so easy. For example – it is surface imprints of intensive rain, so definitely it is necessary to have some experience on interpretation of synthetic aperture radar images.

Oil spills in South China Sea – you see very detailed information on this SAR image. Next image shows the sea near Kalimantan. Intensive fishery – many bright spots sand oil spills - in the Yellow Sea. Why these features are so bright? Probably they are not fishery boats, but oil platforms. They disturb air flow and change sea surface roughness, in particular, increased roughness can be seen as opposite to usual ship wakes when we observe on dark wake or some combination one dak and one or two bright features. Sometimes interpretation is very complicated, because SAR image register some superposition of atmospheric and oceanic phenomena. What is interesting: sometimes very long lines associated with ship wakes are observed with length of one

hundred kilometers and more. They are observed against the different background conditions and different background conditions are very sensitive indicator of area sea interaction.

Sea ice. The ship near the Marginal Ice Zone in the Okhotsk Sea, a very reach sea for fishery. Sometimes we observe oil spills in spite of intensive cyclone action. Next slide shows cyclonic circulation. SAR detects imprint of the sea surface wind field which correlates with cloud field. In spite of wind we can observe both ships and oil spills in this area.

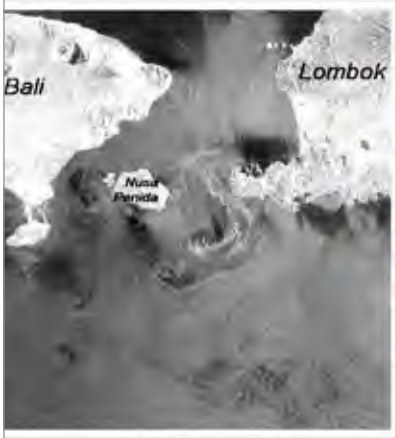
Next SAR image covers again the Yellow Sea and again there are many ships which are detected as light points and the polluted areas as dark lines and patches.

At last I would like to emphasize that knowing of environmental conditions is also very important for fishery. Storm winds are observed in tropical cyclones and around them. Recently, I participated in the Pan Ocean Remote Sensing Conference (PORSEC) in Keelung, Taiwan. At that time, super typhoon Megi displaced in the South-China Sea and Taiwan Strait. We received and processed the brightness temperatures measured by a passive microwave radiometer AMSR-E installed on Aqua satellite. Here you see fields of sea surface wind speed, total water vapor content, and total cloud liquid water content retrieved by application of our original algorithms, developed in my laboratory to the AMSR-E brightness temperatures. This typhoon was studied also with Envisat Advanced synthetic aperture radar. The central area covering the eye and eye wall is shown in insertions. Other insertion show structure of intensive precipitation, squall line and rain bands. All this information is very important for prediction of fishery conditions after the typhoon. Next slide demonstrates high correlation between SAR backscattering and scatterometer-derived wind field. Several next images I will show without comments. At last I would like to mark importance of coastal Doppler radars: they provide information about rains and wind speed. Correlation of radar reflectivity fields and AMSR-E-derived fields of geophysical parameters is very high. Combination of various satellite and ground-based data is very attractive for many applications including fishery.

Short conclusion: Joint analysis of long time series of oceanographic and fish population data is very important for fishery management. I would like to emphasize one more necessity of synergy approach based on to the usage of various satellite and ground truth data, including continuous coastal radars and video cameras observations, to get the detailed information on the oceanic and atmospheric fields. I appreciate very much support of my travel to this beautiful place by Russian Federal Space agency and ScanEx. The last slide – information on Joint training course on Remote sensing data analysis in my Institute on October 8-12, 2011. Please apply – we'll be happy to see you in Vldivostok. Now there are many constructions, including the bridges in connection with next APEC meeting will be in Vladivostok in September 2012.

Thank you very much for your attention!

1



ALOS PALSAR

Plume of the Pacific waters propagating into the Indian Ocean on PALSAR image acquired on 19 March 2007 at 02:29 UTC

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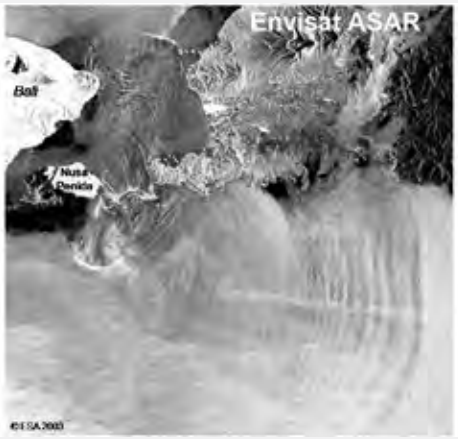

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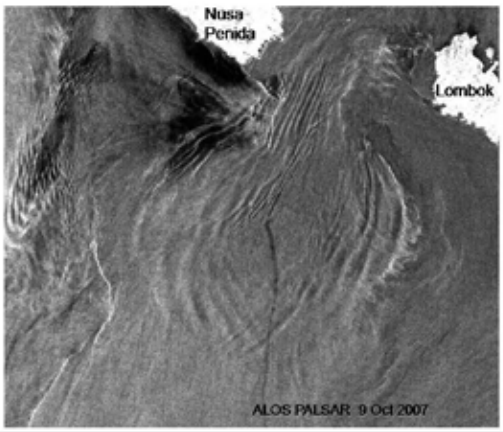

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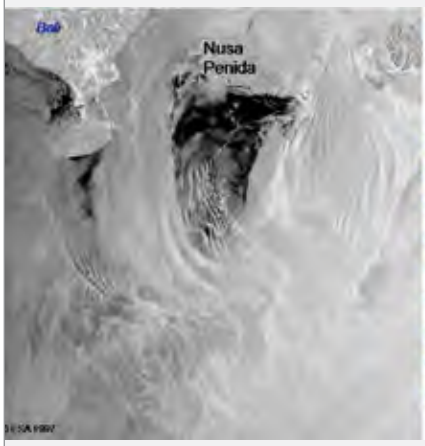


ERS-1 SAR
30 Sep 1997
02:32 UTC

Intrusion of the Pacific waters into the Indian Ocean and packets of nonlinear solitary waves, which were generated in the sill area between Nusa Penida and Lombok

5

Satellites for fisheries

Satellite observations characterize environmental factors that affect fish habitat. *Environmental parameters* that are well measured by data from recent and current orbital instruments include:
surface temperature, ocean color, wind, sea level and current data.

Advantages of satellite-based observation include not only the *ability*
- *to image large areas at once,*
- *to discreetly observe a range of scales,*
- *to repeat observations frequently,*
- *to make observations independent of weather but also to detect*
- *ship wakes, ships, oil spills and ships responsible for spills,*
- *red tides,*
- *severe weather.*

Remote sensing data are used to derive information about *chl* concentration, primary productivity, bio-optical properties of coastal and estuarine regions, ocean circulation features, ice conditions.
For instance, schools of fish commonly *correlate with nutrient-rich waters*, as well as circulation patterns such as *temperature fronts.*

6

Satellites for fisheries

Application of remote sensing to fisheries requires previous knowledge of oceanography of the area, habitat preferences of the fish, biological quality of the waters, behavior of a given species at various temperatures, and catch rates occurring under those conditions. *The effects of the environment on any given species are location- and season-specific.*
A long time series of oceanographic and fish population data are then very important in determining the success of satellite oceanography applied to fishery management.

7

Fisheries Applications. Microwave sensors and MODIS

Application	Sensor				
	MODIS MERIS	Envisat ASAR RadarSAT	SeaWinds ASCAT	AMSR AMSR-E	SSM/I AMSU
Measuring of SST	+	*correlation NRCS-SST*	+	+	
Mapping oceanic wind patterns		Gradients, mesoscale		+	+
Observing eddies, upwelling, currents, int. waves, river plumes	+	+			
Improving bathymetry		+			
Identifying chlorophyll and phytoplankton	+	*Correlation NRCS-fields*			
Monitoring pollution	+	+			
Improving weather and storm prediction	+	+	+	+	+
Ship and ship wake detection		+			

8

SARs, microwave radiometer and scatterometers

Visible and IR images (Terra and Aqua MODIS, NOAA AVHRR, Landsat ETM+), wind fields (QuikSCAT, WindSat), microwave brightness temperatures and products (Aqua AMSR-E), surface analysis maps, bathymetry maps, etc.

9

Active and passive microwaves

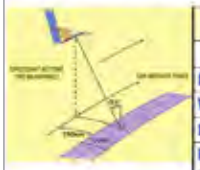
The *oceanic dynamic features* (warm and cold currents, eddies and upwelling zones, narrow streamers, internal waves, river plumes, etc.) as well as the imprints of the *atmospheric phenomena* of various scales (tropical and extratropical cyclones, convective vortices, mesoscale convective rolls and cells, etc.) were revealed on high-resolution Synthetic Aperture Radar (SAR) images of the APEC area. The images were obtained in 1991-2011 from the ERS-1/2 and Envisat for several joint projects POI with the ESA and from ALOS for two joint projects with JAXA.

Interpretation of SAR signatures was supported by supplementary remote and ground-truth observations including ship data.

Quantitative characteristics of the *weather systems* were derived from Aqua AMSR-E microwave measurements using the advanced algorithms. Brightness temperatures were provided in the frames of Agreement with the JAXA.

10

Sensor characteristics



Satellite	ERS-1/2	Envisat	ALOS
SENSOR	SAR	SAR	PALSAR
Frequency, GHz	5.3	5.3	1.27
Wavelength, cm	5.6	5.6	23.6
Polarization	VV	VV, HH	VV, HH
Incidence angle, deg	20-26	15-45 (variable)	8-60 (variable)
Swath width, km	100	100-405	20-350
Ground resolution, m	25 x 25	25 x 25 150x150	7-100

European Remote Sensing Satellite ERS-1 was launched on 17 July 1991, ERS-2 - on 21 April 1995, Envisat - on 1 March 2002, and ALOS – on 26 January 2006

11

The tropical and subtropical ocean viewed by ERS SAR*

Werner Alpers[1], Leonid Mitnik[2], Lim Hock[3], and Kun Shan Chen[4]

1 Institute of Oceanography, University of Hamburg, Hamburg, Germany
2 V.I. Bulov Pacific Oceanological Institute, Far Eastern Branch, Russian Academy of Sciences, Vladivostok, Russia
3 Center for Remote Imaging forRemote Imaging, Sensing and Processing, National University of Singapore, Singapore
4 Center for Space and Remote Sensing Research, National Central University, Taiwan

Contents: Background, Introduction, ERS SAR Oceanic phenomena Atmospheric phenomena

* http://earth.esa.int/ers/instruments/sar/applications/ERS-SARtropical/

Oil spill monitoring by remote sensing
http://cearac.poi.dvo.ru

Background, research, database, services, links. Annotated SAR images, supplementary data

UNEP. Clean seas. NOWPAP region (Japan, Yellow Sea, Northern East-China Sea)

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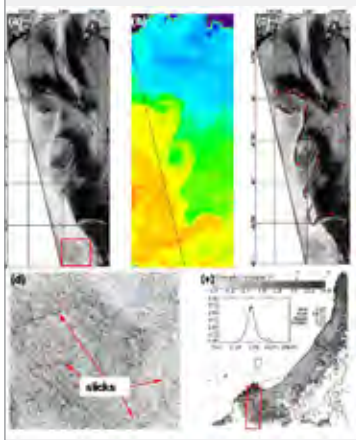

SST
The Japan Sea
(south of *Vladivostok*).
13 November 2003

Eddy-like variability in the area dividing warm and cold waters in (a) Envisat ASAR image at 12:53 UTC and in (b) NOAA AVHRR IR image at 07:55 UTC. (c) ASAR image with superimposed SST gradients. (d) Slicks in the area of cellular convection marked by a red rectangle in (a). (e) map of chl-*a* concentration for 10-17 November 2003.

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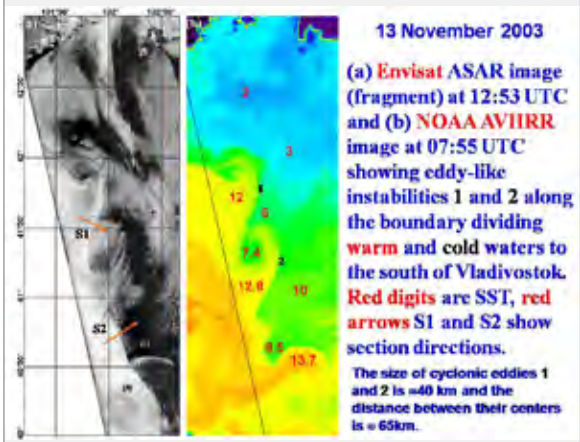

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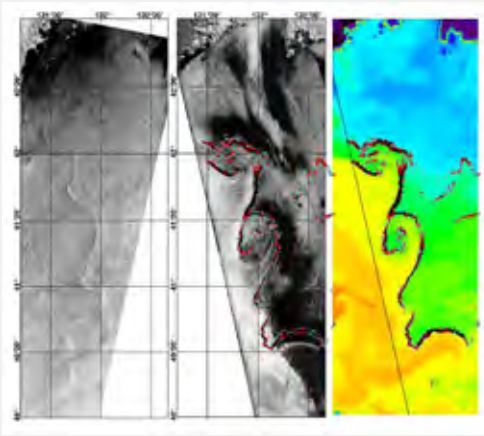

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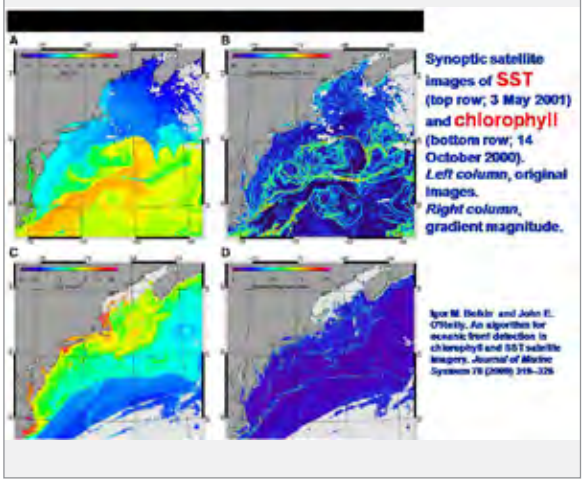

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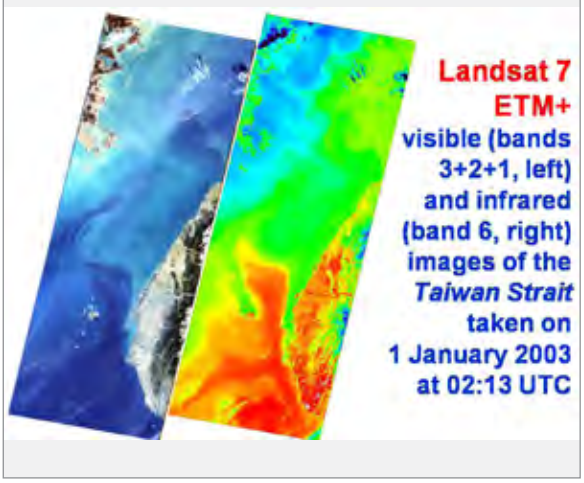

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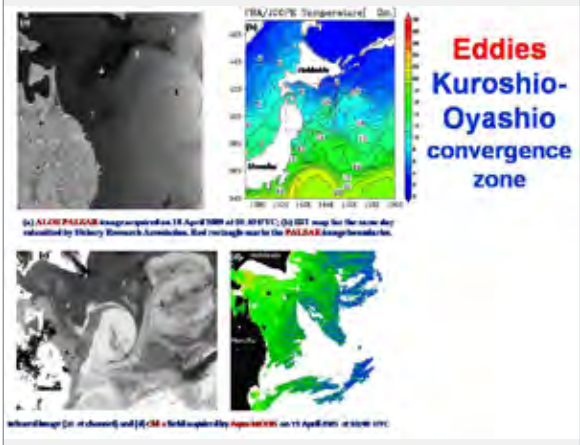

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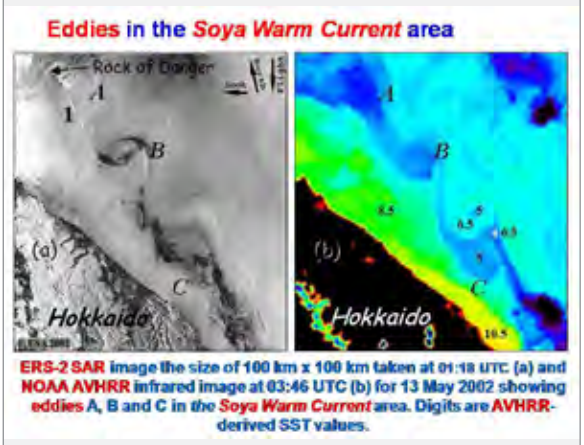

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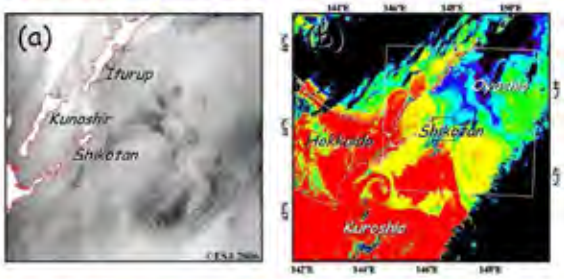
Eddies. Oyashio-Kuroshio frontal zone



Envisat ASAR image (a) and Terra MODIS thermal image (b) east of *Hokkaido* and *Kuril Islands*, taken on 24 September 2006 at 00:20 UTC. The white square in (b) shows the boundaries of the image in (a).

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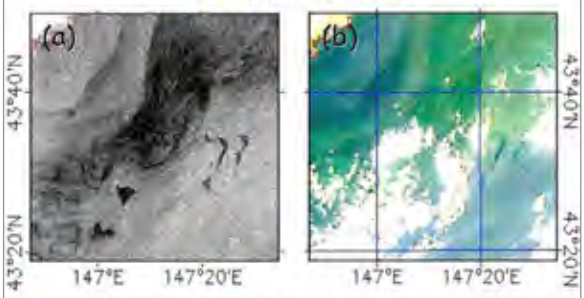
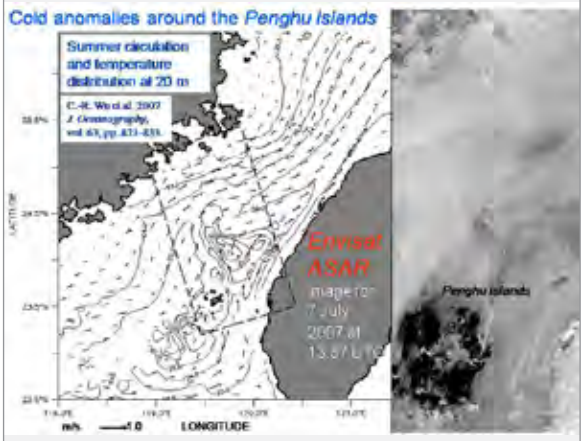
Area of Pacific saury *commercial fishing* 24 September 2006



Envisat ASAR image (a) and an Aqua MODIS visible image (b), taken at 00:20 UTC. Boundaries of the images are shown in previous slide. The white area in upper left is *Shikotan Island*.

21

Cold anomalies around the *Penghu Islands*



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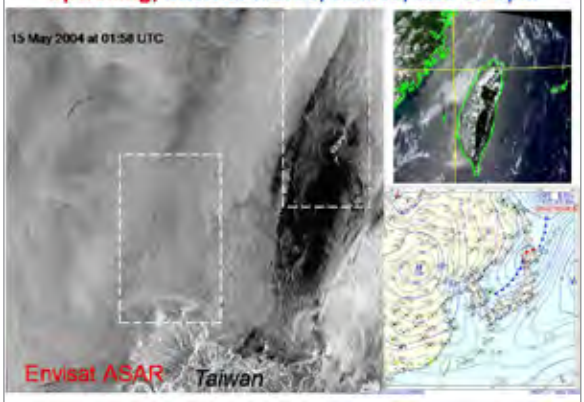
Upwelling, internal waves, eddies, and oil spill



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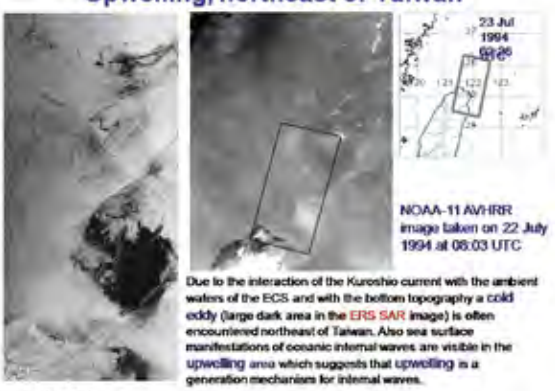
Upwelling, northeast of Taiwan



Due to the interaction of the Kuroshio current with the ambient waters of the ECS and with the bottom topography a cold eddy (large dark area in the ERS SAR image) is often encountered northeast of Taiwan. Also sea surface manifestations of oceanic internal waves are visible in the upwelling area which suggests that upwelling is a generation mechanism for internal waves.

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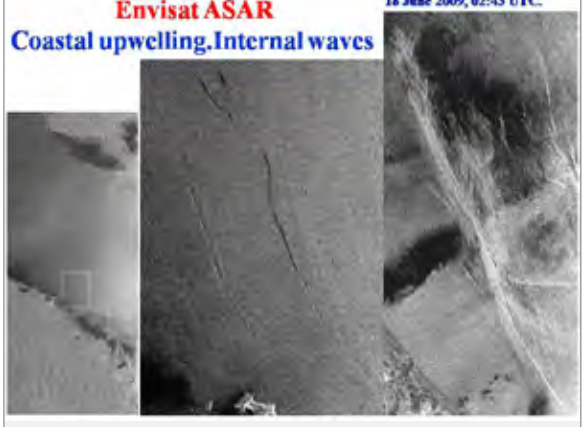
Envisat ASAR Coastal upwelling. Internal waves



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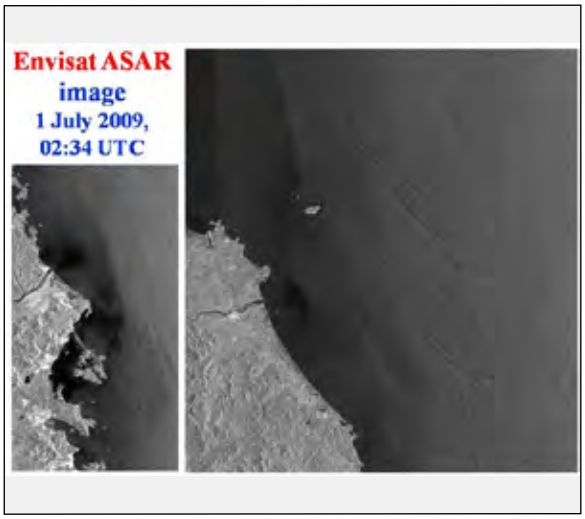

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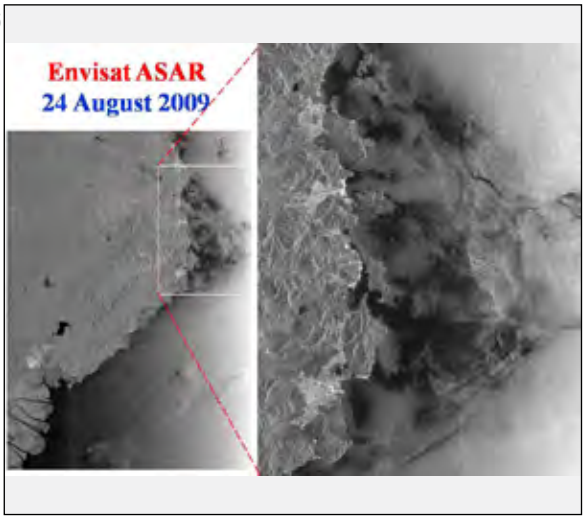

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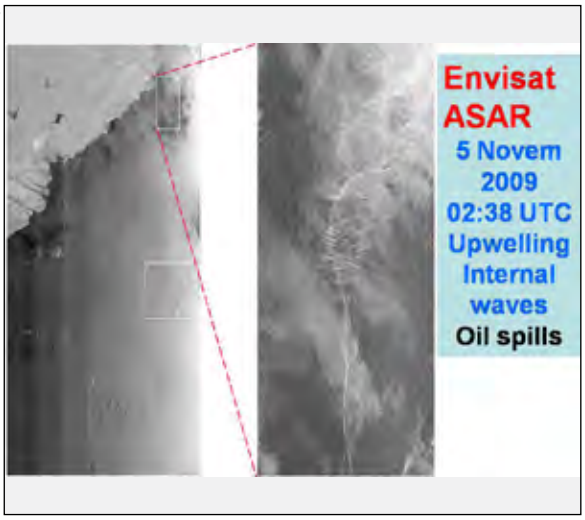

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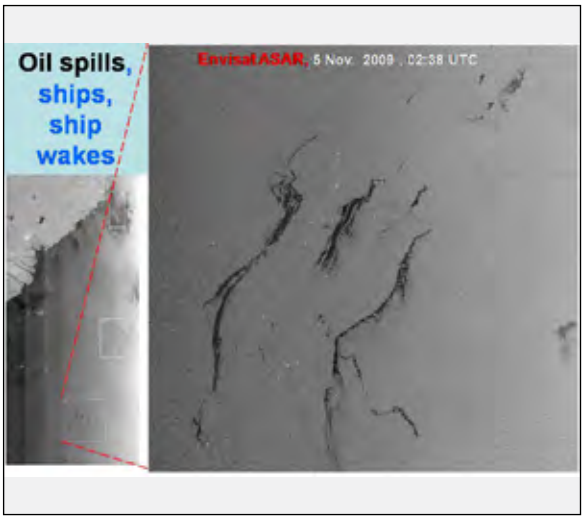

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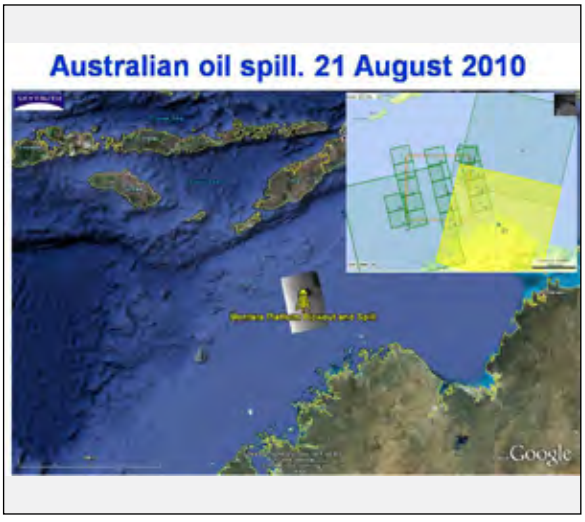

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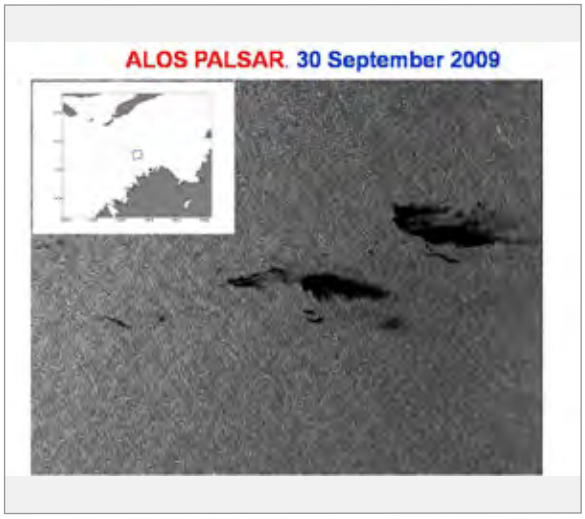

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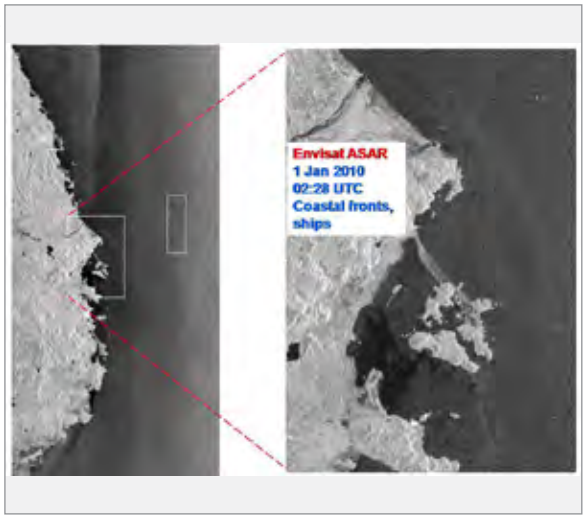

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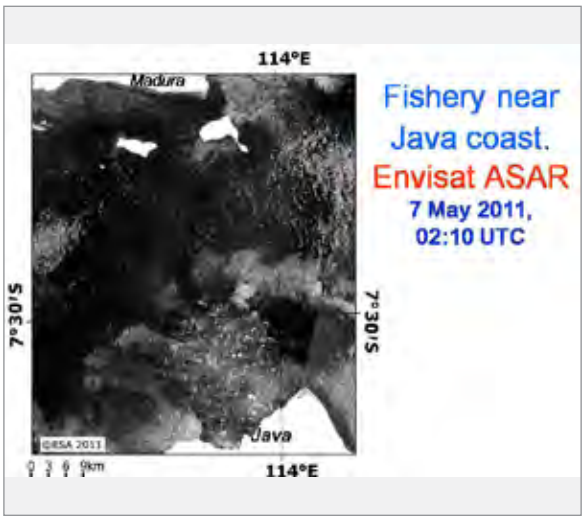

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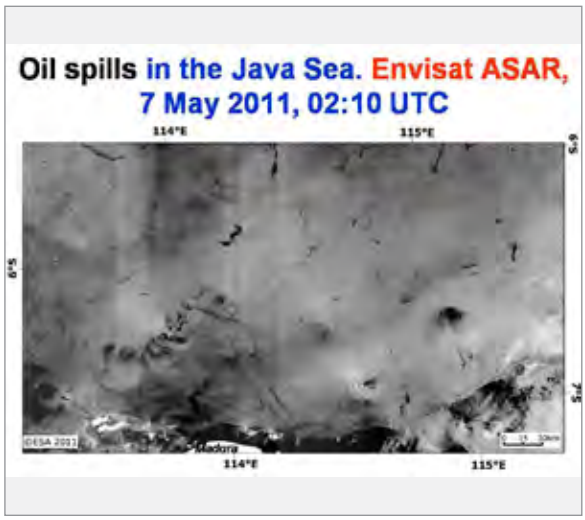

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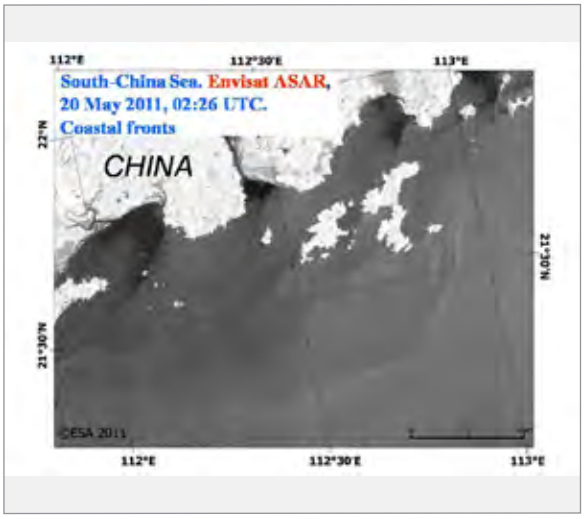

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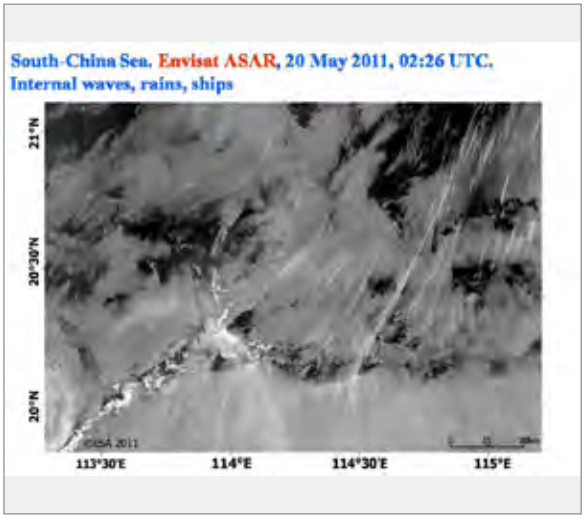

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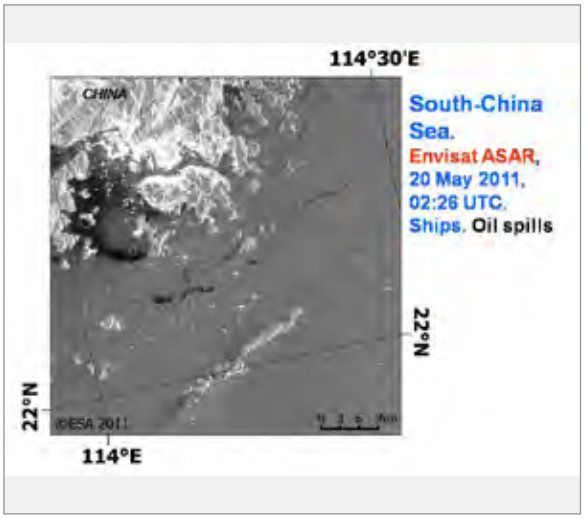

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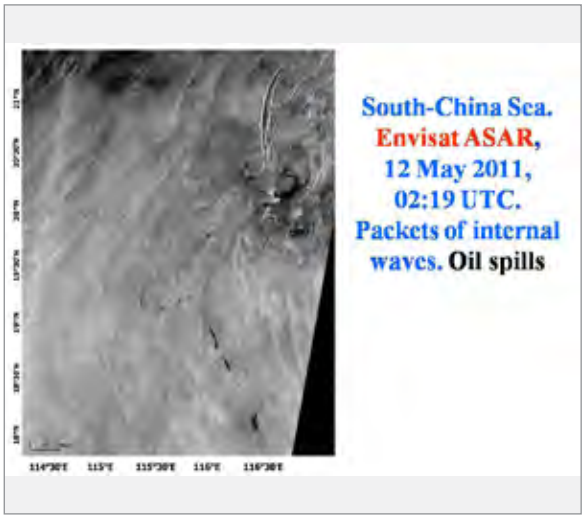

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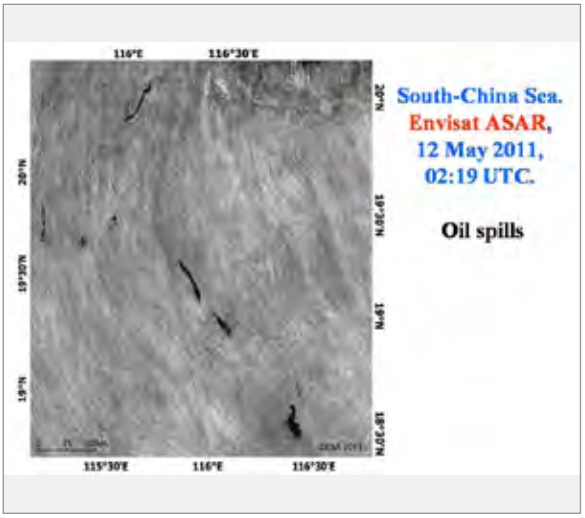

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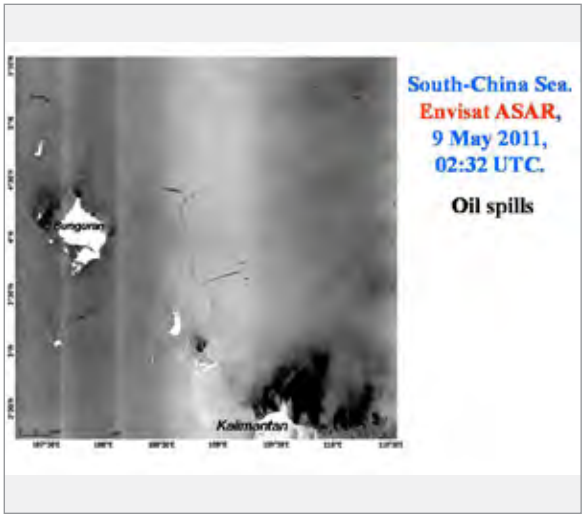

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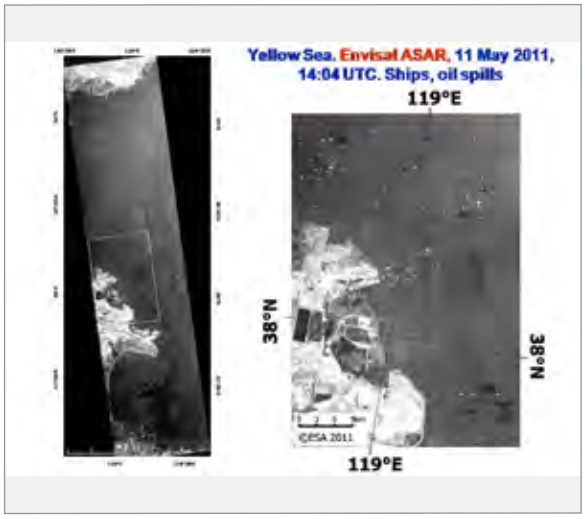

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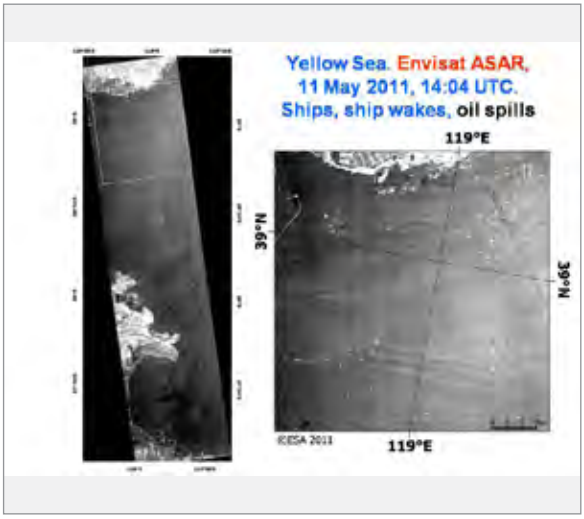

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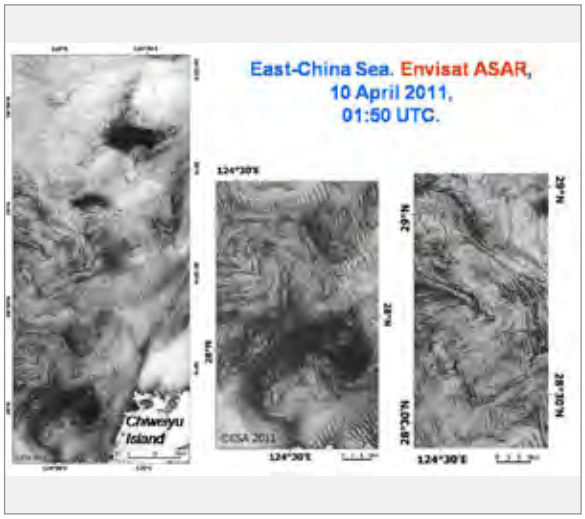

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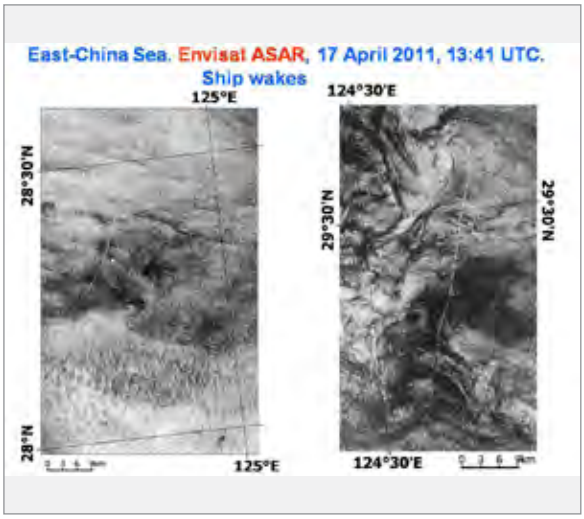

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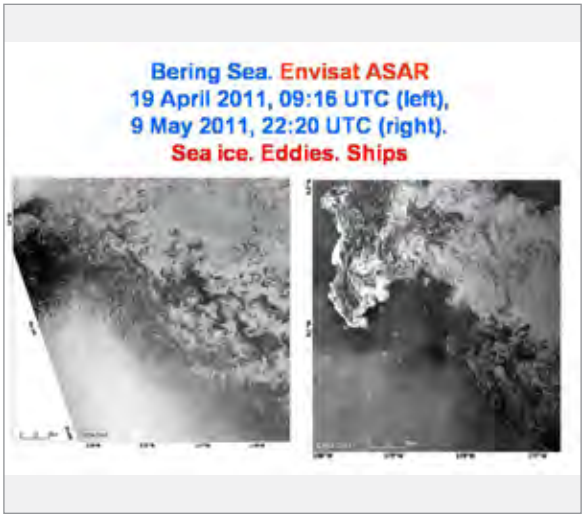

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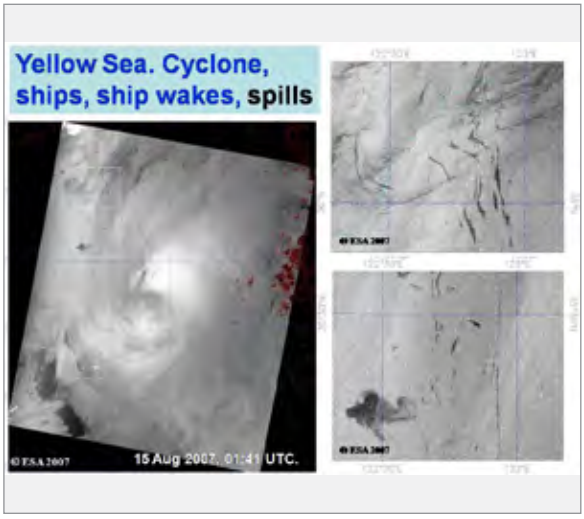

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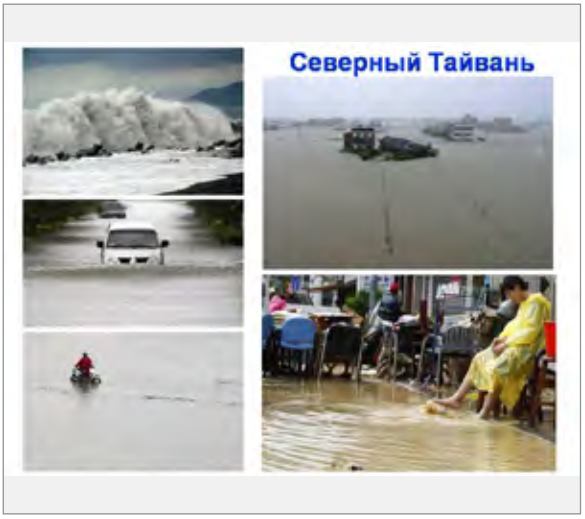

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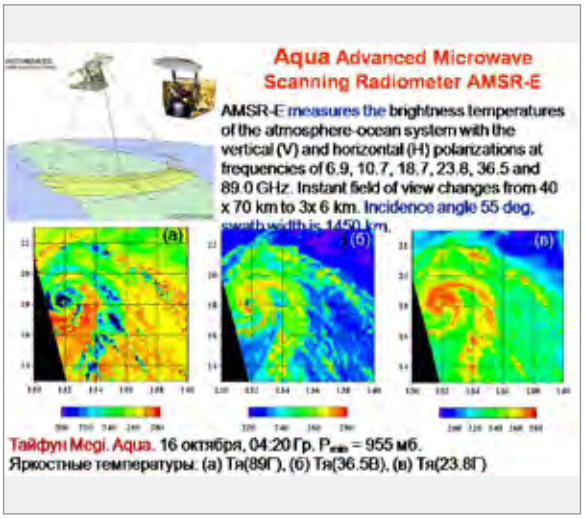

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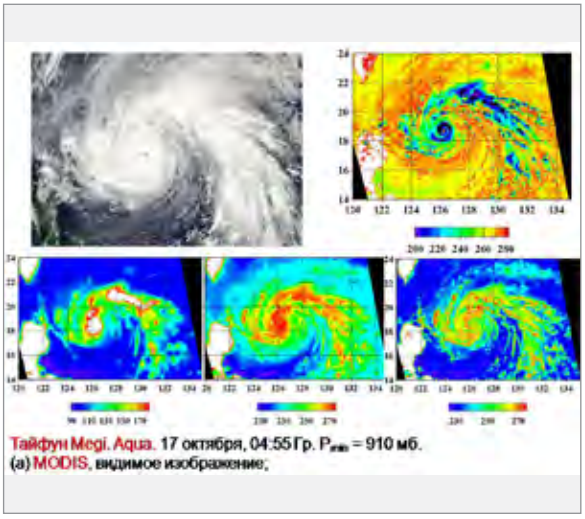

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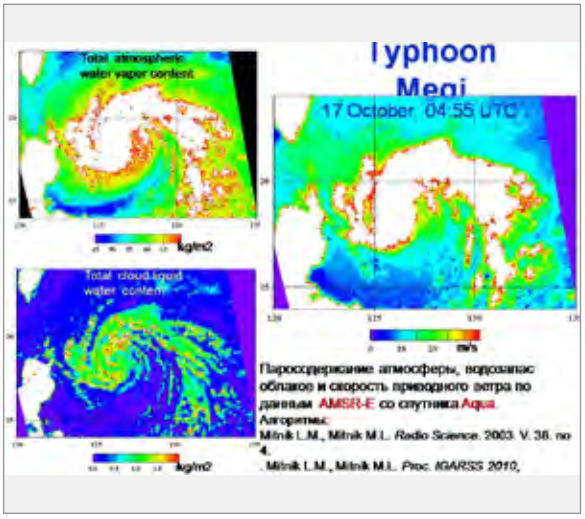

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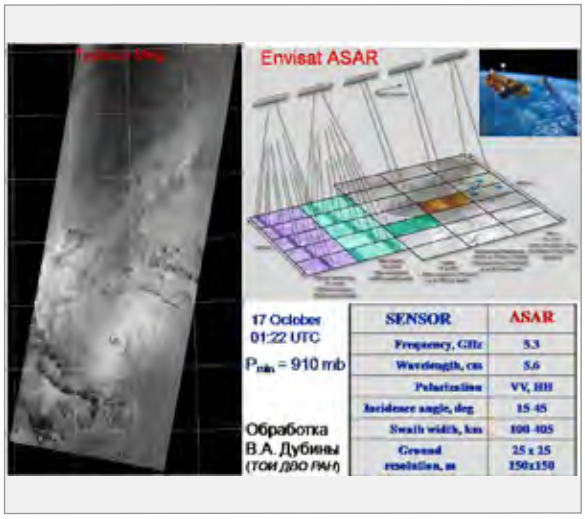

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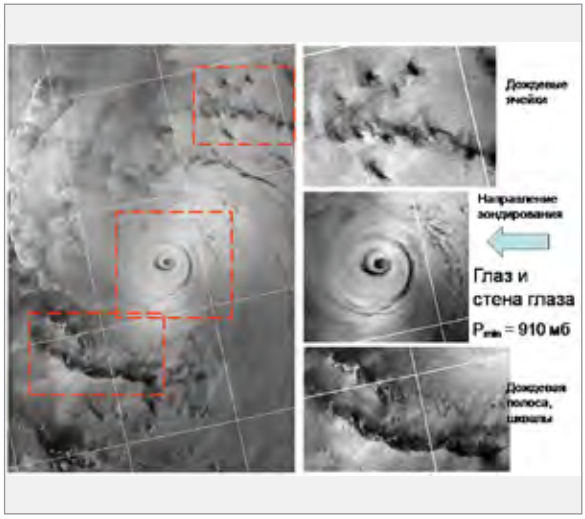

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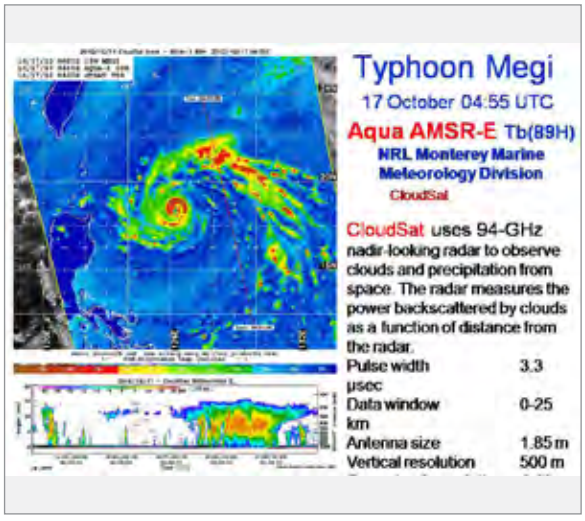

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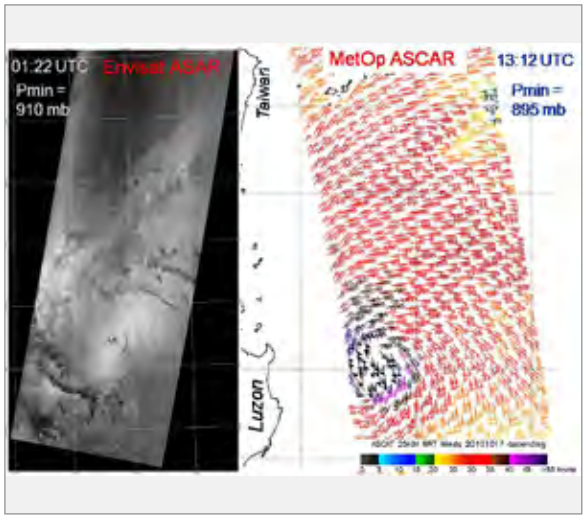

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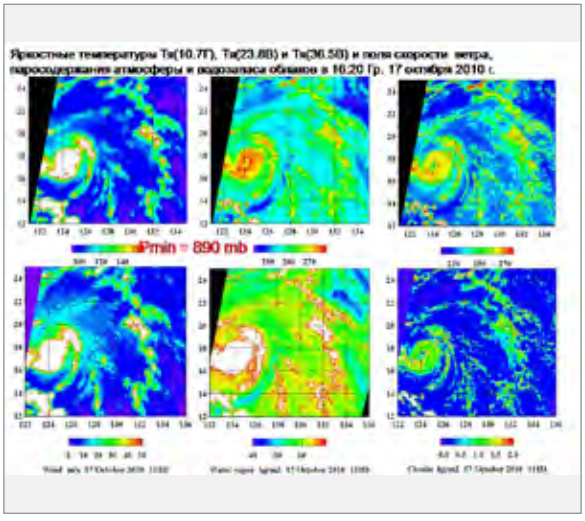

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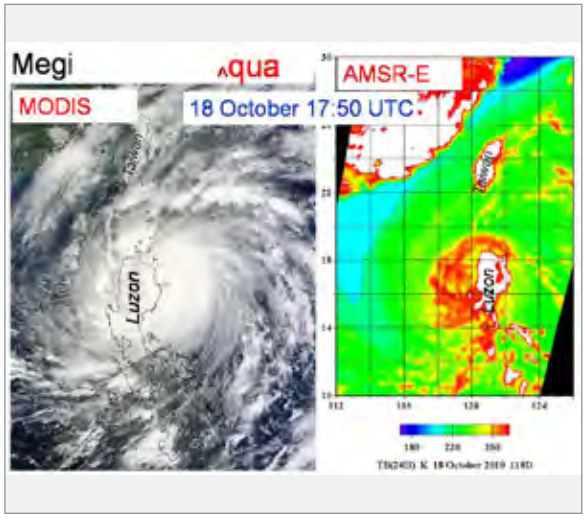

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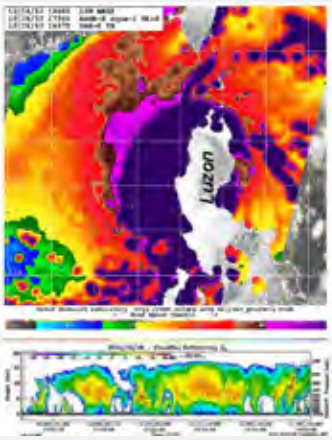

Aqua AMSR-E

18 October 2010, 17:50 UTC. Wind

CloudSat's image of Megi shows *clouds higher than 15 km. The blue areas along the top of the clouds indicate cloud ice. The wavy blue lines on the bottom center indicate intense rainfall. Where the solid line along the bottom disappears there is intense rainfall*

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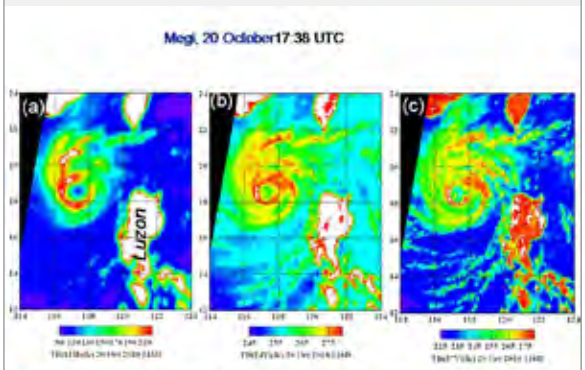

Aqua AMSR-E brightness temperatures measured at: (a) 10.7 GHz, H-pol; (b) 23.8 GHz, V-pol and (c) 36.5 GHz, V-

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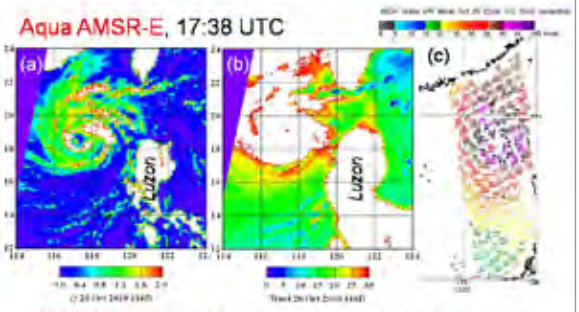
Megi, 20 October



AMSR-E-derived total cloud liquid water content (a) and wind speed (b) and ASCAT-derived wind speed

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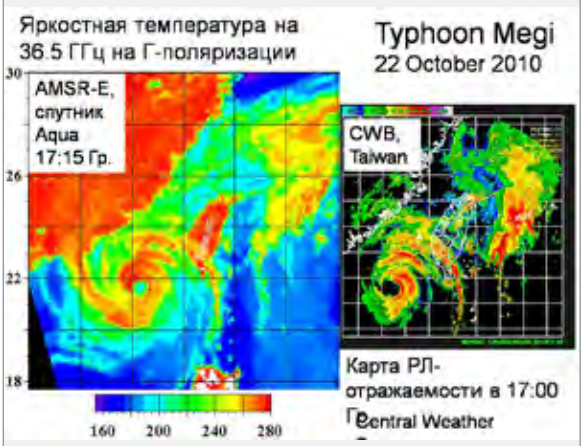

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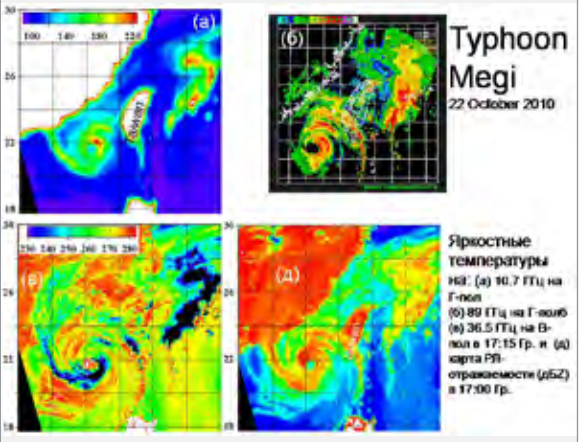

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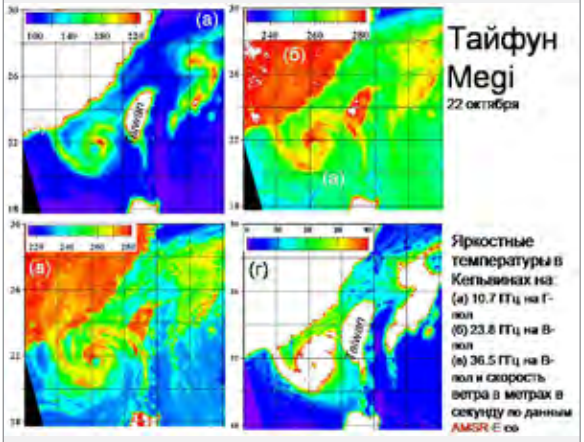

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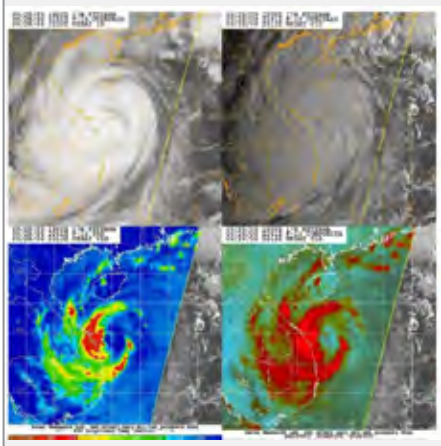

Typhoon Ketsana 28 Sep 2009. Naval Research Lab composite. MTSAT, vis, IR, F15 DMSP

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Conclusions

A long time series of oceanographic and fish population data are very important in determining the success of satellite oceanography applied to fishery management.
Synergy. Sensors, swath width, resolution, ground truth including continuous coastal observations by radars and video cameras

Acknowledgements
Author thanks the Russian Federation Space Agency and ScanEx R&D for the invitation and travel support, the ESA and JAXA for providing satellite data and colleagues of Satellite Oceanography Laboratory, POI FEB RAS

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Joint Training Course on Remote Sensing Data Analysis

October 8-12, 2011,
V.I. Il'ichev Pacific Oceanological Institute, Vladivostok, Russia
http://ocearac.nowpap.org/monitoring/3rdRST/1st_Announcement.html

Deadline for application 15 July

The course will consist of lectures by specialists and hands-on practical sessions on the process and analysis of ocean remote sensing data. Topics will cover remote sensing of eutrophicaion, red tides, oil spills and coastal habitats.

Integrated Operational Satellite Solutions for Sustainable Ocean resources

Dr. Philippe Courrouyan, President, Pt CLS Indonesia

CLS is a subsidiary of the French Space Agency and I wanted to thank my Russian Colleagues to invite me to this presentation and to celebrate the long lasting cooperation between French and Russian Space organizations. So this presentation is about Integrated Operational Satellite Solutions. As you can see my Russian colleagues have shown an amazing area of satellite system existing. All the systems are working pretty well. And when we talk about sustainable ocean resources, I don't talk here only about sustainable fishery, what we have to address — is amazing quantity of available information: from fishing vessels, from the ocean, and any other source. So we've been thinking and working a lot, and I would like to show you couple of ideas we've developed in this field and couple of operations and systems we've implemented.

So when we talk about sustainable marine resources first you have to look at what exists. And if you want to have sustainable resources, first you have to realize that in the Pacific Region there is what we call VMS which is Vessel Monitoring System, which basically controls the activity of fishing vessels. So the first thing to do is to address this, to realize the catch of it. The second thing — is to fight against IUU and this is the big work — to describe the illegal activities. And second point – is to monitor the evolution of ocean resources and finally — to integrate all these into Integrated Centralized Multi Mission National System. As you could see everybody is doing something here and then, so the foots in all directions and what seems very important to us is that when we talk about regressing ocean problems and fishing problems, this kind of information must be synchronized, and this kind of information must be distributed and operated by the right people. So first of all when we look at what our dear fishermen are doing at sea, what does exist? So in the region, I am not talking about the rest of Pacific, because we are here, in Indonesia, it is the area where I work the most, well what you realize – since 2003 in Indonesia were about 3 000 fishing vessels which are tracked, monitored. So basically every hour we have a position of these vessels and we know exactly what they are doing. In 2008 the same system was implemented in the Philippines. And about 18 vessels equipped in the Philippines. In 2010 we've done the same in Vietnam. So basically we have 3 big fishing coastal states which monitor the fleet. The biggest problem in the region is pirates, that of course have a lot of vessels, but we do not monitor them. However entire vessels are coming to Indonesia they have to be tracked by this system. So the

first thing is in order to monitor the ocean you have first of all to monitor fishing vessels, so this is done through this. The problem now is that many of these vessels are fishing illegally, and in the region 50 % of fishery revenue is done by illegal vessels. So this is totally out of picture. And basically it is really nice to have control systems to fisheries policies if on the other hand you have fishermen doing whatever they want. So the old story — how can we cope with this and how can we fight it. To fight against IUUV is not a new story, and it is systems are being implemented to do, and the best way to fight against IUUV, is first to integrate monitoring with legal vessels and then to monitor the whole vessels. In order to do so we use of course Synthetic aperture radar satellite systems and indeed what is really important to fight against IUUV is idea of the real time. It means — if you want to fight IUUV you need to have data ASAP. If it takes two days to get the data — all the guys are gone. So forget about it. So if to take the example of Bali — if you put an antenna to Bali — this is the coverage you could reach – which would cover if we talk about Indonesia a huge part of Indonesia and Philippine waters. So what does it mean — this concrete solution, we installed systems like this in the Indian Ocean, we have installed system like that in Australia, and it works well. If somebody says that ICLR doesn't work — it has no sense. Basically what you do? You program a satellite, you process data, and you compare VMS data and radar data. And the end of the day you send it to enforcement units — as you see a typical case of the arrest of illegal vessel arrested by the Navy and since we can free one coming from is not rich we can turn this illegal vessel into a patrol vessel — is also a good way to monitor of the fishing vessels. So as far as SAR for IUUV actually is concerned it is really a great tool. The only thing is if we could have in the region tropical orbiting radar satellite, it would be a real plus, because we could have more passes and more information.

The other advantage of SAR is to give you information about pollution: here is an example of typical oil spill measured there, when you cross this information with IRS information or VMS information you can automatically identify the vessel that is coming to this. So once again here when you couple SAR information with tracking information (IRS, NRIT, VMS___) you are able to have operational solution and answers to questions which when you don't have this are totally unanswered. So once again: this is operational, working well. Last but not least – controlling fishing vessels is one thing; the other thing is to know about sustainable resources. So basically we are talking here about the evolution and forecast of the ocean resources. So what it means. You saw very interesting presentation before mine about the quantity of information we can get from all satellite systems in terms of temperature, currents, chlorophyll, and salinity and so on. All this information when you mix them with migration of fish population gives you the capacity to monitor the health of your resources and then to elaborate policies to have better sustainable resources. So here the mixing of this different technology and different information compare to the biggest predator of this population which are fishing vessels give you a good idea of the fishing effort and gives you an idea of evolution of your stocks. Well, basically we've developed models about the behavior of fish in order to better know the evolution of the stock. Some models were used by

South Pacific commission on the population of skipjack tuna in the region of Papua New Guinea, Java about the evolution during '99–'00 between El Nino and La Nina year. In terms of pollution as well, the impact of pollution towards fishing population is pretty heavy. This is the example with BP oil spill. And what I want to show is that all this technology exists, all models exist. The only problem when you address the fishing resources is, especially when you work in the Pacific area, is that these systems have to be operated in each poll of this region, so it means that it is no sense to imagine that if you don't have infrastructure you can run such system, because what you need in every country or region to have satellite plus in–situ data based and served and also to develop the possibility. Most of the mathematic models about circulation and so on fish stock assistant developed in France, Russia, the US, however this kind of model have to be transformed to region models by local engineers, and this is the only way to have operational system working in around the Pacific. So when we talk about stock assessment compared to fishing effort it takes years to truly use the system, to give politicians tools to take intelligent decision based on scientific data, but this has to be made operational, has to be centralized, has to be done in the operational way. And indeed — from the moment when we gather all this information and you are able to produce data for ____ protection, you are able to produce data for coastal area management, when you can improve the quality and define better area and implement algae, fish or ship funds, in order to bring the countries around Pacific the necessary protein they are requiring and this is really the biggest challenge for the years to come. When you look what is going on around the Pacific I really do think that the main word when you look at all the techniques developed by Russia, the US, all the countries — these techniques — are space techniques really have to be made available to the countries that are coastal to the Pacific and that are relying a lot on the Pacific resources. I really encourage you to create Units or Working Groups where this kind of technology can be transformed to all the countries around the Pacific in order to manage the resources of the Pacific in a better way. Thank you for your attention!

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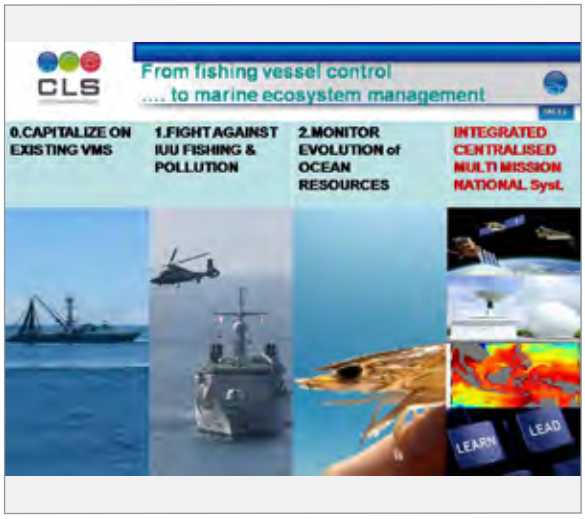

From fishing vessel control
.... to marine ecosystem management
0.CAPITALIZE ON EXISTING VMS
1.FIGHT AGAINST IUU FISHING & POLLUTION
2.MONITOR EVOLUTION of OCEAN RESOURCES
INTEGRATED CENTRALISED MULTI MISSION NATIONAL Syst.
LEARN
LEAD

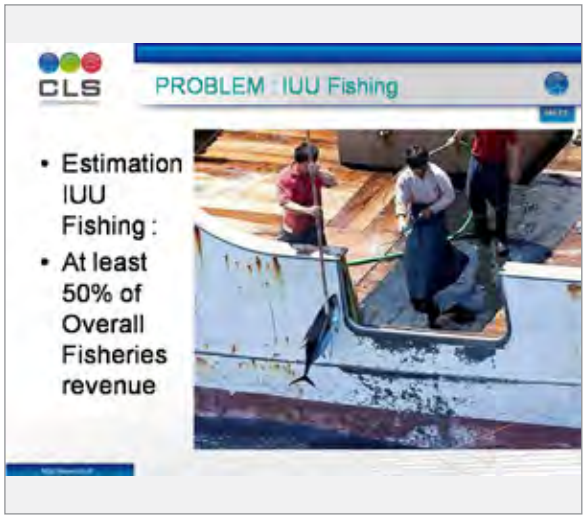
2


STEP 0: CAPITILIZE ON THE EXISTING VMS

3


Step 0. Ongoing since ...2003
2003: Indonesian VMS : largest in the world 3000+vessels tracked
2008 : Philippines
2010: Vietnam..
CLS GROUP

4


PROBLEM : IUU Fishing
Estimation IUU Fishing :
At least 50% of Overall Fisheries revenue

5


STEP 1.FIGHT AGAINST IUUV

6


STEP 1 : Real Time Data against IUUV

7


CLS
STEP 1.Proven Operational System
AGAINST IUUV
2. Processing
3. Analysis Interpretation
1. Programming Acquisition
4. Interception

8


CLS
STEP 1.Proven Operational System
AGAINST POLLUTION

9


CLS
STEP 2 .MONITOR & FORECAST
EVOLUTION of OCEAN RESOURCES

10


CLS
STEP 2: Know Today, better live tomorrow; the Ecosystemic approach
Know Today :
-Ocean condition
-Marine Ecosystems
Follow & Plan:
-Monitor & assess the "health "of resources
-Elaborate Policies for better use of resources
-Develop control of marine activities
Better Live Tomorrow:
-Sustainable mgt of marine resources
Oceanic and climatic conditions
Reproduction
Migration
POPULATION
Natural mortality
Fisheries (legal & illegal)

11


CLS
Step2 . From Physics to upper trophic levels
SEAPODYM
Predator's population dynamics model
Prey model
3-D models
Ocean Biogeochemistry
Primary Production from satellites
Ocean Physics
3-D models

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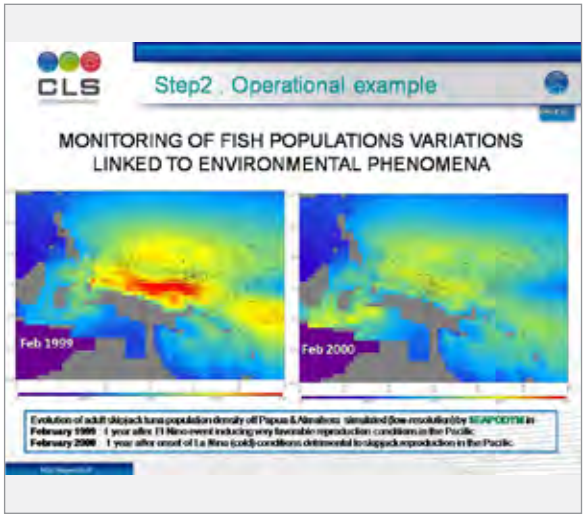
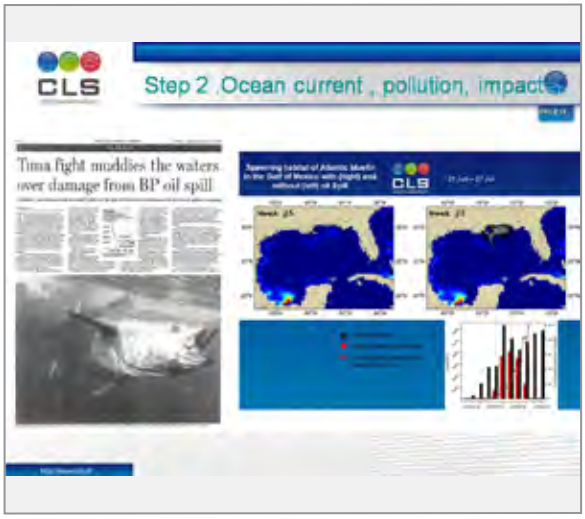

CLS
Step2 . Operational example
MONITORING OF FISH POPULATIONS VARIATIONS LINKED TO ENVIRONMENTAL PHENOMENA
Feb 1999
Feb 2000

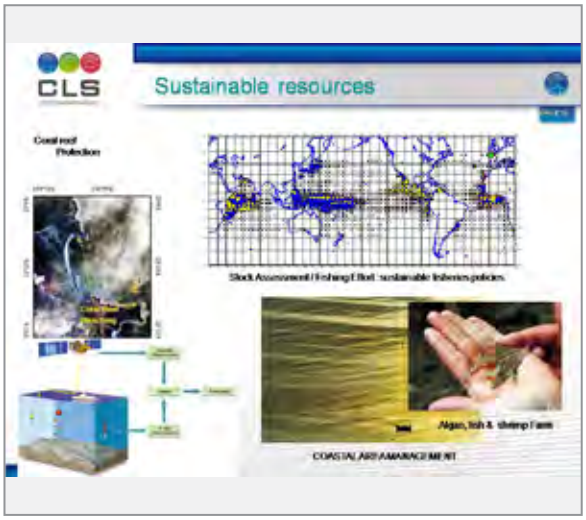
13


CLS
Step 2 :Ocean current , pollution, impact
Tuna fight muddies the waters over damage from BP oil spill

14


CLS
General Architecture
INFRASTRUCTURE DEPLOYMENT
SATELLITE & IN SITU DATA BASE
CAPACITY BUILDING
OPERATIONS: SUSTAINABLE OF MANAGEMENT OF MARINE RESOURCES

15


CLS
Sustainable resources
Coral reef Protection
COASTAL ARTAMANAGEMENT

Sustaining Russian fisheries in the western part of the Bering and Barents Seas Ecoregions: problems & prospective

Dr. Konstantin Zgurovsky, Marine Programme Coordinator, WWF–Russia

I decided to change a little bit my topic and concentrate your attention to the Pacific coast, including Barents Sea issue, Barents Sea area because nobody here live in this region. But believe me all problems and all solutions which we apply for the Pacific area are similar to the situation in the Barents Sea. So I am talking here only about fishery in Russian zone and North–West Pacific. You see here some figures for this situation and for 2012 and you can see that the total catch is growing and total allowable catch for the future is growing as well. And even now we are ahead of previous years. You could see here some figures of total allowable catch for 2012 and main targets of our fishery in the Russian Seas — Alaska Pollack (don't be confused by the name — it is Russian Alaska Pollack, not just in Alaska), Pacific Herring, Pacific Cod, Squid, Salmon and Greenling. There are some figures on Russian export and main portion of it is frozen fish, Alaska Pollack and Salmon caviar, plus a little bit of fillet, crustaceons and fish meal. Main countries who buy Russian fish are: China — 35%, Korea — 25%, Japan — about 10%, Germany — about 10%, Ukraine also, but it is in the European part.

You can see here current system of fishery management. I don't want to give you a lot of details. There are three Agencies: Federal Fishery Agency, Ministry of Natural Resources, who is responsible for the environmental assessment, and I will talk about it a little bit later, and Federal Security Service of Coast Guard.

Here is a picture of how total allowable catch is worked out and approved. So in general it is produced by regional fishery institutes, where Dr. Nasarov and myself used to work and there is a central institute in Moscow, after approval of this system, it is going to be approved by the Ministry of Ecology and Natural Resources, there is a state environmental export panel, and after approval it is going back to fishery agency. So Dr. Nazarov said about some positive trends in our development and I maybe should add smth to it. But in general I'll concentrate mainly on problems and solutions.

So Russia signed IUU agreements with different countries (prevention of illegal unreported unregulated catch) and poaching level decreased for cod for sure in the Barents Sea and for Pollack in the Pacific Area. And two fisheries: cod and haddock in the Barents Sea and one

fishery in the Far East — Salmon near Kuril Island are MSC certified and huge Association of Alaska Pollack catchers is under the process of MSC assessment (Marine Stewardship Council). So problems are pretty common for all fisheries. It is poaching, discard, by—catch, gaps in VMS, absence of independent observers on board, absence of electronic scales, of electronic log books. The Federal Agency is working now on introduction of electronic log books, so it still in progress. Main problems are — lack cooperation I should mention — between law enforcement agencies and no traceability system "from boat to throat". Recently I made the presentation on necessity of introduction of traceability system during a meeting of the Advisory Board under the Fishery Agency and got approval that we need this system badly. So since the monitoring is not so strong the data for catch per unit and total catch data is not as good as it could be and also the problem is that we have some lack of the market incentive for sustainable usage of living resources. In many cases it is destruction of habitats by gears and also I mentioned environmental impact assessment. It includes only assessment of TAC (total allowable catch) and doesn't include ecosystem impact, for example harm of big scale at sea driftnet salmon fishery in Russian EEZ.

So the most valuable fishing targets are the main targets of poaching. It is crab, salmon, shrimps, Alaska pollack, etc. And according to the Russian coastguard data main value of poached products is in the Far East, about 2,4–4 billion a year. And for example, the real catch of the Kamchatka King Crab near Western Kamchatka is three times more than official data. And as some scientists say the discard of Alaska Pollack is at least 20% of the total allowable catch. There is one example of some of the fishing incorrect data about Sockeye Salmon — one of the most important species on the Japanese market from the Russian EEZ and you could see some figures of Japanese import and real catch and for several years import is much higher than the catch. And we also talk to our Japanese partners about the improvement of this system and as I mentioned Russia signed an agreement on IUU with Korea and we are in the process of signing the agreement with Japan, so we believe it could be improved drastically in the future. But there still problems with certificates of origin and inspection of documents and products itself — I'll talk about it later. So what are the economical reasons for illegal fisheries? It is high demand for wild fish, especially last years, and very effective buyers' chains developed by the Asian market which is increasing, heating the market, high level of unemployment between the near shore fishermen. Let's take a salmon poaching in Kamchatka and Sakhalin for example. We published a book on the overcapacity and low efficiency of the Russian fleet in the Barents Sea and we show that this is one of the main reasons for poaching because fishermen should fish more to cover the growing expenses, increasing cost of the fuel and inflation, and this is why renovation of fleet is also an environmental issue. And I also mentioned before weak economic incentives for responsible fishery. So other reasons — fiscal policy and legislation does not match to the seasonal nature of fishery, some bureaucratization of landing procedure despise effects, there are some improvement already, regularity of the Russian funding for regular service research and

as I mentioned before, an inter-department cooperation is not so efficient. And as I said before traceability system is required and there is no precise mechanism for the whole Russian System of traceability of products — there are loses of information between the chains of custody and absence of unique identification code, barcode and possibility of mixture of different shipment of fish.

So what are the solutions?

We think that recently it was development of effective North-Pacific Regional Fishery Management organization and it should be based on ecosystem approach and developing of assessment and management tools, like fishery management plan/fishery improvement plan, comprehensive observers system and VMS system and we are here to talk about it. And also increasing level of cooperation between authorities, tracking IUU vessels and chain of custody in particular by satellite systems.

So what also is necessary to do — is to gather the statistics data better through the international networks, we have the TRAFFIC organization in our WWF family, which is working on illegal catch. We work with legislators, and regulatory agencies, and just ordinary inspectors to educate them, especially in Kamchatka you could see discarded salmon after poachers stripped fish and take caviar. And also we try to involve fishermen and local communities and management. We help creating public councils, advisory councils, and river basin councils, and we believe it is necessary to support specific legislative initiatives of local communities, fishermen and associations. And we are in tight cooperation with big and small associations of Russian fishermen. And I think it is much better when fishermen have long term interest in conserving fishery grounds, fish stocks, and also we believe that the FAO Code of Conduct should be a basis for all our activities and we plan to publish some comments on it to update it. And I talk about different enforcements in management agencies cooperation and it is very important to exchange data and technologies, and I think we'll talk about it today. And of course it is a problem to attract more resources, more money for research to monitor fisheries, and the previous speaker talked was about it. I believe it is very crucial to invite independent experts who assess the existing data and promote improvement, propose some new ideas regarding observer system and we actually made some proposals about it already. I also would like to say a little bit about driftnet activities in our EEZ: there are 2 different fisheries: one is Russian big scale driftnet and Japanese big scale driftnet in Russian EEZ. We can see it is dangerous activity for marine ecosystems. We are not against driftnet in general, but we believe there should be some strong restrictions on it. And if anybody is interested I could talk about it, we have some publications on it. We believe indigenous people should be involved in management and their rights should be well protected and it s also a very important issue, and their voice was more and more heard during the last years. And of course we should create market incentives for sust. fishery. And there should be the market for sustainably harvested fish, so we also working on it and if you want to talk about it with me — I'll be glad to. So I invite you to be a partner in protection of marine resources of the Pacific area for the next generation. Thank you!

1

Stock conditions in Russian EEZ:

- Total Catch in 2010 was equal to 2 716 thous. MT or 69% of TAC;
- TAC for all targets in 2012 (without salmon) – 2 623 thous. MT;
- By June 2011 - 1 761 thous. MT or 3,4% more than in June 2010 (59 thous. MT)

09.06.2011

2

TAC for main targets in 2012:

Main target:	Volume:
AK Pollock	1 745 thous. MT
Herring	315 thous. MT
Cod	105 thous. MT
Squid	95 thous. MT
Salmon	About 200 thous. MT (incl. 23 thous. MT in EEZ (driftnet)
Greenling	86 thous. MT.

09.06.2011

3

Export values from Russian EEZ:

- Frozen fish – 64%;
- Caviar (roe)+liver – 15%;
- Fillet - 10%;
- Crustaceans – 5,5%;
- Fish meal – 5%

09.06.2011

4

Main importers:

- China – 35%;
- Korea – 25%;
- Japan – 10%;
- Germany – 9,7%

09.06.2011

5

Current system of fishery management :

6

How TAC is approved

09.06.2011

7

Russian fishery management achievements:

- Russia signed IUU agreement in 2010;
- Poaching level for cod in the Barents Sea drastically reduced;
- 2 fisheries: 1) Cod+ Haddock 2) Iturup Salmon are MSC certified, AK Pollock - in progress.

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II. Problems of Fishery Management :

- Poaching, discard, by-catch;
- Gaps in VMS and absence of independent observers, electronic scales & logbooks;
- Weak cooperation of enforcement agencies;
- No traceability system from «boat to throat»

09.06.2011

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Problems of Fishery Management in RFE (cont.):

- Insufficient CPU & total catch data;
- Lack of market incentives for sustainable usage of living resource;
- Destruction of habitat by gears;
- EIA for TAC only, not for ecosystem impact (for example - harm of big scale at-sea driftnet salmon fishery is ignored).

09.06.2011

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Poaching and discard:

- Most valuable fishery targets are main targets of poaching: Crab, salmons, shrimps, AK Pollock, etc.;
- Money value of poaching according to Russian Coast Guard data is equal to $2,4 – 4 billion a year;

For example, real catch of the Kamchatka King crab three times more then official catch;

- Discard of AK Pollock is at least 25% of TAC in the northwest Pacific

09.06.2011

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Japan's Imports of Russian Sockeye

Reported quantities of Total Allowable Catch (TAC), catch and total exports from the Russian Federation (to all countries), and imports from the Russian Federation as reported by Japan for Sockeye salmon

TAC	9275	15390	20295	20548	29525	28989	30108	
Catch	24797	17630	16342	19818	24732	30077	27069	
Exports				14368	18193	21080	24152	19207	23542
Japanese imports	24562	20892	18822	24759	24649	25597	22559	19373

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Import control systems in Japan

- Certificate of Origin:
  - Issued by Russia; confirms fish were caught legally;
- Inspection and Quarantine Certificate:
  - Issued by exporting country (may or may not be point of origin).
- Problems:
  - Documents may not be checked thoroughly or carefully
  - Claim by customs inspectors that if paperwork appears valid, it's impossible for them to know if fish were legally or illegally sourced
    - Failure can occur through failure to thoroughly inspect documents and/or due to forgery or counterfeiting

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Economic reasons for IUU:

- High demand for wild fish;
- Effective buyers chain developed by Korean, Chinese and HK companies;
- High level of unemployment - inshore poaching - salmon for roe mainly;
- Overcapacity of aged fleet + low effectiveness of fish harvesting/ processing;
- Increasing cost of fuel and general inflation;
- Weak economic incentives for responsible fishery.

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Institutional reasons for IUU:

- Fiscal policy and legislation does not match seasonal nature of fisheries;
- Bureaucratization of landing procedures in Russian ports;
- Irregularity of governmental funding for regular surveys;
- Uneasy interdepartmental cooperation in enforcement.

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Instutional reasons for IUU (cont.):

Lack of traceability system from «boat to throat»:

- No precise mechanisms of traceability;
- Loses of info inbetween chain of custody;
- Absence of unique ID code;
- Possibility of mixture of different shipment of fish

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Common Solutions for Russian IUU (institutional):

- Development of effective North Pacific RFMO with EBM approach;
- Development of new assessment and management tools (FMPs/FIPs, comprehensive observers program);
- Increasing level of cooperation between authorities involved in control and enforcement;
- Tracking IUU vessels and chains of custody

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What also is necessary to do:

- Gather better data & statistics through international network - TRAFFIC, etc.;
- Educate legislators and regulatory agencies, fish inspectors to create efficient system of protection

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Improving management:

- Promote deeper involvement of fishermen & local communities in management (public & basin councils, engagement in resources protection);
- Support specific legislative initiatives of local communities & regional fishermen associations

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Legislation improvement:

- Advocate long-term leasing to responsible groups for sustainable fishing;
- FAO Code for responsible fishery promotion

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Improve interagency cooperation:

- Connect different enforcement & management agencies;
- Facilitate exchange of data & technologies.

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Improve forecasting & statistics and strengthen research

- Attract resources for more research to monitor fisheries;
- Invite independent experts to assess existing data & promote improvements: installation of national observers system, e-scales, e-logbooks, VMS improvement.

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Struggle against big scale driftnetting:

- Conduct studies to show economical benefits of coastal fishery;
- Cooperate with coastal fishing groups to decrease open water fishery;
- Campaign against big scale drift-netting showing it as destructive for ecosystems and Russian economy.

09.06.2011

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Support indigenous people rights for traditional life style

- Provide additional capacity to indigenous people associations;
- Promote traditional uses of salmon & other fish as environmentally friendly

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Introduce market incentives:

- Promote brands of sustainable harvested fish, educate buyers;
- Assist responsible companies in environmental certification - ISO 14000, MSC;
- Connect producers with responsible buyers;
- Working on "green ratings" of companies

09.06.2011

The Role of Remote Sensing Data for Supporting the Sustainable Management of Capture Fisheries

Dr. Dewayany Sutrisno, Indonesian Society For Remote Sensing

For this presentation I would like to prepare the more applied RS for the sustainable management of capture fisheries. The background of the study is based on the potentiality of the fishery resources in our ocean territory. However, the usages of these resources still limited in such policy and strategy that make the exploration of the resources cannot be established properly. Since the majority of the fishermen in Indonesia are traditional ones, the information about how to utilize the capture fisheries are urgently needed. In this case, the spatial information will hopefully help the decision makers in determining the prospect marine area and its related regulation in order to help the traditional fishermen and manage the resources in sustainable manners. Therefore we try to develop a geospatial fisheries resources accounting model to meet the sustainable management.

What fisheries accounting can do? Fisheries accounting is able to describe potentiality of resources; describe the sustainable yield; describe multi date utilization changed; and may be able to model the future prediction utilization.

The theme of the study is captured fisheries based on traditional vessel and fishing gears. Why? Because as we said before, we have high prospect of captured fisheries, but still not utilize properly since the traditional one is not attached by technology and cannot determined properly the area of fishing school. And also there are still unbalancing in utilizing the resources, whereas in western area has been exploited and in eastern area still have abundance of resources. That why we decide that the aim of the study is to develop a spatial captured fisheries information model by assessing spatial fisheries resources accounting and we hope that spatial information is able to indicate the fisheries prospect in sustainable manner as an input for policy makers.

What RS can do for developing the model? In combining of RS and GIS, the model can be developed. Here, for the mapping unit we use ecosystem and sea water column as 3D. RS is able to determine the fisheries spatial zone based on (1) ecological zone assessment whereas RS can obtain the depth and the distribution of ecosystem (2) fisheries data assessment, whereas RS data can obtain Sea Surface Temperature, Chlorophyll and current data. This fisheries spatial zone or mapping unit then combine with the multi date fisheries statistical data whereas the database of each unit mapping then can be developed. The spatial fisheries database then can be used for determining the stock and utilization including in its monetary aspect. Meanwhile, based on the

production of dominant species the sustainable yield of the fisheries can be obtained and the spatial model regarding the availability of the resources can be developed.

We used Poso regency in central Celebes as a study area. The data that were used for this study are ASTER, NOAA and MODIS for RS data, base map or topographic map and bathymetry map for vector spatial input, and fisheries statistical data from field inventory and secondary information. From RS analysis distribution of ecosystems, Sea surface temperature, chlorophyll, and current information can be obtained. Then, we can develop the mapping unit or fisheries spatial zone based on depth (bathymetry), and yearly analysis of ecosystem, sea surface temperature and chlorophyll.

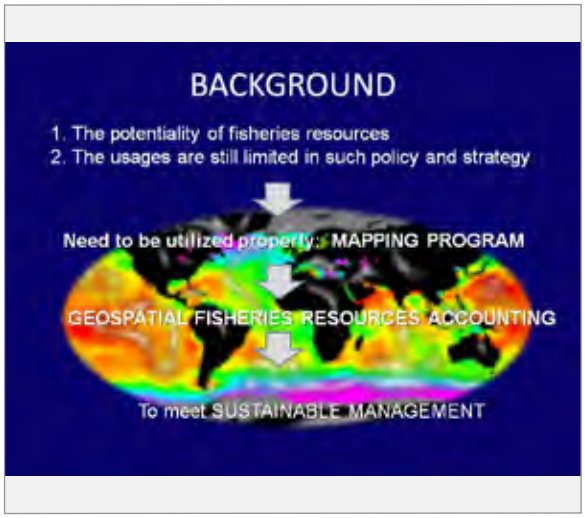
Fisheries attribute data assessment then were examined based on (a) surplus production for assessment of biological parameters, (b) Gompert method for sustainable yield assessment and (c) change of productivity method for fisheries resources accounting method and (d) Calculating the monetary unit, based on (1) conversion the market price to the real price, (2) calculate the average of fisheries product (=year of basic), (3) calculate the productivity change = average production – productivity at year 1 and (4) calculate the depression value

The next step is integrated the spatial ecological data – fisheries spatial zone and attribute data – fisheries attribute data. In this case, spatial ecological data that was represent fisheries spatial zone was used as mapping units for all of those attribute information. Here, we can obtain spatial fisheries data including stock, utilization, valuation and accounting.

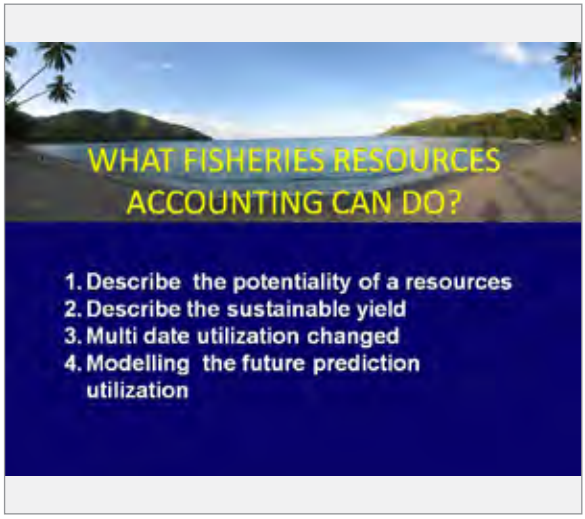
The result of the study indicate that Poso shallow coastal waters can be divided into three ecological or fisheries spatial zone, i.e (a) coastal fisheries (small pelagics), (b) coral reef fisheries (demersal) and (3) shallow water fisheries (pelagics). Indeed, in this area there was decreasing productivity and increasing species types even though the actual utilization is still under sustainable yield. The decreasing productivity from 2002 to 2005 is about 1.030 ton for coastal fisheries, 852 ton for coral reef fisheries and 2711 for shallow water fisheries. Whereas the sustainable yield is: (a) coastal fisheries 42, 487 ton, (b) coral reef fisheries 10,184 ton, and (c) shallow water fisheries 12, 633 ton. The Economic loss of this resources is about 15 x`109 to 217 x 109 IDR, indicate that there is still prospect for fisheries economic development.

And the conclusion is that we believe that Remote sensing data are able to provide up to date oceanographic information for projecting fisheries condition; Remote sensing data are best tool for such monitoring and developing of captured fisheries spatial management model; Fisheries resources accounting map is able to inform the status and the condition of captured fisheries; Fisheries resources accounting map is able to indicate the sustainable fisheries sector for decision makers.

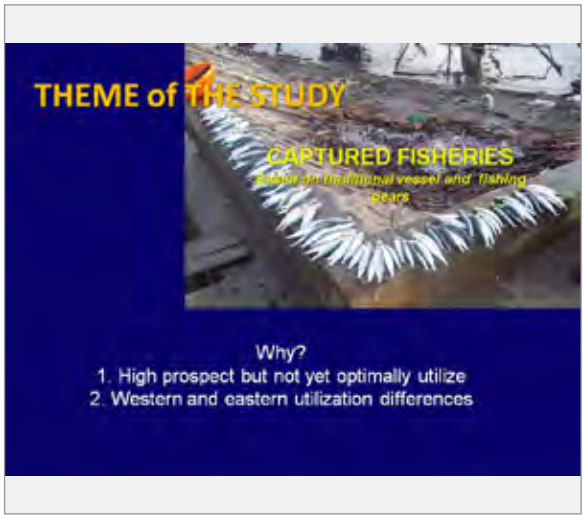
1


BACKGROUND
1. The potentiality of fisheries resources
2. The usages are still limited in such policy and strategy
Need to be utilized properly : MAPPING PROGRAM
GEOSPATIAL FISHERIES RESOURCES ACCOUNTING
To meet SUSTAINABLE MANAGEMENT

2


WHAT FISHERIES RESOURCES ACCOUNTING CAN DO?
1. Describe the potentiality of a resources
2. Describe the sustainable yield
3. Multi date utilization changed
4. Modelling the future prediction utilization

3


THEME of THE STUDY
CAPTURED FISHERIES
Why?
1. High prospect but not yet optimally utilize
2. Western and eastern utilization differences

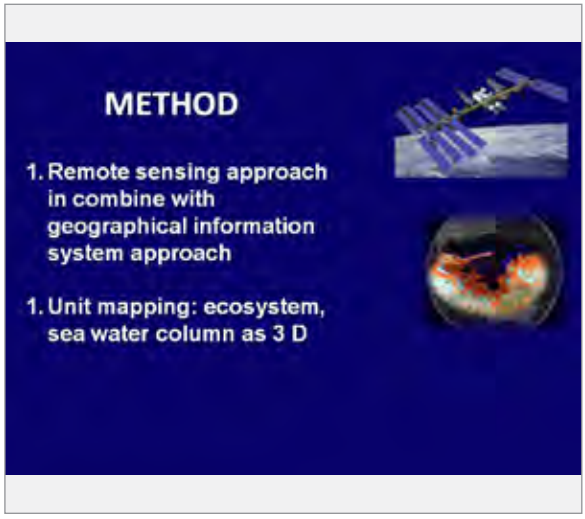
4


AIM
Develop a spatial captured fisheries information model
By
Assessing spatial fisheries resources accounting
SPATIAL INFORMATION
Able to indicate the fisheries prospect in spatial and sustainable manner as an input for policy management

5


WHAT REMOTE SENSING CAN DO FOR DEVELOPING THE MODEL

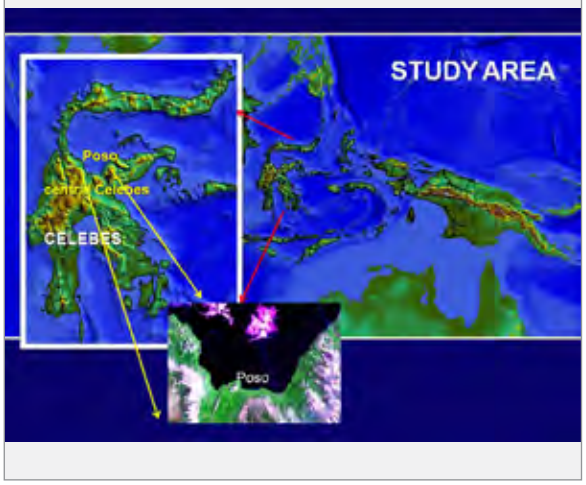
6


METHOD
1. Remote sensing approach in combine with geographical information system approach
1. Unit mapping: ecosystem, sea water column as 3 D

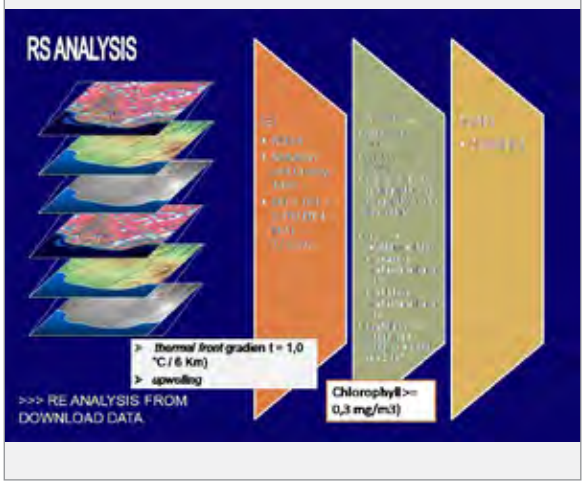
7


MODEL

8


STUDY AREA
Poso
central Celebes
CELEBES
Poso

9


RS ANALYSIS
thermal front gradien t = 1,0 °C / 6 Km)
upwelling
Chlorophyll >= 0,3 mg/m3)
>>> RE ANALYSIS FROM DOWNLOAD DATA

10


SUPPORTING DATA
1. Fisheries Statistical Data
2. Remote sensing data: ASTER, NOAA, MODIS
3. MAPS:
1. BASE MAP
2. Bathymetry maps
OTHERS:
1. In situ data
2. Others spatial data

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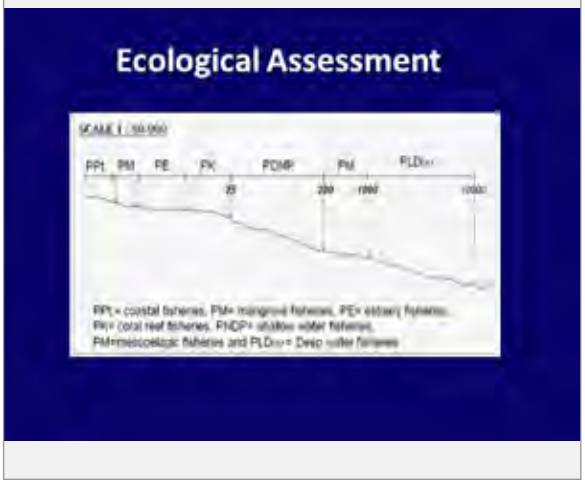
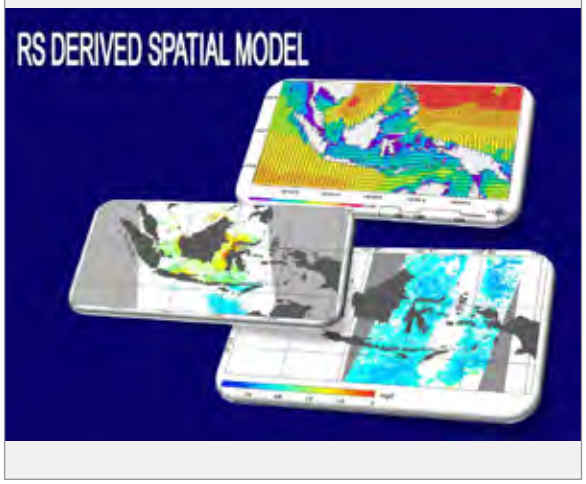

Ecological Assessment
PPL PM PE PK PDMP PM PLDw
25 200 1000 1000

12


RS DERIVED SPATIAL MODEL

13

Fisheries Attribute Data Assessment

Assessment of biological parameter : SURPLUS PRODUCTION

$u = \frac{h}{E}$ u = catch per unit effort, h= production, E = effort

Assessment of sustainable yield: GOMPERT METHOD

$h = qKE\left(\frac{qE}{r}\right)$ h = sustainable yield, q = production, E = effort

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Assessment of fisheries resources accounting

$\Delta NP_i = \left[\frac{NO_i}{x_i}\right] x \Delta\Omega$ ΔNP_i = Change of productivity at t; Not = output value at t1; x^1 = output at t, $\Delta\Omega$ = change of productivity

Change of productivity

$\Delta\Omega = \bar{x} - x_i$ where $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$

$\bar{x}$ Average of productivity from year 1 to basic year (Tb) of productivity change

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Calculating the monetary unit:

1. Conversion the market price to the real price
2. Calculate the average of fisheries product (=year of basic)
3. Calculate the productivity change = average production – productivity at year 1
4. Calculate the depression value

$Price_{real} = \frac{price_{year}}{indexconsumerprice} x100\%$

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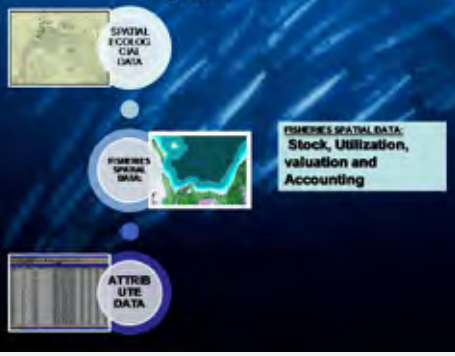
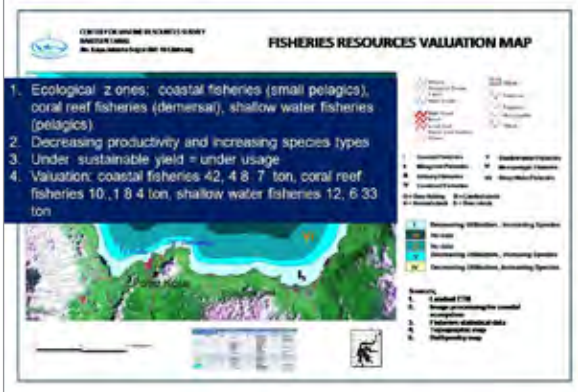
INTEGRATING SPATIAL AND ATTRIBUTE DATA

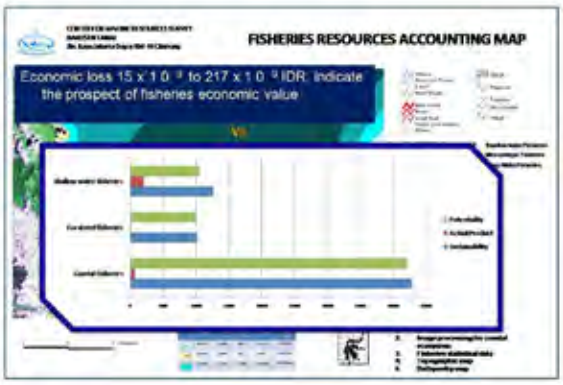


17



18

19


FISHERIES RESOURCES ACCOUNTING MAP
Economic loss 15 x 10 ³ to 217 x 10 ³ IDR. indicate the prospect of fisheries economic value

20


CONCLUSION
1. Remote sensing data are able to provide up to date oceanographic information for projecting fisheries condition
2. Remote sensing data are god for such monitoring and developing of captured fisheries spatial management model
3. Fisheries resources accounting map able to inform the status and the condition of capture fisheries
4. Fisheries resources accounting map able to indicate
makers

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FOR THE FUTURE OF OUR CHILDREN
DO SUSTAINABLE RESOURCES MANAGEMENT

22


THANK YOU
For Your Attention

Application of satellite data for environmental projects

Ekaterina Tsybikova, Transparent World, non–for–profit partnership

Dear ladies and gentlemen, good afternoon,
Let me present you several case studies of remote sensing data application for environmental projects by my organization but I believe our view on satellite imagery reflects the view of our colleagues from environmental community.

Firstly, several words about Transparent World, non-for-profit partnership (TW). TW is a non-governmental, Moscow–based organization established in 2000. Our main focus areas are forests, specially protected nature areas, monitoring projects and currently cartographical webservices. We see our mission in providing environmental organizations with informational support by using mainly RS data and GIS.

So, why are satellite images so important for conservation practitioners?

In many cases environmental problems have spatial nature. We've saw it today already (for example, oil spills, illegal fishing, illegal logging, construction).

Without satellite data it is sometimes impossible to get up-to-date and administratively nonfiltered spatial and temporal information on the issue.

So let's go now to China, Inner Mongolia, where the Hailaer–Argun River water diversion project is carrying out. The map on the slide demonstrates a transboundary area of Russia, China and Mongolia and hydroeconomic projects and main nature protected areas situated here. The boundary between Russia and China is formed by the river of Argun. The Argun River then goes to the Amur River, so the Argun River is the upper reaches of the Amur River. Planned and existed water diversion projects are marked with red (construction of canal is marked with a red arrow). In green hatching is the territory of trilateral (Mongolia-Russia-China) Dauria international protected area. So we can say that the Hailaer-Argun River canal construction is carrying out on the territory of the protected area.

This Hailaer–Argun River water diversion project will be harmful not only for the ecosystems of the Argun River but also for the whole Amur basin. According to the project documents canal will divert into Dalai Lake about 30% of the Argun River annual flow, construction of planned water reservoirs upstream from the canal could divert up to 30% more. In 2007 during intergovernmental China-Russia meeting Mr. Putin expressed serious concern regarding planned canal construction.

And after that there were no information on the project available in the media. As it was found out later it was a kind of censorship in China and as it turned out satellite imagery were the only source of information at that time.

On the next slide there is an interface of the webservice launched by Transparent World. It was launched as a way for the public access to the information what's happening on the ground. You see a photo taken at the place of canal construction. Right that time we were asked to look at satellite images and inform others about the situation with a canal. We found out that canal is almost completed. So we launched a webservice, put available for free Landsat images and also satellite data of medium, high and very high resolution provided by ScanEx R&D Center — data showing the progress in canal construction. So environmentalists and politicians could use that information in negotiations, could obtain technical and temporal information on canal construction.

On the next slides there is the Hailaer river – Dalai lake water transfer canal before penetrating the Dalai Lake Biosphere Reserve and the situation in two weeks later when the canal was filled with water and entered the core zone of the Biosphere Reserve. On the next slide the situation with canal just 2 weeks ago (May 17th, 2011).

As I've said before, canal can divert 30% of Hailaer-Argun river annual flow and other 30% can be caught by water infrastructure upstream. On slides you can find illustration of one of the hydro reservoirs upstream (Honghuaerji reservoir): before construction (in 2007), and after (in 2010 and in April, 2011). Actually, these new pictures were prepared for Russian officials from the Working group on transboundary waters of the Joint Sino-Russian Commission on protection and use of transboundary waters, since they will visit the canal tomorrow (10th of June, 2011).

Why else are satellite images important for conservation practitioners?

Satellite images are the main source of up-to-date, independent and open information; they help to identify, measure and map.

This is a map of last world intact forest landscapes (IFL). It was a 1st global assessment of remaining blocks of IFL larger than 500 sq km. Our team was responsible for most part of Russia (Siberia, Russian Far East), for China, India, Pakistan, Afghanistan, South – Eastern Asia and Australia. The assessment was done mainly on the basis of Landsat data.

Satellite imagery allows us to identify other types of valuable nature areas. For example, this is a publication on identification of high conservation value forests (HCVF) in Russian Far East (the cover of the Atlas, overview map and examples of detailed maps); we put information on a webservice also. High Conservation Value Forests were delineated by HCVF concept on the basis of space imagery mainly (Landsat MSS, Landsat TM, Landsat ETM+, Terra/Aster), and also topographic maps, forest inventory and field data.

The next is example from Kalimantan, Indonesia — we made change-detection of forests by using Landsat and IRS AWIFS data. You can see gradual progression in clearcuts.

By using Landsat and IRS AWIFS imagery we produced a forest map of current tree species composition of forests in North-Western Russia. You know official forest materials in Russia are very often outdated and satellite imagery help update them. As in example with canal we put information on web to allow more people to get this information.

Satellite imagery allows us to monitor change. Here is an example of webservice based on ScanEx technology — Geomixer (previous examples were based on ESRI server technology). This webservice is devoted to the monitoring of protected areas. We identify and monitor threats or nature phenomena occurring on protected areas or near by. The monitoring is based on using of multitemporal optical satellite imagery of different spatial resolution (0.7-250 m/pixel), provided by ScanEx R&D Center for free and the data downloaded from USGS GLOVIS. I'd like to demonstrate some problems associated with Sochi 2014 Olympic objects construction. Olympic objects are created on the territory of Sochi national park (federal–level protected area), very close to the UNESCO World Nature Heritage site "Western Caucasus". On the slide there is an example of construction of automobile road on the territory of national park and strict nature reserve (Caucasus zapovednik). The situation in 2006 (Ikonos imagery), in March 2010 (photo) and in November 2010 (Ikonos) is very clear on space images and photos: new road, clearcuts, a bridge and change of the river course.

Another case from monitoring project is a resulted map of fire monitoring in South–Western Primorie (Russian Far East). What's important is that right this map helped to negotiate with land users because showed who was responsible for main part of fires. It was a joint project of WWF Russia, ScanEx R&D Center and Transparent World.

Another application of satellite imagery is for forestry performance monitoring in the Russian Far East. We identify violations of the Russian Forest Code by RS data (logging outside of the permitted area, in water protection zones); FSC violations (logging in moratorium on logging due to HCVF even though it is a FSC-certified company), etc.

Next map was produced during preparation to negotiation with Terney-les FSC–certified Company. According to the logging plans of Terney–les, logging will take place in HCVF. You can see how the HCVF will be fragmented — the map presents existed and planned logging in leased plots of Terney-les.

So maps (visual images) based on satellite data are the universal language for communication with the stakeholders: help to understand each other.

And the next important thing is that space imagery solves the "Security Classification" problem of many categories of information (scaled maps, air photo images, pipeline charts etc.). And permanent Earth observation is like "Blackbox" of our planet: all that happened is fixed and can not be hidden.

For example here is example from Sakhalin east shore where Western grey whale feeding area is located. And in 2007 there was a leak and oil spill occurred. Grey whale feeding area

is to the west from this site, so it is very sensitive nature area. It was a pilot project on oil spills monitoring by using radar data that time. And oil companies knew about the pilot project. And when the oil spill occurred, the WWF Russia Moscow office unexpectedly got a phone call from the oil company with information that they take measures on response to the spill. So the land users begin to understand that nothing can be hidden and almost everything is visible from space.

Another application of satellite imagery is to use infrared channels for oil spills identification on the ground — look at slide.

The next is an example from ESPO (East Siberia Pacific Ocean) pipeline which will bring Russian oil to APEC countries. It was already the 2nd oil spill on ESPO in February of 2010. By using panchromatic very high resolution imagery (ErosB) it was possible to identify the area of oil spill quickly.

To conclude I'd like to say, that

- Satellite images are the main source of up-to-date, independent, open, administratively non-filtered information
- Satellite data can play a key role in investigation, decision support and conflict solving
- Satellite data and results of their interpretation (especially included into webGIS) provide environmental and civil society in whole with powerful tool for public control in different spheres
- In case of inactivity of public authorities, environmental NGOs using GIS and RS data can facilitate proper (sustainable) decision making

Thank you very much for your attention

1

Why are satellite images important for conservation practitioners?

- In many cases environmental problems have a spatial nature

(Eg.: territory damaged by BP 2010 spill in the Gulf of Mexico, illegal fishing, illegal logging, construction new facilities)

- Without satellite data it is sometimes impossible to get up-to-date and administratively nonfiltered spatial and temporal information on the issue

(Eg.: when and how was a new hydrotechnical facility built?)

2

The Hailaer-Argun river water diversion project: "saving shrinking Dalai Lake from climate change"

(Hulunbeier prefecture of China's Inner Mongolia)

additional information:
www.daanrivers.org

http://new.transparentworld.ru/rulenvironment/monitoring/monitoring_hydro

http://gis.transparentworld.ru/argun

3

Hydroeconomic projects and main nature protected areas of the central part of the Argun River basin

4

- Argun River valley is a precious transboundary wetland, designated as international Important Bird Area (Japanese cranes and swan, major Asian flyway).
- Canal diverts at least 30% of the Hailaer/Argun River into Dalai Lake
- Additional water infrastructure upstream (5-10 reservoirs) would take another 30% of Hailaer-Argun river annual flow
- Canal/reservoirs would ruin globally important wetlands, change Argun meandering process, increase manifold concentration of pollutants, and probably force river to go dry in the driest periods of natural climate cycle. The downstream wetlands and communities both in China and in Russia will be severely affected, as the Hailaer/Argun is the primary watercourse in the region.
- The project is disguised as "saving shrinking Dalai Lake from climate change" (but in reality lakes of the region widely fluctuate naturally).
- The project sets most dangerous precedent of storing scarce water of transboundary rivers in national territory and stimulates growth of unsustainable water consumption in a drought-prone regions. Such project signifies the beginning of transboundary water management crisis in the Amur-Heilong River basin – globally important freshwater ecoregion.

In spite of bilateral Russia-China Water Treaty (on sustainable management and protection of transboundary waters), there is no information on Argun river water diversion project in Chinese media still (state censorship).

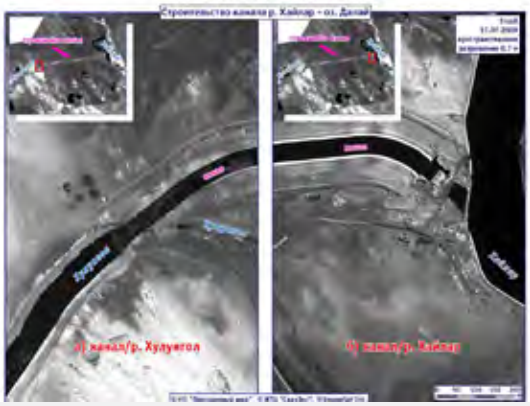
The only source of information – satellite imagery

5

Web-service: http://gis.transparentworld.ru/argun

6

canal on VHR satellite data



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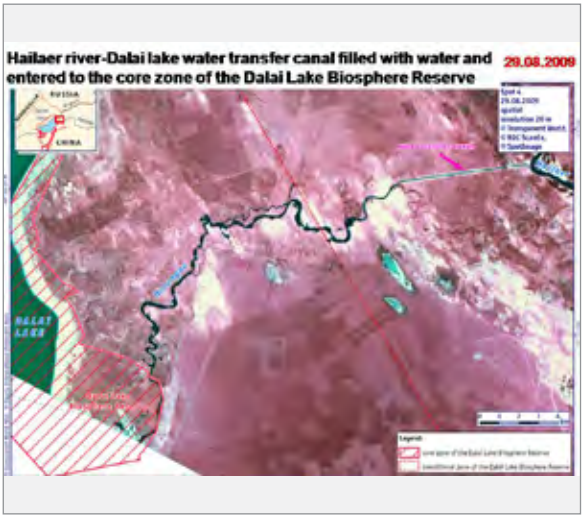
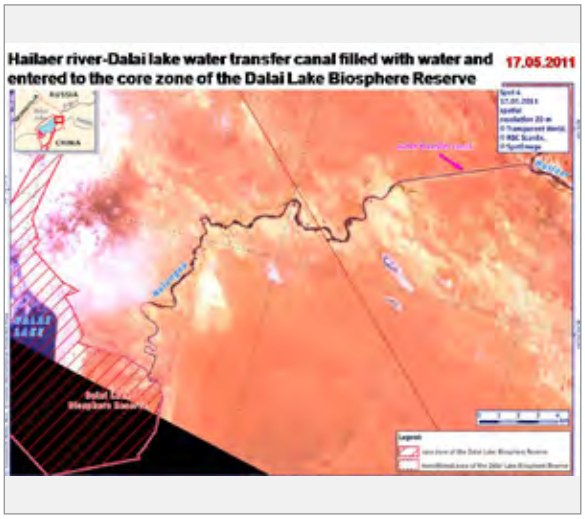
Hailaer river-Dalai lake water transfer canal before penetrating the Biosphere Reserve
12.08.2009
RUSSIA
CHINA
DALAI LAKE

8


Hailaer river-Dalai lake water transfer canal filled with water and entered to the core zone of the Dalai Lake Biosphere Reserve
29.08.2009
RUSSIA
CHINA
DALAI LAKE

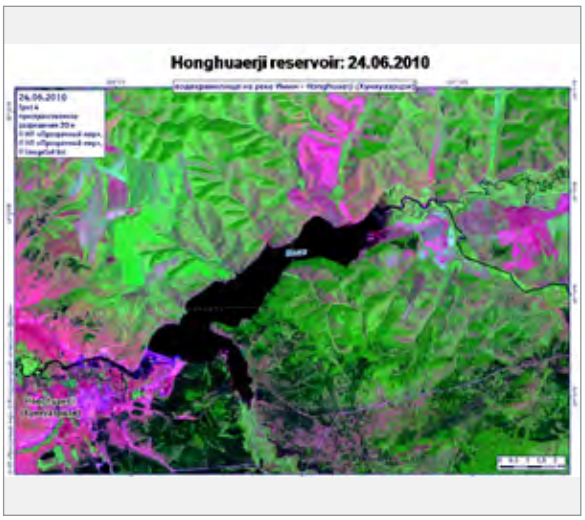
9


Hailaer river-Dalai lake water transfer canal filled with water and entered to the core zone of the Dalai Lake Biosphere Reserve
17.05.2011
RUSSIA
CHINA
DALAI LAKE

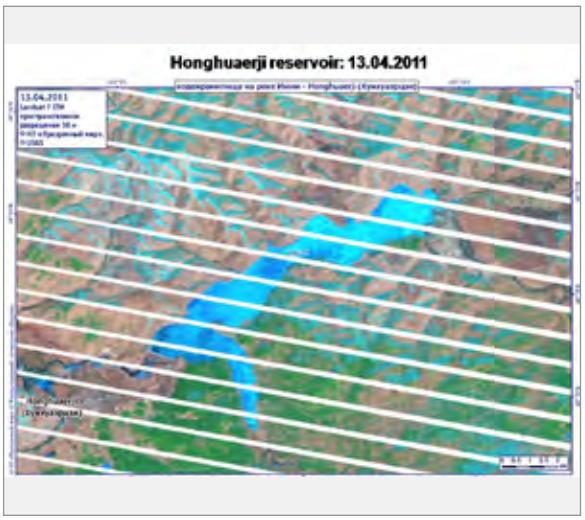
10


Honghuaerji reservoir: before construction. 16.08.2007

11


Honghuaerji reservoir: 24.06.2010

12


Honghuaerji reservoir: 13.04.2011

13

Why are satellite images important for conservation practitioners?

- Satellite images are the main source of up-to-date, independent and open information: help to identify, measure and map; assess and analyze; monitor change

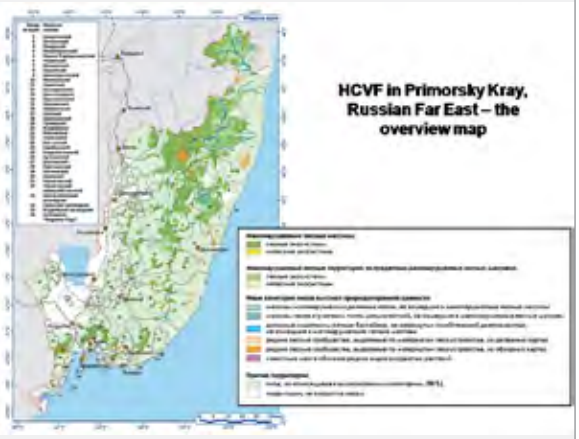
14

2005-2006: our team was mainly responsible for Russia, South-Eastern Asia and Australia

15

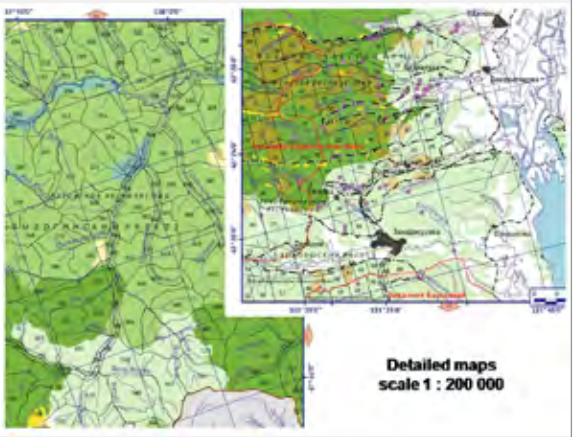
2004-2006 – Mapping of high conservation value forests (HCVF) in Primorsky Kray, Russian Far East

16



HCVF in Primorsky Kray, Russian Far East – the overview map

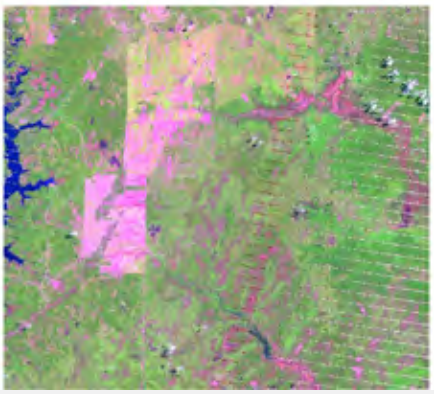
17



Detailed maps scale 1 : 200 000

18

Forest maps: Change-detection of forests of Indonesia: Landsat 7, 2004



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Forest maps: Change-detection of forests of Indonesia: Landsat 7, 20

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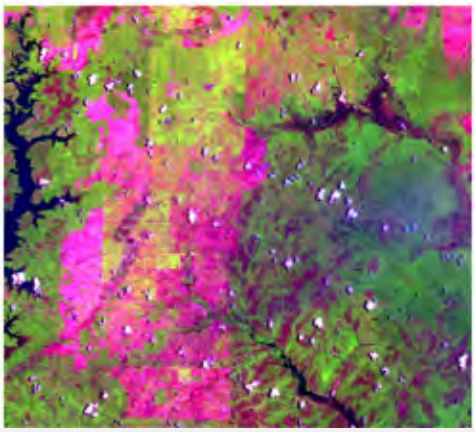
Forest maps: Change-detection of forests of Indonesia: AWIFS



21

Forest map of North-Western European Russia: http://gis.transparentworld.ru/northwestks/

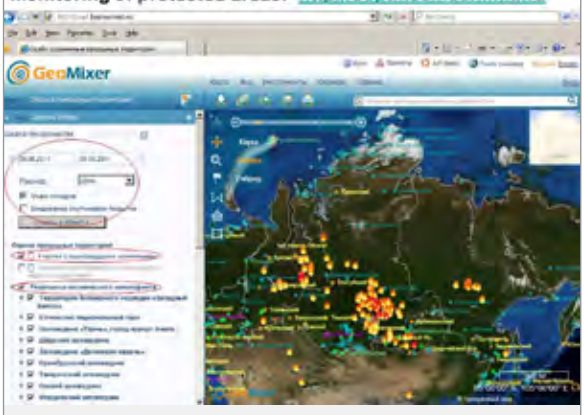
22

Why are satellite images important for conservation practitioners?

- **Satellite images are the main source of up-to-date, independent and open information:** help to identify, measure and map; assess and analyze; monitor change
- **Maps (visual images) based on satellite data are the universal language for communication with the stakeholders:** help to understand each other

23

Monitoring of protected areas: http://oopt.kosmosnimki.ru



24

Sochi 2014 Olympic objects construction

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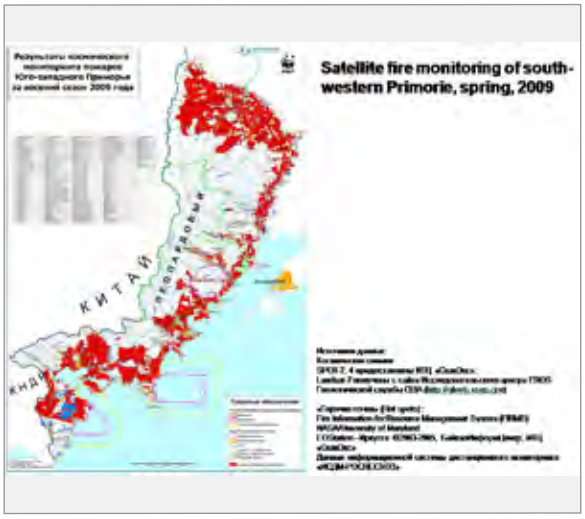

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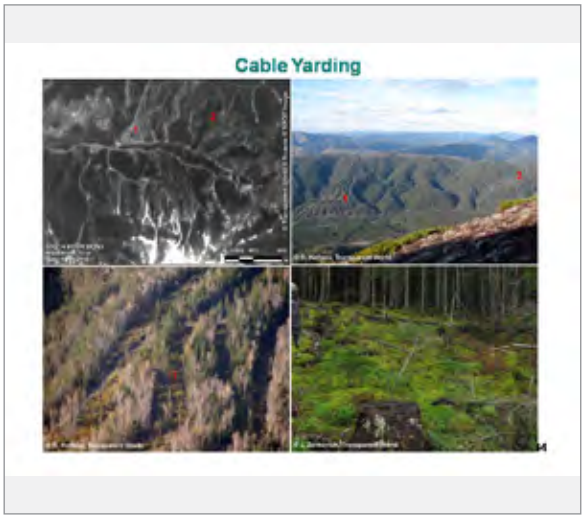

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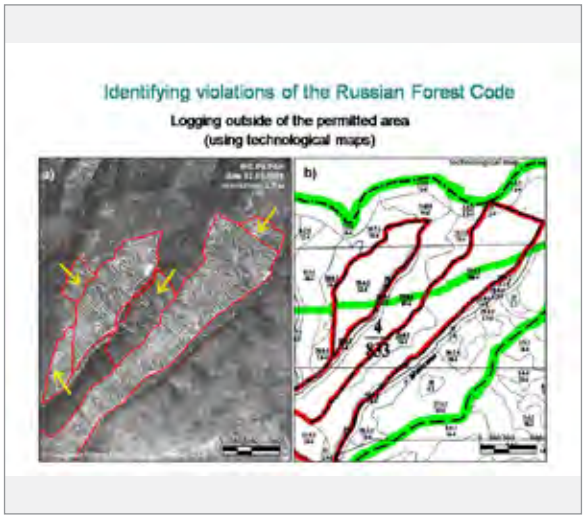

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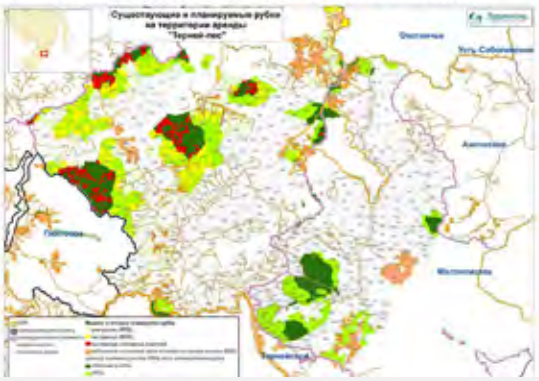
Existed and planned logging in FSC-certified leased plots of Terney-les company (according to the logging plans of Terney-les, 2011)



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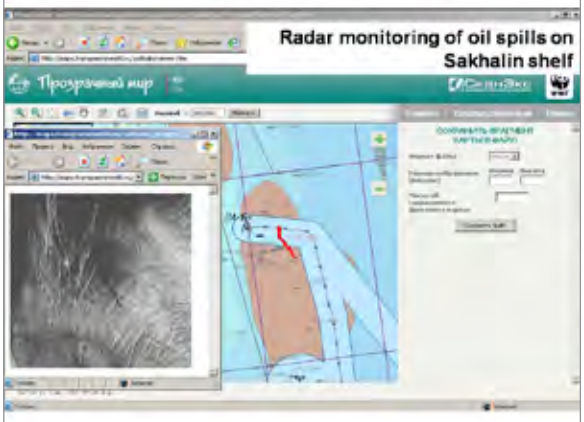
Why are satellite images important for conservation practitioners?

- **Space Imagery solves the "Security Classification" problem of many categories of information** (scaled maps, air photo images, pipeline charts etc.)
- **Permanent aquisition of Earth's images – "Blackbox" of our planet**: all that happenned is fixed and can not be hidden, even if the traces are deleted (Ex: oil spills)

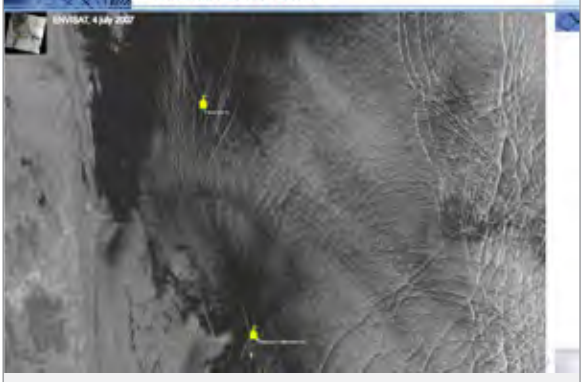
39

Radar monitoring of oil spills on Sakhalin shelf



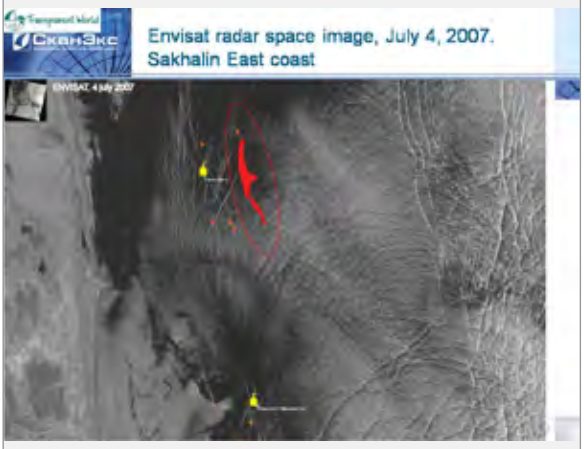
40

Envisat radar space image, July 4, 2007. Sakhalin East coast



41

Envisat radar space image, July 4, 2007. Sakhalin East coast



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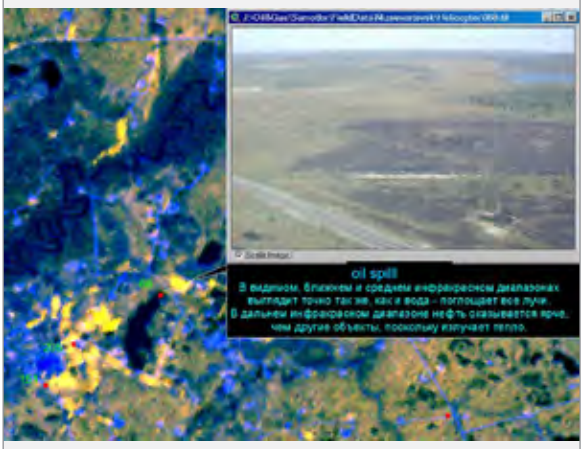

43

ESPO-1: oil spill on Bolshoi Never River (upperheads of Amur river), Amur region. 03.02.2010

44

oil spill on Bolshoi Never River 12.02.2010 ErosA

45

Conclusion

- Satellite images are the main source of up-to-date, independent, open, administratively non-filtered information
- Satellite data can play a key role in investigation, decision support and conflict solving
- Satellite data and results of their interpretation (especially included into webGIS) provide environmental and civil society in whole with powerful tool for public control in different spheres
- In case of inactivity of public authorities, environmental NGOs using GIS and RS data can facilitate proper (sustainable) decision making

46

Transparent World

Thank you!

Ekaterina Tsybikova
Transparent World, non-for-profit partnership
http://new.transparentworld.ru
e-mail: tsybikova@biodiversity.ru

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Transparent World: Environmental projects team (1994-2011)

Works as a team in various organizations:

1994-1996 – Moscow University, Student Corps for Nature Conservation

1996-1999 – Biodiversity Conservation Center (Moscow)

1999-2006 – Social Ecological Union International (Moscow)

2006 – Transparent World / ScanEx R&D Center

Other partners:

1995-2005 – Taiga Rescue Network (headquarter in Ykkimokk, Sweden)

1999-2006 – World Resources Institute (D.C., USA) / Global Forest Watch

Since 1995 – Greenpeace Russia

Since 2004 – WWF

Remote Sensing Data and Coastal Resources Management

Ash Elena, RDC Scanex, Unit Head, Marketing, Russia

Dear ladies and gentlemen, today I'm presenting my Moscow State University and at the same time I'm working at ScanEx Research & Development Center. So in my presentation I will speak about sea part and land part as well, because I will speak about coastal zones and system approach to their management. First of all I'd like to remind most important points of coastal zones. Coastal zones mean natural boarders between four spheres: lithosphere, atmosphere, hydrosphere and biosphere. A very sensitive area because of its contact points. And also every day at coast we can see sophisticated balance between different natural and technogenic processes and phenomena. On the other hand coastal zone is the most populated area. On this slide you can see the night space imagery of our planet and the lights of cities correspond to coast lines.

So, what does system approach to coastal zones mean? On this slide you can see a 3D model of the Black Sea coast and system approach means that we look at coastal zones like at a complex of different systems. We draw borders between systems according to watershed lines. So coastal systems is the area of coastal zone that forms an integral unit with the adjacent coastal and offshore parts, with which it exchanges the flows of matter and energy during modern terrain formation. That means that we look not only at sea or land parts, it is a complex area. In other words coastal system is a complex of forms of abrasive, denudation, accumulative terrain, created by different geomorphologic processes and described by a number of parameters. On this slide on the left side there is list of parameter, describing coastal system. We can analyze how we can get and what sources of information we should use to get some knowledge about these parameters. In this research we focused on cartographic information and surely on remote sensing data. So we elaborate common principles of using thematic maps. On the boxes of this slide you can see ways how we should use maps to get information about each group of parameters, which are connected by lines…... We made the same job for analysis of digital elevation models. There ways of using are different, but …is the same. Surely we analyze space imagery based on spatial resolution and spectral band and we determined what most appropriate type of space imagery we should use to get information about each group of criterion of morphosystems. We test these methods and our study is the Black Sea coast near Sochi area. So, again this is the 3D model of the test area and for thematic maps analysis we used geomorphologic maps . It helps us

to have such histograms for each system. This slide illustrates distribution of different relief types inside of the system. We also have a digital elevation model for this area, we analyze it and find morphometric indexes, like distribution of heights, distribution of slopes angles and distribution of slope aspects for each morphosystem, for each coastal system.

So we collect all these parameters in the matrix of different indexes and analyze then later I'll show you what we received from this. And for the analysis of remote sensing data, IRS imagery of our test area, which ScanEx supplied for us. We made supervised classification of this imagery to determine land cover and land use for our test area. As a result we found six types of land cover and land use. The next step was that we used EROS A data. This data has higher spatial resolution (1.9 m) and we use it to determine the anthropogenic influence on coastal systems. For each system we found the area of economic activities, the length of roads and so on. So as a result we received different maps, because we used different parameters for classification. Based on this data we can get such a classification tree. It obviously shows that if we used one classification, we divide all coastal systems into different classes, and if we use additional parameters, the classes are divided into groups and so on, so at the end we can have only one system for each cluster. The depth of classification surely should be determined by the purposes of the research. And one more case study, how it could be used in practice. In 2002 we have a really terrible debris flow near Novorossiysk and many…. as a result of this hazard, so we analyzed this hazard and classified all the Black Sea coast systems by assessment of potentials of such a debris flow. The red color indicates high potentials of the flow. So when you plan the development of coastal zones you should keep in mind that this territory has a big potential for such a hazard. So systematic approach tells us to use successful experience in similar coastal systems and share such successful experience with other systems, which has similar parameters, for example: marine culture, "green" energy – in Kola Peninsula the electric power plant, based on tidal energy. This experience can be shared with coastal systems with similar parameters. For example, transport. This is the industrial port of the Kamchatka Peninsula, Petropavlovsk-Kamchatsky and you can see another example with coastal systems in other conditions, it's Sochi – the capital of the future Olympic Games. And for example successful experience of fishery, you can see fishing …. for fishing. And I have a question to my colleagues, how can these guys do fish monitoring, is it legal or illegal? And finally, it is tourism and sports. To conclude I'd like to say that system approach considers coastal zone as a complex of coastal morphosystems. The each coastal system has individual features as well as common features , which allow us to group them into classes, types, and so on. Classification of coastal systems could be a reliable base for a choice of the most appropriate way of coastal zones sustainable development and management. And almost all parameters of coastal systems could be getting from different sources of information such as thematic maps, digital elevation models and remote sensing data. But we should keep in mind initial information for thematic maps and digital elevation models could be gotten also from space imagery. That's all. Thank you very much for your attention.

1

Background: coastal zones

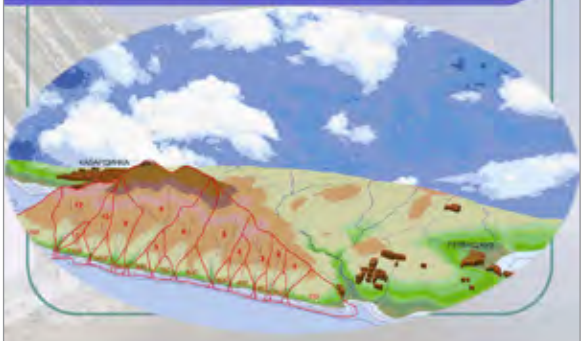
- Natural border between four spheres: lithosphere, atmosphere, hydrosphere and biosphere
- Sophisticated balance between different natural and techogenic processes and phenomena
- The most populated area

2

Background: coastal zones

3

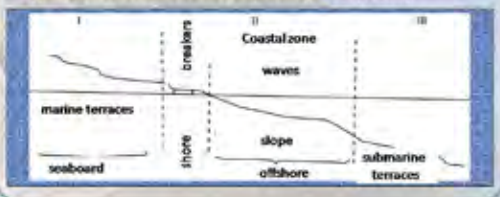
System approach to coastal zones



4

System approach to coastal zones

Coastal morphosystem (CSM) means an **area of coastal zone** that forms an **integral unit with the adjacent coastal and offshore parts,** with which it **exchanges the flows of matter and energy** during modern terrain formation (Prof. Ignatov, 2004)



5

System approach to coastal zones

Coastal morphosystem is a complex of forms of abrasive, denudation, accumulative terrain, created by different geomorphologic processes and described by a number of parameters.

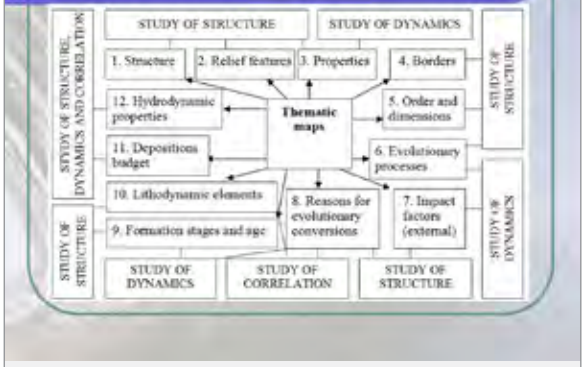
6

Coastal system: analysis of parameters

Criteria of coastal morphosystems	Sources of information					
	Cartographic informations			Remote sensing data	Text data	Statistic data
	topographic maps	thematic maps	DEM			
1. Structure	+	+	+	+	+	+
2. Relief features	+	+	-	+	+	-
3. Properties	+	+	+	-	+	-
4. Borders	+	+	+	+	+	-
5. Order and dimensions	+	+	+	+	+	-
6. Evolutionary processes	-	-	-	-	+	-
7. Impact factors	-	+	-	-	+	+
8. Reasons for evolutionary conversions	-	+	-	+	+	+
9. Formation stages and age	+	+	+	+	+	+
10. Lithodynamic elements	-	+	-	+	+	-
11. Depositions budget	-	+	-	-	+	+
12. Hydrodynamic properties	-	+	-	-	+	+

7

Common principles: thematic maps



8

Common principles: DEM

9

Common principles: space imagery

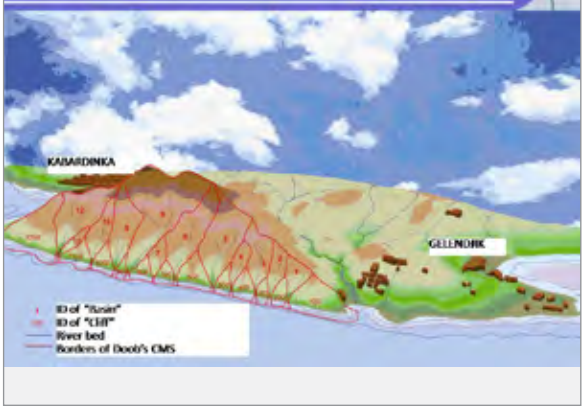
Criteria of CMS	Remote sensing data
1. Structure	Landsat 5/7, IRS-1C/1D/P6, SPOT 2/4, ASTER
2. Relief features	Landsat 5/7, SPOT 2/4, ASTER
3. Properties	IRS-1C/1D/P6, SPOT 2/4/5
4. Borders	Landsat 5/7, IRS-1C/1D/P6, SPOT 2/4, ASTER
5. Order and dimensions	IRS-1C/1D/P6
6. Evolutionary processes	IRS-1C/1D/P6
7. Impact factors	SPOT 5, ALOS, IRS-P5, EROS A/B, FORMOSAT-2, KOMPSAT-2, IKONOS, QuickBird, WorldView-1/2, GeoEye-1, RADARSAT-1/2, ENVISAT-1, TerraSAR-X, COSMO-SkyMed
8. Reasons for evolutionary conversions	Landsat 5/7, IRS-1C/1D/P6, SPOT 2/4, ASTER
9. Formation stages and age	IRS-1C/1D/P6
10. Lithodynamic elements	Landsat 5/7, IRS-1C/1D/P6, SPOT 2/4, ASTER
11. Depositions budget	Landsat 5/7, IRS-1C/1D/P6, SPOT 2/4, ASTER
12. Hydrodynamic properties	Landsat 5/7, ASTER

10

Case study: Black Sea coast

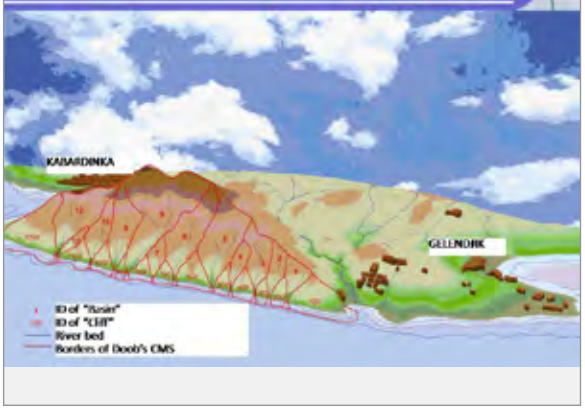
11

Case study: 3D-model of test area



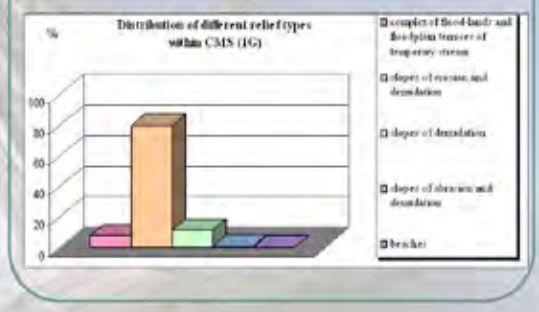
12

Case study: 3D-model of test area



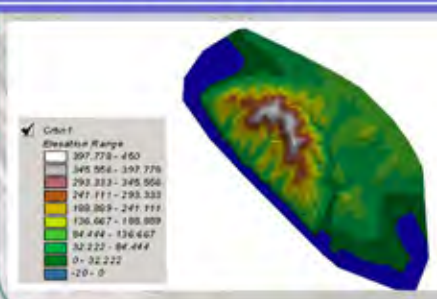
13

Case study: thematic maps analysis



14

Case study: DEM analysis



Input data: DEM of study area

15

Case study: DEM analysis

ID of CMS	1G	2G	3G	4G	5G	6G	7G	8G	9G	10G	11G	12G
1G		100	110	110			170	350	100	100	104	312
2G	100		100	120			011	130	100	100	004	101
3G	110	100		100			101	120	100	100	104	101
4G	110	100	100				100	100	100	000	101	102
5G	270	110	100	100			100	120	101	100	105	102
6G	240	120	100	100			100	110	101	110	112	101
7G	130	011	101	100				100	101	100	000	100
8G	350	130	120	100			100		130	130	123	103
9G	100	100	100	100			101	140		100	105	105
10G	100	100	100	000			100	140	100		104	101
11G	104	004	104	101			000	123	105	104		101
12G	312	101	103	100			100	103	105	101	101	

Student's test: matrix of difference indexes

16

Case study: RS data analysis

Input data: IRS-P6/LISS 3 (23.5 m) from February 13, 2007

17

Case study: RS data analysis

Input data: IRS-P6/LISS 3 (23.5 m) from February 13, 2007

18

Case study: RS data analysis

Results of supervised classification:

2 type = 2 type SWIR

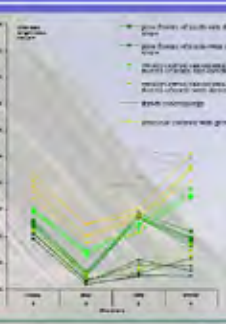
4 type = (2 + 4 types) NIR – 2 type SWIR

3 type = 3 type green = 3 type red

6 type = 6 types red

1 type = (1 + 3 + 6 types) NIR – 3 type green – 6 type red

5 type = 5 type NIR



19

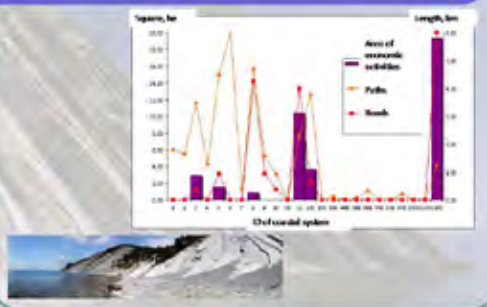
Case study: RS data analysis

Input data:
EROS A
(1.9 m),
from
Mach 8,
2007

ScanEx
RESEARCH AND DEVELOPMENT CENTER

20

Case study: RS data analysis

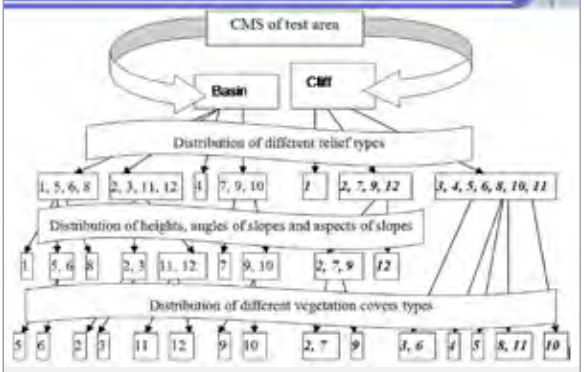


21

Case study: resulting maps

22

Case study: classification tree



23

Case study: debris flow hazard

24

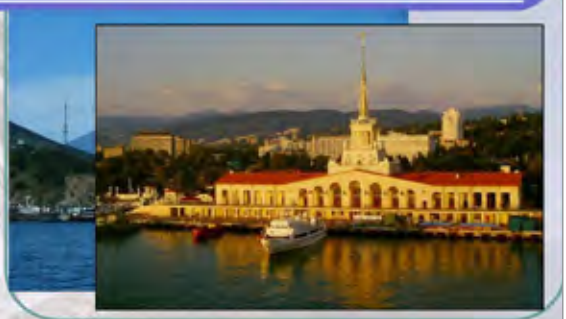
Successful experience: marine culture

25

Successful experience: "green" energy

26

Successful experience: transport



27

Successful experience: fishery

28

Successful experience: tourism & sport

29

Conclusions

- System approach considers coastal zone as a complex of coastal morphosystems. The each coastal system has individual features as well as common features which allow grouping them into classes, types, etc.
- Classification of coastal systems could be a reliable base for a choice of the most appropriate way of coastal zones sustainable development and management.
- Almost all parameters of coastal systems could be getting from different sources of information such as thematic maps, digital elevation models (DEM) and remote sensing data. Moreover initial information for thematic maps and DEM could be gotten also from space imagery.

30

APEC-2011, Bali

THANK YOU FOR YOUR ATTENTION!

Impact of Climate Change on Fishery and Marine Biodiversity

Dr. Geoffrey Muldoon, Strategy Leader, WWF Coral Triangle Program, Indonesia

Thank you for the chance to make this presentation today. I hope I will make for a useful contribution. Oganes asked me to speak today in relation to climate change in fisheries But I have to be completely in front with you and concede that my knowledge of satellite and remote sensing applications to fisheries in not great, but I have a practical sense and understanding of the potential impacts of climate changes on fisheries, to which remote sensing applications can be applied. In the context of this presentation I want to make a clear link between the climate change, ecosystems and people.. Climate change is real and the source of that climate changes is real. We know, that oceans are warming, sea surface temperatures are changing both which are obvious applications for remote sensing data collection. I asked Oganes' permission to focus my discussion, given geographically we are situated here in Indonesia, on the area known as Coral Triangle. The geographic boundary known as the Coral Triangle is represented by the orange color, you can see in the middle of the screen. It encompassed six countries: Papua New Guinea Solomon Islands, Timor–Leste, Indonesia, Malaysia and the Philippines. It is the center of global marine biodiversity, and is considered to be the "Amazon of the Sea". This Coral Triangle is the most marine biologically diverse area in the world. It contains 76% of the world's known corals and 40% of the world's known reef fish species. In the context of understanding the social dimension, there are more than 120 million people living in this region, who are dependent on marine coastal resources of the region for their survival.

The waters of the Coral Triangle are likewise rapidly warming. On the left-hand diagram we can see that current increase in water temperature will be 3–4 degrees over the next century, whereas 1–2 degrees is regarded as too much. On the right-hand diagram we can see the implications of increasing temperature on coral reef building, where blue conditions are needed to maintain the structure of coral reefs. This has major implication for reef–based fisheries productivity as we can see that within the Coral Triangle, acidification that increases to more than 500ppm will break down these carbonate structures. So what are the consequences of climate change with respect to fisheries in this particular region? Well, without effective action coral reefs may disappear from Coral Triangle by 2100. In the context of how fish depend on coral reef structures for survival, coral reefs are like houses for fish, in this part of the world. Without their "houses"

fish have less habitat in which to live and productivity will decline. Thus it is estimated that the ability of the region's coastal environment to feed people will decline by 80 percent. Remember, potentially 100 million people in this region could be affected by the results of climate change. It is therefore likely that issues of regional security will become far more acute. When I say regional security, this is direct reference to things like access to fish, access to food and protein, access to water. And, obviously, export income opportunities as a result of decline in fisheries productivity may be curtailed. These implications are serious. What are the actions we must take then, in terms of climate change? When we talk about climate change, the discussions are often about future sea level rises in this region, and the discussion is also often around the likely consequences of climate change some 30-40 or 50 years hence. When it comes to fisheries the issues are more immediate in terms of adaption, they are potentially far more sever or far more acute, and we need to think about adaptation of fisheries here and now. Why? Because boosting reef resilience can ensure the potential for survival an increasingly hostile climate; and that requires investment in adaptation — now. What does investment in adaptation entail? In this context, investment in adaptation is specifically about improved data, the investment in technology such as remote sensing and satellite data collection, and how that data information can be used to support the adaptation of fisheries. What are the potential climate change impacts on fishery systems? Some of the impacts are considered to be changes in fish yields, changes in fish distributions, damage and degradation of reef structures — as outlined in the slide on acidification, impacts on human health and safety.

These all require changes in policy, but in terms of the systems that will be impacted upon, by climate change there will be impacts on natural system and the fish resources themselves, impacts on the habitats of the fish resources, including tropical, pelagic and offshore fisheries. There will be man–made systems that are impacted upon by climate change such as seaweed farming and oyster/mussel farming. And then there will be impacts on human systems themselves. What will happen to food supplies, what will happen to livelihoods, what will be the impact on settlement areas where people live,. Tropical coastal resources is also critical to 100 million people and they are threatened. As I acknowledged before coastal resources provide food, income and building materials also they provide coastal protection against storm and tsunami events. There are local factors that will be impacted upon by climate change including water quality/pollution, fresh water availability, health of communities. Then there are local human-induced impacts that will reduce the ability of ecosystems to remain productive under climate change scenarios such as through over-fishing, destructive fishing, and targeting schools of spawning fish as well as the physical destruction of habitats. Then of course there are globally induced factors, such as ocean warming, acidification and sea level rises, intensifying storm activity and Illegal Unregulated and Unreported fishing.

And I think you could see that for these local and global factors there very many applications for remote sensing and satellite data collection to measure changes over time. I want to

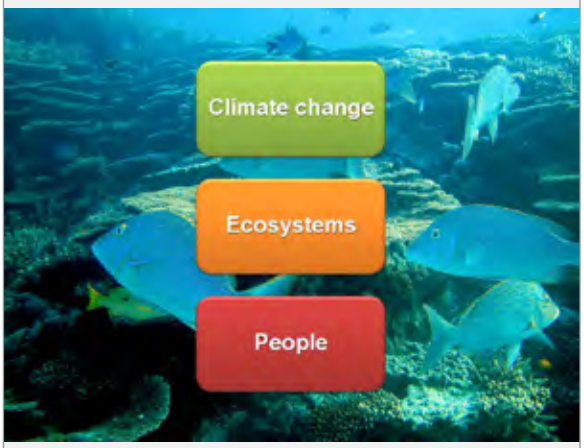
make a reference to Ecosystem Approaches to Fisheries under changing climate scenarios because it is important in the context of APEC priorities. There is agreement between the APEC economies on the use of Ecosystem Approach to Fisheries and to Aquaculture and so with regards the application of satellite data and remote sensing data to fisheries this needs to be considered. When it comes to managing fisheries, this is the necessary framework by which to consider the collection of data through remote sensing and satellite applications. I don't want to spend too much time on this slide and I will present it as an opportunity and as a framework and also to acknowledge the last point, again with the emphasis placed on the Ecosystem Approaches to Fisheries and to Aquaculture, and that is that climate change funding is vast, however a large proportion of this funding is dedicated towards, to the long–term effects I mentioned before such as sea level rise, and minimizing emissions., But the debate would benefit from an emphasis on how fisheries can be managed better to provide more resilient ecosystems to support the ecological systems and the human systems necessary to sustain both fish and people. Of course one can see again the opportunities provided for satellite and remote sensing data. In terms of fisheries and climate change, it's acknowledged that there are climate change impacts that would affect aquaculture and fisheries.

So in terms of improved resilience, in terms of fisheries management resilience we need to think about to the importance of managing our fisheries better now to improve their resilience, and to better safeguard them against he likely impacts of future climate change. And the sort of things that this requires will be decreased pollution and sedimentation, decreased anthropogenic stressors of pollution, improved habitat (coral cover), reduction in illegal, unreported and unregulated fishing and monitoring of marine protected areas, again all of these are applications for remote sensing and satellite data. Let's move on to the second last slide. I'd like to talk to you about issues like the "blue economy". In terms of fisheries, in terms of more traditional "carbon footprint" ideas, there is a starting to be a stronger movement to look at greening of fishing fleets. Many of the world's fishing fleets are very old, and so many organizations, such as WWF, are working with governments to promote legislation and policies that requires new vessels being built for fisheries are built in accordance with low carbon emissions and greater efficiency. In effect this is legislating for a reduced carbon footprint. And on the other side of the equation, when thinking about reducing fishing capacity, it can be thought about in terms of not only reducing capacity but also the removal of "dirty" boats from the fishery, again legislating for a reduced carbon footprint. Whiles these are important fisheries issues, I'm not sure how and if remote sensing data can provide any useful inputs in support of these kinds of movements in transitioning of fishing fleets. However, I do think there is an aspect where satellite data can be very important and that is the issue of Rights Based Management.

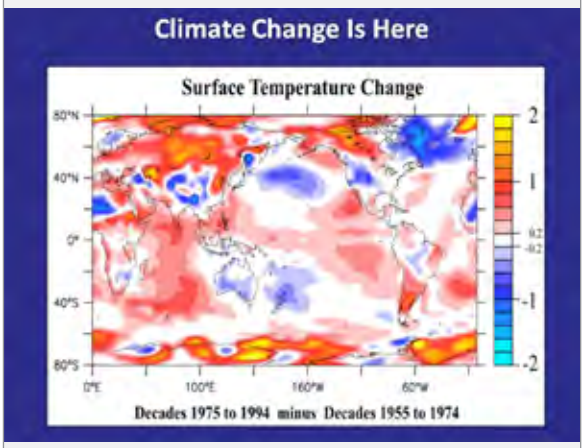
Rights Based Management is not a new paradigm in fisheries. It is a fisheries management tool where individuals or boat-owners, are given rights to harvest an existing fishing stock and through their "ownership" of a portion of the harvestable fish stock, rights holders have an incen-

tive to manage their allocation for the longer term. It's a bit like investing your money in the bank where that money is earning interest which you can withdraw while leaving your capital intact. And if Rights Based Management is going to be an increasingly important paradigm to improve the management of fisheries into the future, and we accept that under a changing climate primary production will be influenced by changes in water temperature and these might changes may differ geographically, then obviously this is going to have some impact on how Rights Based Management functions. Why? Because climate change may have a major influence on distribution of trans-boundary stocks (e.g. pelagic Tuna stocks). Under a changing climate scenario, the productivity of stocks of these species may shift making formerly highly productive fisheries less productive and in other areas formerly less productive fisheries more productive. And in relation to the "Rights" that people have to fish in certain areas and where we are talking about trans-boundary stocks, then this could create jurisdictional issues on an international level. Once again, I think this situation represents an opportunity for the application of remote sensing and satellite technology to collect data on geographic changes in climate indicators and movements of fish stocks as a result of these changes. And now to my last, concluding slide. If we accept that rising ocean temperatures and ocean acidification are radically altering aquatic ecosystem, that climate change is modifying the distribution and productivity of marine and freshwater fish populations and this is having impacts on the sustainability of fisheries and aquaculture, and on the livelihoods of the communities that depends upon them, then the question is; how can satellite data better support information needs for fisheries management agencies, what are the mechanisms by which that information can be disseminated and in terms of the forum in which we sit here, APEC, what are the regional implications for trade that can be leveraged to place increased emphasis on the need for satellite remote sensing data and by who and how can this be paid for. Thank you very much!

1


Climate change
Ecosystems
People

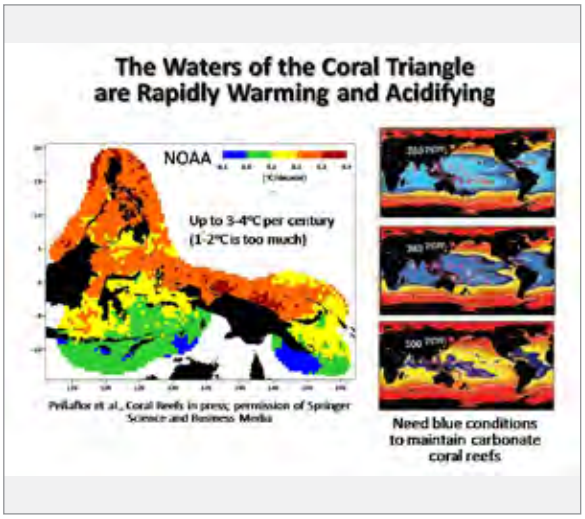
2


Climate Change Is Here
Surface Temperature Change
80°N
40°N
0°
40°S
80°S
0°E
100°E
160°W
60°W
2
1
-1
-2
Decades 1975 to 1994 minus Decades 1955 to 1974

3


Coral Triangle Region
Centre of Biodiversity
• Corals (>76%), Reef fish species (37%)
• Epicentre of most marine organisms
• 100 million people live coastally

4


The Waters of the Coral Triangle
are Rapidly Warming and Acidifying
NOAA
Up to 3-4°C per century
(1-2°C is too much)
Need blue conditions
to maintain carbonate
coral reefs

5


Climate Change: What are the Consequences?
Without effective action:
– Coral reefs may disappear from Coral Triangle by 2100
– Ability of the region's coastal environments to feed people will decline by 80 per cent
– Livelihoods of around 100 million people will have been lost or severely impacted.
– Issues of regional security will become far more acute
– Export income opportunities may be curtailed
A climate chain reaction?
???

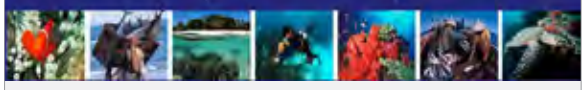
6


Climate Change: What actions must we take?
Adaptation:
Boosting reef resilience to ensure the best chance of surviving an increasingly hostile climate
No Fish
Fish
Investment in Adaptation :
Important part of response - but pointless if we fail to stabilise atmospheric carbon dioxide well below 450ppm

7

CC Impacts on Fisheries Systems

Natural Systems	Man-made Systems	Human Systems
Coral Reefs & fish resources	Fish ponds	Food Supply
Coastal Habitats fish resources	Fish cages / Fish pens	Livelihood
Open Water (tropic pyramid, circulation etc)	Seaweed farms	Settlement areas
Pelagic and offshore fisheries	Oyster/ Mussel farms	Fresh water supply
		Health
		Community



8

Tropical coastal resources are critical to 100 million people yet are threatened.

Coastal resources provide:

- Food
- Income
- Building materials
- Coastal protection
- Wave energy
- Storm/tsunami impacts
- Coastal stability
- Traditional medicines
- Bio-discovery
- Cultural importance

Sea grass

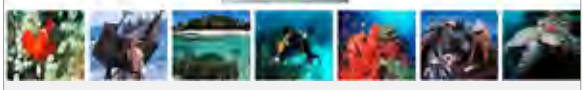
Coral reefs are declining at 1-2% per year (Bruno and Selig 2007)

Local factors

- Water quality/pollution
- Over-fishing
- Destructive fishing
- Physical destruction

Global factors

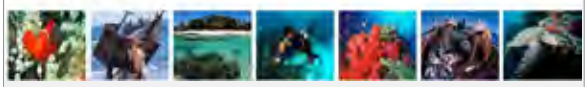
- Ocean warming
- Acidification
- Sea level rise
- Storm intensity
- IUU Fishing



9

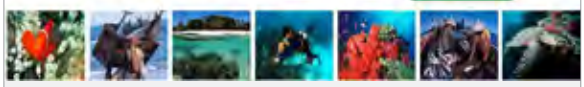
EA to Fisheries in Changing Climate

- EAF/EAA useful for:
  - Addressing adaptation or resilience of fisheries and aquaculture in the face of climate change impact and effects.
  - Identifying ecological, and social indicators to monitor and evaluate climate change impacts
  - Provide funding opportunities for EAF/EAA related work.



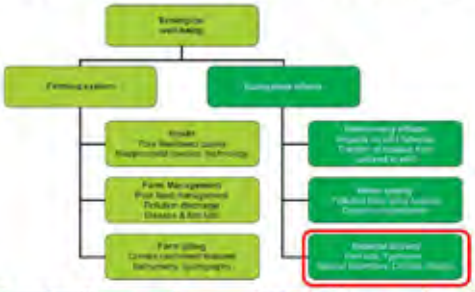
10

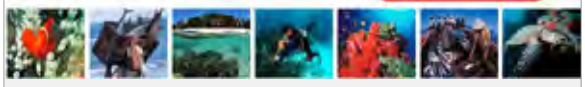
EA to Fisheries in Changing Climate



11

EA to Aquaculture in Changing Climate



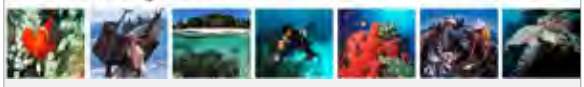


12

Resilience and Fishery Management

Improved resilience needs improved fishery management

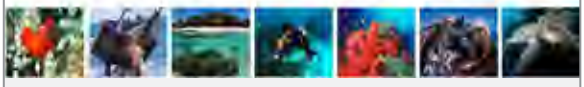
- Decreased pollution and sedimentation
- Decreased anthropogenic stressors
- Improved habitat (i.e. coral cover)
- Reduction in Illegal, Unreported and Unregulated fishing
- Monitoring of MPAs



13

Fishery Initiatives – "Blue Economy"

- Focus on developing international collaboration:
  - Indirect "Greening" the fishing fleet through:
    - New vessels being built in accordance with low carbon emission and greater efficiency (carbon footprint);
    - Reduce fishing capacity thru removing "dirty" boats
  - Rights Based Management (RBM):
    - Primary production influenced by water temperature and under CC this may change geographically;
    - Climate change may influence distribution of trans-boundary stocks may resulting in jurisdictional issues

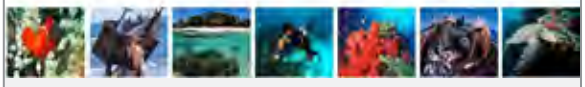


14

Conclusions

Rising ocean temperatures and ocean acidification are radically altering aquatic ecosystems. Climate change is modifying fish distributions and the productivity of marine and freshwater species and this has impacts on the sustainability of fisheries and aquaculture, on the livelihoods of communities that depend on fisheries, the question is:

- **How can satellite data better support information needs for fisheries management agencies**
- **What are the mechanisms by which that information can be disseminated**
- **What are the regional implications for trade that can be leveraged - by who and how can this be paid for**



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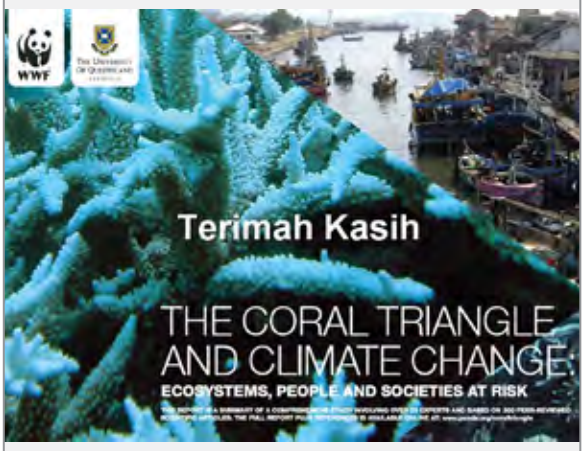


16

Climate Change and the Coral Triangle

What are the consequences?

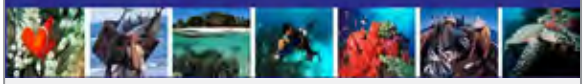
20 experts and based on 300 peer-reviewed scientific articles.

Input and review by CT researchers and practitioners

Modelled 2 different IPCC climate change scenarios:

current climate change path

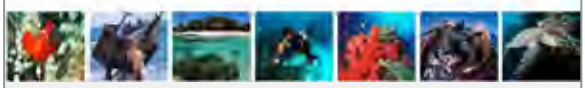
best-case



17

First, we must…
Know what to expect . . .

1. Understand CC and its impacts
2. Scenario Setting with focus on local vulnerabilities
3. Information and data gaps filling
4. Identify partners

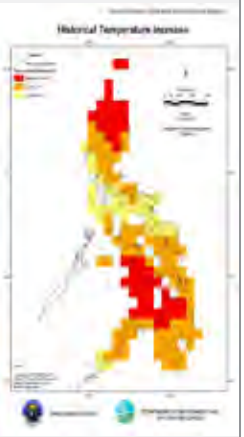


18

Climate shifts will vary from place to place.

In most cases, adaptation will have to be **planned and implemented locally.**

National or Regional efforts, should focus on harmonization.

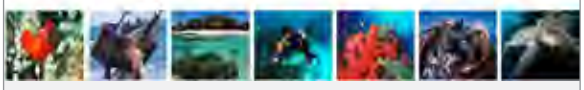


19

second, we must...

Know what to do . . .

1. Evaluate scenarios most likely to happen
2. Prepare some measures specific to each situation "Adaptive Measures"
3. GET INVOLVED – business & individuals can make a change. Government alone will not succeed
4. Look for job and business opportunities



20

PREPARE

1. Scenario Building

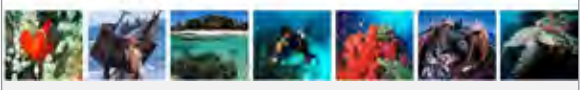
Impacts on fisheries resources / ecosystems of the fishing **village**

Impacts on fisheries resources/ ecosystems from land-based sources

Impacts on the people and community in terms of:

Livelihood,
Food supply,
Fresh water supply,
Health (diseases)

NFR Fishing Village



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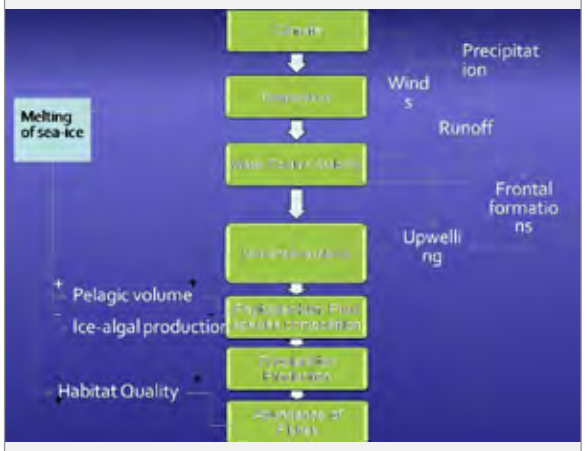

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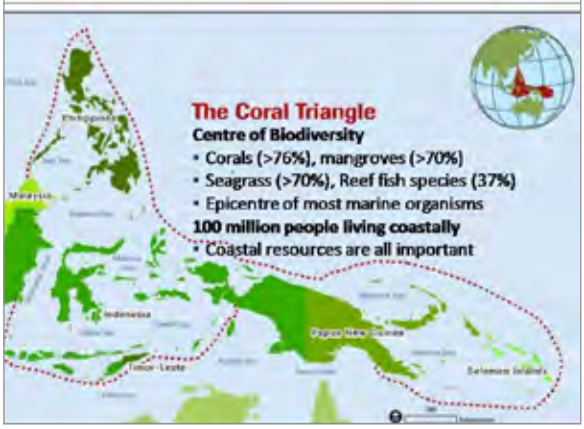


Utilization of Remote Sensing Data to Improve Capture Fisheries Production in Indonesian Waters

Dr. B. Realino, Institute for Marine Research and Observation, Bali, Indonesia

So, I want to apologize, because I just come from a workshop in university in….. So I try to inform you about our activity. In our office, it is in the Institute for Marine Research and Observation and I will inform you about our activities in using satellite data. This is my outline, plus I want to introduce my office, then our activities, our ground station operational, fishing ground map implementation and future plan. This is the location of my office. It is in Bali, but if you want to go there it is about a few hours from here, about one kilometer from the coast. This is the observation of our office. Our mission is to achieve a mixture of research and observation capacity and monitoring of the ocean. We have three research teams. The first one is Ocean Remote Sensing Team, the second one is Ocean Modeling and the last one is Climate Change Team. The Ocean Remote Sensing research team is the first team that we have since 2002, involved in collecting satellite data, like seas surface temperature, sea surface height, ocean color and tropical cyclone to support another information, like CTI observation, fisheries oceanography, regional and local areas. The second research team is Ocean Modeling, created in support of Ocean Remote Sensing and Climate Change teams to make some modeling about oceanography. The last one is the Climate Change team.

This is the youngest research team, created earlier this year. The main objective of this team is to see the sea–air carbon flux and the ocean acidification. The other concern is the Coral Triangle Initiative for bleaching, and identification of coral reefs. I want to go into more details about Ocean Remote Sensing research team regarding the topic of my presentation. I work in this research team, which activities are: ocean satellite database collection, then from the ocean database we produce fishing ground map distribution and also we do some research and development for fishing ground and with the ocean satellite we also do some observation for ocean phenomena and dynamics. This is our equipment. We have a receiving ground station in Perancak. This ground station was built in 2005 by CLS France. Our ground station started in 2002. This is the first installation. The next installation in 2003 and then the CLS France built a new antenna in 2004. The station is collecting remote sensing or satellite data, like seas surface temperature data, sea surface heights data, sea surface chlorophyll-a data and this is a sample of fishing ground data. After collecting data we distribute this data in our website. This is the example of what we have done. This is the fishing ground map on our website. This is the website address. This is the example of

the national fishing ground map area in Sumatra. Made in five areas: Java area, Sumatra, Papua and Maluku, Kalimantan (Borneo) and Sulawesi area. We also make some semi detail fishing ground map. The fishing ground map I mentioned before is lower resolution map. This is more detailed fishing ground map of the Bali Strait area. We also make in Sawu Sea — it is another area in Indonesia. Then we also make fishing ground map for some fishing ports. This is the example of the fishing ground map. This is Pemangkat fishing port. This is the location of the fishing port. This is the main fishing port we distribute our fishing ground map. We plan to cover all fishing ports in Indonesia. This is our main objective in 2014. We want to do some operational oceanography for fisheries capture, for marine culture and also for ocean observation. In next two years we also plan to make automation for fishing ground collection and for marine culture. We also want to have some early warning system for ENSO and IOD phenomenon. This is our equipment to support operational oceanography, the processor (IT). By the fishing ground map we also disseminate satellite data on our website.

And this is the distribution flow: after we produce and process satellite data we disseminate fishing ground map to fishermen, but no directly to fishermen, we coordinate it via local government to distribute to the fishermen. And after that fishermen will report to us their fish catch report each month. We put our fishing ground map in website, this is our ministry website, so that everybody in Indonesia can download it. Until now the fishing ground map is still free. This is the fishing ground map in another ministry website. So fishermen who have Internet connection, can download this fishing ground map free every day. But sometime not every day, because in depend on satellite data condition, if it is more cloudy — we cannot update this fishing ground map. This is the satellite data we receive on our website. This is our future design we trying to make some operational oceanography for ocean remote sensing. And this is the picture of our future plan “Operational Oceanography”. We want to do some forecasts on fishing ground, mariculture and etc. I think this is the last topic. Development program in our plan. First step is we want to develop ground station capability, we also would like to develop our database management and to do some research development for fishing ground maps, especially for big eye and yellow fin tuna and Sardinela Lemuru. We plan to make some fishing ground maps for big eye and yellow tune and sardinela lemuru in 2012 and 2013. Also we want to make automation for fishing ground map processing in 2014. Then we want to make operational oceanography for fisheries capture. I think this is the end of my presentation. Thank you.

1

OUTLINE

- IMRO Description
- Ground Station Operational
- Fishing Ground Map Implementation
- Future Plan

2

Institute for Marine Research and Observation (IMRO) Office

3

IMRO Statement of Vision

As a *Center-of-Excellence* for the Implementation and Development of Marine Applied-Research and Observation

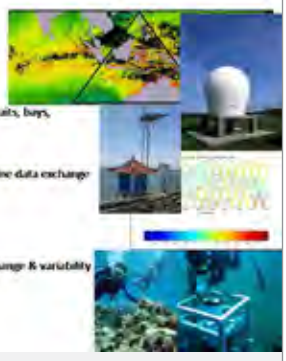
Statement of Mission

1. **ACHIEVEMENT;** of marine research and observation capacity & competency building
2. **MASTERY;** marine resources applied-research and monitoring supported by continous & virtual data and information system
3. **ENHANCEMENT;** the utilization of ocean research and observation program

4

Research Teams at IMRO-SEACORM

- **Ocean Remote Sensing**
  - SST, SSH, ocean color
  - tropical cyclone
  - support CTI observation (SSH)
  - *operational fisheries oceanography*
  - regional & local fishing ground (internal sea, straits, bays, high-sea)
- **Ocean Modelling**
  - marine data asimilation, marine database, marine data exchange
  - Ocean dynamics prediction
  - coastal modeling (e.g. oil spills)
- **Climate Change**
  - Sea-Air carbon flux
  - Coral Triangle Initiative → bleaching, climate change & variability
  - Ocean acidification



5

Ocean Remote Sensing Research Team

Member:

Denny Wijaya Kusuma, B. Realino, Bambang Sukresno, Komang Iwan, Teja Arief, Adi Wijaya, Eko Susilo, Dinarika, Ari Murdimanto, Hanggar Prasetyo, Wawan & Novianto.

Activities:

- NOAA Ground Station Operational (not operational since April 4, 2011)
- Ocean Satellite database management (SST, Chlorophyll-a, SLA & SSCur)
- Fishing Ground Map distribution
- R & D for Fishing Ground
- Ocean phenomenon observation

6

Ground Receiving Station in Perancak

Antenna

Computer acquisition

Ground Station Room

7

Development of The Antenna

Year 2002

First instalation in September 2002 around IMRO residential

Year 2003

Next installation after IMRO Office was built

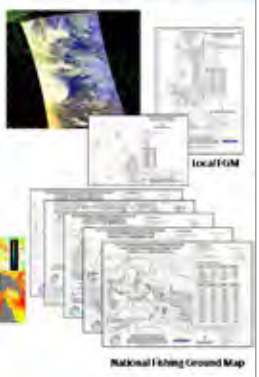
Year 2004 – March 2011

CLS France built new antenna in November 2004

8

Satellite Ground Receiving Station Operational

- Satellite database compilation
- Fishing Ground Map distribution
- Ocean phenomena observation



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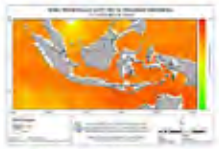
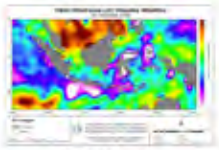
SATELLITE OCEANOGRAPHIC DATA



Sea surface temperature

Sea surface chlorophyll-a

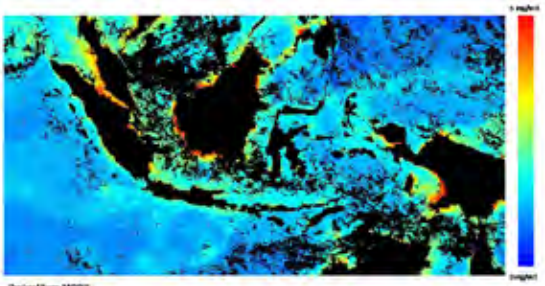


Sea level anomaly

Sea surface current

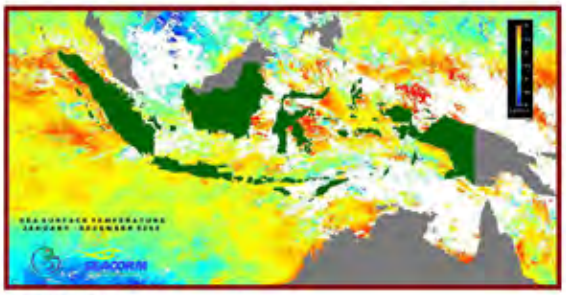
10

Monthly Average *Chlorophyl-a* distribution in Indonesia sea 2007 - 2008



11

Monthly Average of SST in Indonesian Sea (2008)



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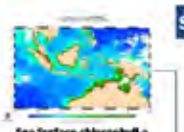
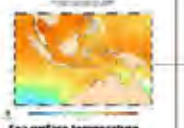
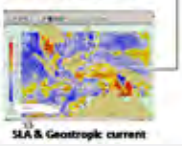
Satellite Data for Fishing Ground Map



Sea Surface chlorophyll-a



Sea surface temperature



SLA & Geostropic current

Fishing ground map distribution system

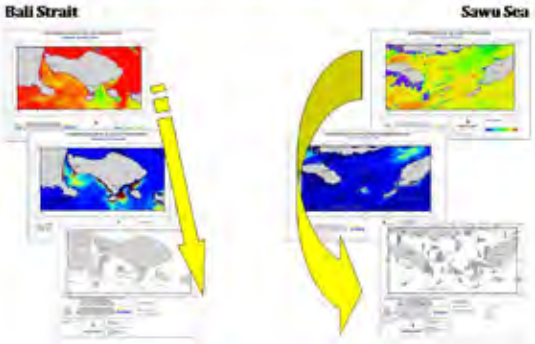
http://www.brok.kkp.go.id

13

National Fishing Ground Map

14

Semi Detail Fishing Ground Map



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MAIN OBJECTIVE IN 2014 (Ocean Remote Sensing Only)

1. Operational oceanograhy for Fisheries Capture
   - Fishing Ground Map development for economic pelagic fish (Tuna & Skipjack Tuna)
2. Operational Oceanography for Marine Culture
   - Development for database automation for marine culture
3. Operational oceanograhy for Ocean Observation
   - Early Warning System for ENSO & IOD phenomenon
   - Identification for upwelling phenomenon

17

IT Support for Operational Oceanography

- Mikrotik Server optimization
- Bandwidth development (now: 2 Mbps)
- FTP Server development (online data storage)
- Web Server development

18

Information Dissemination on Website (current condition)

1. Fishing Ground Map (FGM)
   - National FGM (Sumatera, Jawa-Bali-Nusa Tenggara, Kalimantan, Sulawesi & Maluku-Papua)
   - Semi detail FGM (Sawu Sea & Bali Strait)
   - Fishing Port Area FGM
2. Satellite Data
   - Sea Surface Temperature
   - Sea Surface Chlorophyll-a
   - Sea Surface Height

19

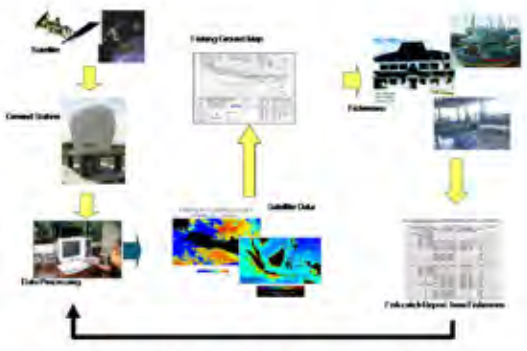


Diagram of Fishing Ground Map Production and Distribution

20

Fishing Ground Map in MMAF Website (since 2005)

21

Fishing Ground Map in AMFR Website (since 2006)

22

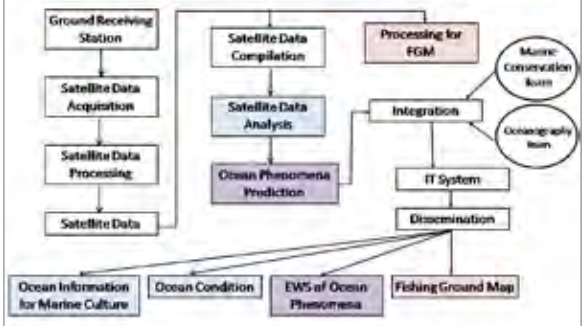
FISHING GROUND MAP DISTRIBUTION (IMRO website, since 2008)

23

SATELLITE DATA DISTRIBUTION (IMRO website, since 2009)

24

Design of Operational Oceanography for Ocean Remote Sensing



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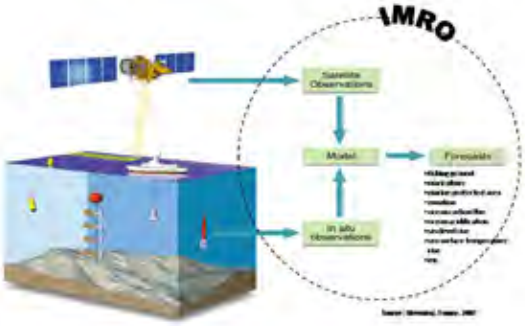
IMRO Future Plan → Operational Oceanography



26


DEVELOPMENT PROGRAM 2011-2014
• Development for Ground Station Capability
→ room, computer, satellite data acquisition
• Series data from in situ measurement (fix station)
→data logger or buoy
• Database management development
• Research development for FGM
– Big Eye & Yellow Fin Tuna Potential Location Map (2012)
– Sardinela Lemuru Potential Location Map (2013)
– Automation for FGM processing (2014)
• Operational Oceanography for Fisheries Capture

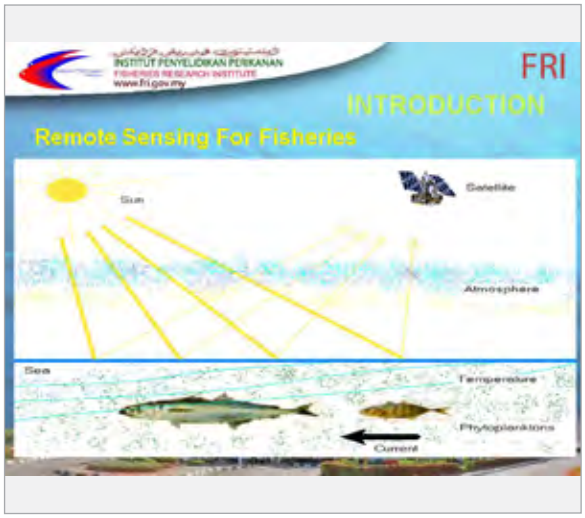
The Application of Remote Sensing Technology to Fisheries in Malaysia

Dr. Ku Kassim bin Ku Yaacob, Fisheries Research Institute, Malaysia

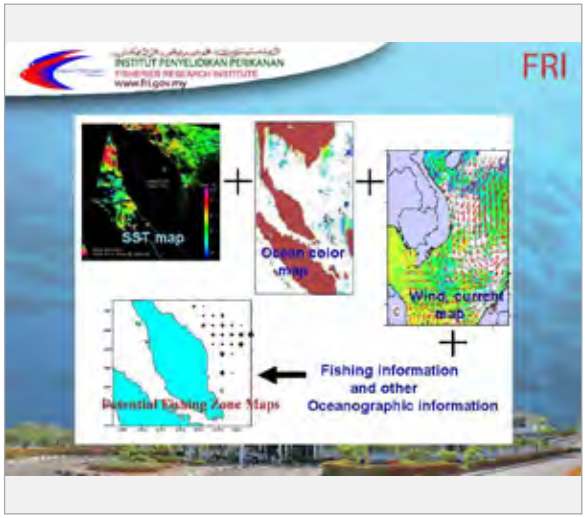
Thank you very much. My name is Ku Kassim bin Ku Yaacob from Fisheries Research Institute. Today I would like to talk about activity using remote sensing for fisheries in the sea. Speaking about fisheries and remote sensing I think all of you know since this morning that the concept of remote sensing is something that on the screen, which is remote sensing detecting ocean condition, not detecting the fish itself but ocean condition, which is important for fish distribution. To….. concept fisheries and remote sensing requires temperature map, ocean color map, wind, current map and other conditions. After that we can produce potential fishing zone maps, which can be distributed to fishermen. For Malaysia we can measure our influence by two monsoon seasons, mainly Northeast Monsoon, which is in December to February each year and Southwest Monsoon, which is during June to August each year. This is the map of January wind in ocean, North–West Monsoon. And this is chlorophyll condition during this month. We can see that this has high chlorophyll content. We can also see that during this March it has plankton bloom offshore. This area, ok? This plankton bloom originates from …… north–east to the south–west. This situation is in January. This is in May. July: this one during southwest monsoon season. You can see that the wind condition already changed. You can see this strong wind here and during this season we can have very good upwelling. You can see the upwelling. SOS here. So we have to investigate this upwelling phenomena. You see this SST, it's a chlorophyll map. You can see that during this period we had high chlorophyll content, but low SST, from A to B, SOS from C to D. High chlorophyll, but low temperature. Meaning that this is the upwelling area. In the three….we collected…..in 2006 and we found that in this upper region of Straits of Malacca high content of chlorophyll. You can see that in this region, this area quite high chlorophyll, but I think this is due to the ability of the water, not the chlorophyll itself, but the ability of the water. So that's why we have to investigate into this area to conclude that this area is reach in chlorophyll during the tide. This is the concentration of phosphate at sea surface during this period, high in the northern area, high chlorophyll, meaning that lower water level of the sea comes to the upper level to create the upwelling. This is the result of the hydroacoustic survey (SA value). We got high high SA value, meaning that we have more fish in this area. X to Z we got higher fish content. So we have high SA value in this area. We suspect that this area has high efficiency, but this imagery cannot show anything, whether it is

high…….to the ocean condition or not. So based on this information, on this knowledge fisheries agency collaboratively work with LKIM (Malaysian Fisheries Development Board), Remote Sensing Agency, Fishermen's Association, Malaysian Institute Of Microelectronic Systems to develop fish forecasting system in Malaysia. The project was implemented in 2007-2010. Those are system components of the project. Number one is "Sea truth and model calibration". We have to undertake oceanography courses and compare catch data from fishermen. Number two is "Processing satellite image" (MODIS, OCM, NOAA, RADARSAT and so on). Then number three is "free database and the model". Number four is "potential fishing ground map". And the fifth component is the distribution system to the user. That means fishermen. So we have developed this kind of system to the website "Sistem Penentuan Lokasi Ikan" (Fish Forecasting System). It can be accessed by registered users only. And registration is determined from local fishing association. This data is from 1st June 2011. The data has longitude, latitude and the zone, the fishing zone. This is data has high potential for fish catch during this day. And this is the map of this data on the 1st of June. This area — highly potential for fish catch. I thing similar data have been presented by …..We have used SST gradient, chlorophyll maps and so on to model fish distribution area. So we have here, it is the example, monsoon on the 18th of May we have in Sarawak. Potential rotation of fish in Sarawak with detailed position. To use this system the fishermen or fisher vessel should have legal license. If IUU vessel, it is not legal, so we cannot register it. So, all fishermen have to report their activities: vessel number, coordinates, volume of catch and type of fish. This is the weather report from the Malaysian Meteorological Department, so fishermen can check whether it is safe or not for fishing operations: wave height, wind speed and so on, we have it all here. For information distribution we have sms system. We data is available in the web we send the sms to the registered users only. This is the sample of the sms on 1st June 2011. When fishermen get this sms, they can browse the Internet and see, where is the location of fishing. Until 7th June 2011, 142 vessels have registered with this system. So far we received 19 feedbacks and many informed the good catch.

1


FRI
INTRODUCTION
Remote Sensing For Fisheries
Sun
Satellite
Atmosphere
Sea
Temperature
Phytoplanktons
Current

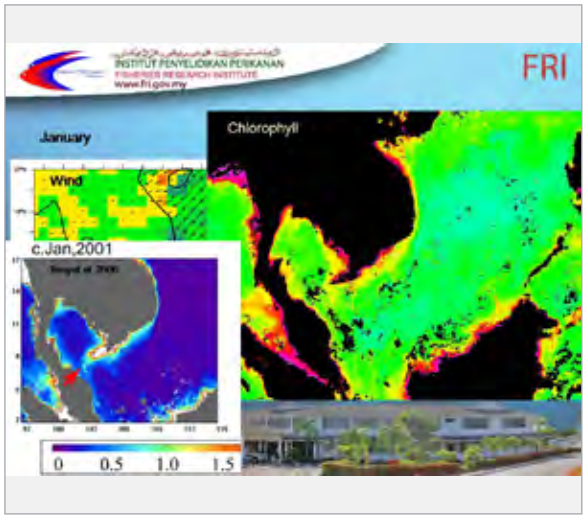
2


FRI
SST map
Ocean color map
Wind, current map
Potential Fishing Zone Maps
Fishing information and other Oceanographic information

3


FRI
Sea surface conditions
Malaysia is influenced by two monsoon seasons :
•Northeast Monsoon (December-February)
•Southwest monsoon (SWM) (June - August)

4


FRI
January
Chlorophyll
Wind
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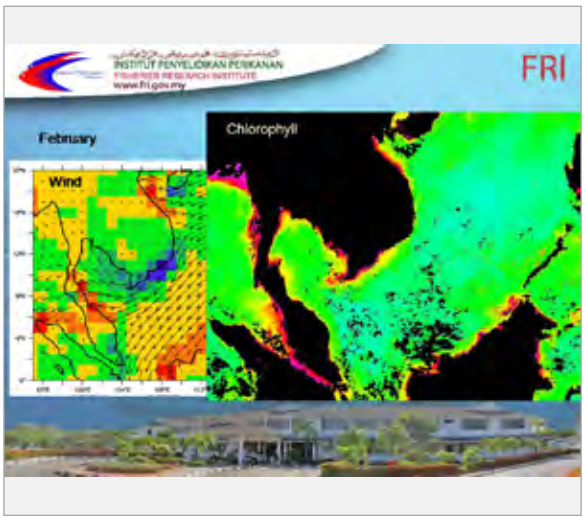
FRI
February
Chlorophyll
Wind

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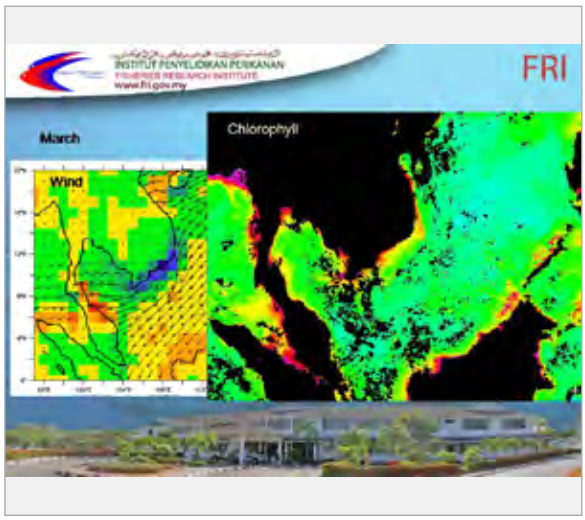
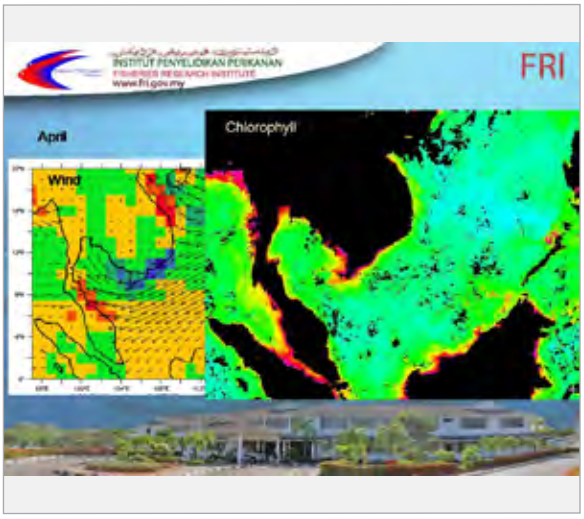
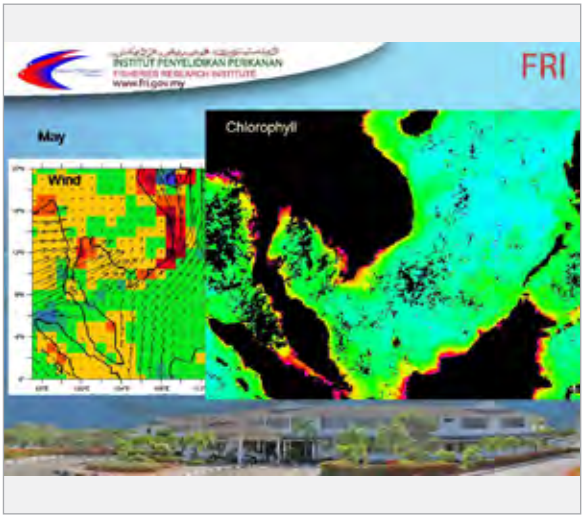

FRI
March
Chlorophyll
Wind

7


INSTITUT PENYELIDIKAN PERIKANAN
FISHERIES RESEARCH INSTITUTE
www.fri.gov.my
FRI
April
Chlorophyll
Wind

8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FRI
May
Chlorophyll
Wind

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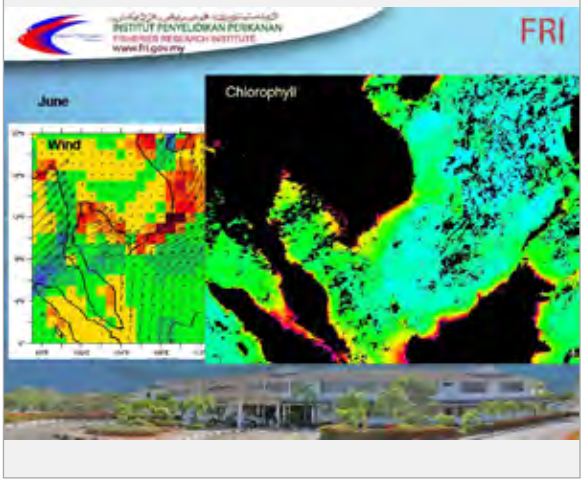
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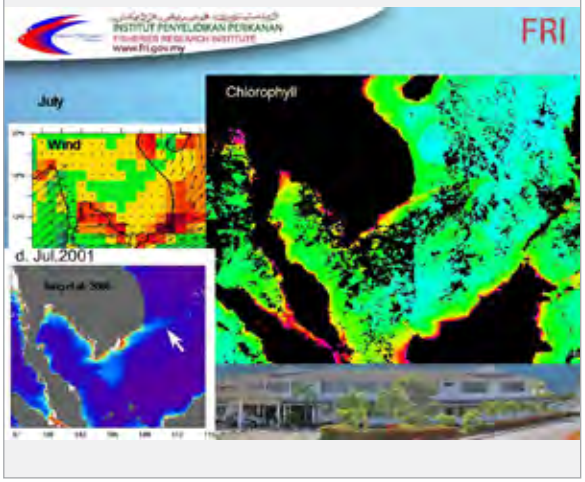
FRI
June
Chlorophyll
Wind

10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FRI
July
Chlorophyll
Wind
d. Jul.2001

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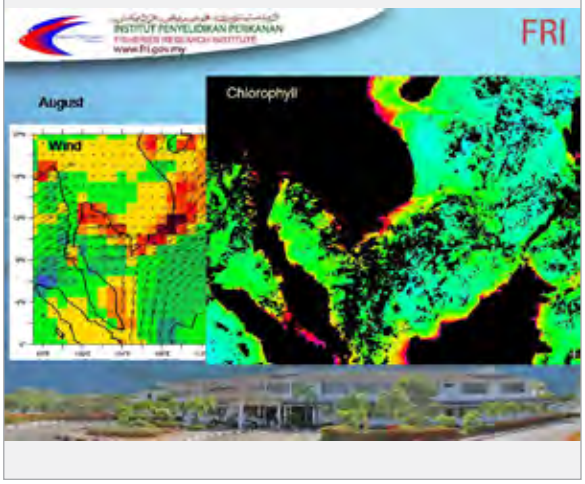
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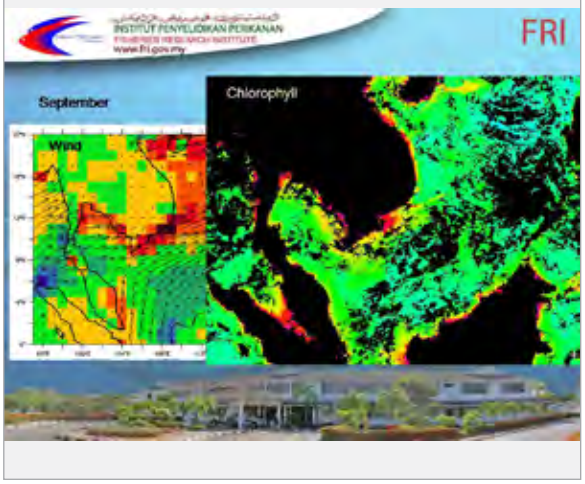
FISHERIES RESEARCH INSTITUTE
www.fri.gov.my
FRI
August
Chlorophyll
Wind

12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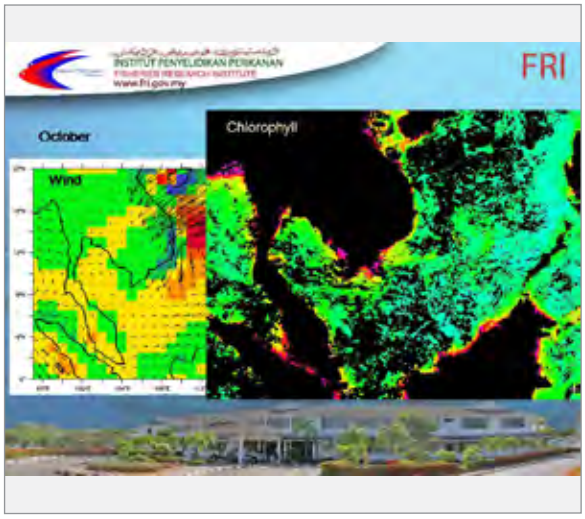
www.fri.gov.my
FRI
September
Chlorophyll
Wind

13



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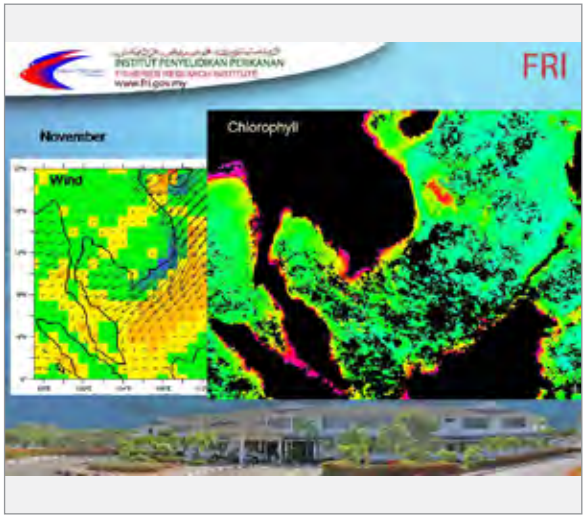

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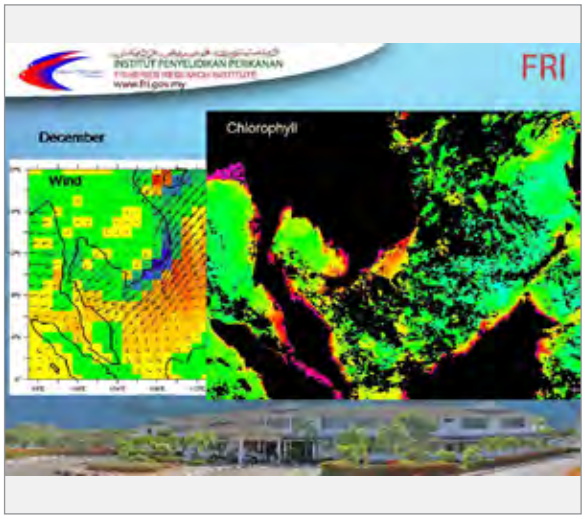

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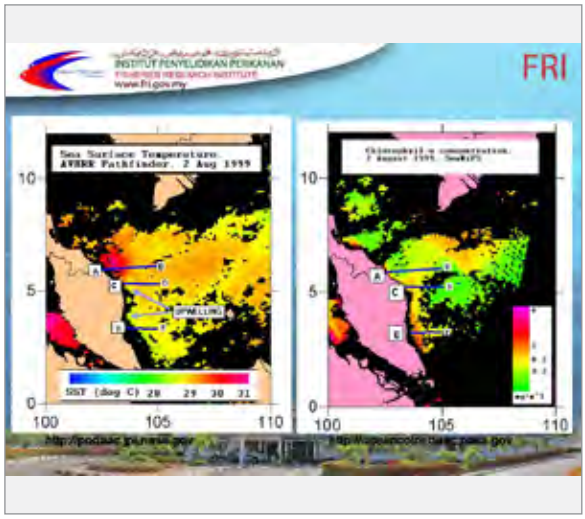

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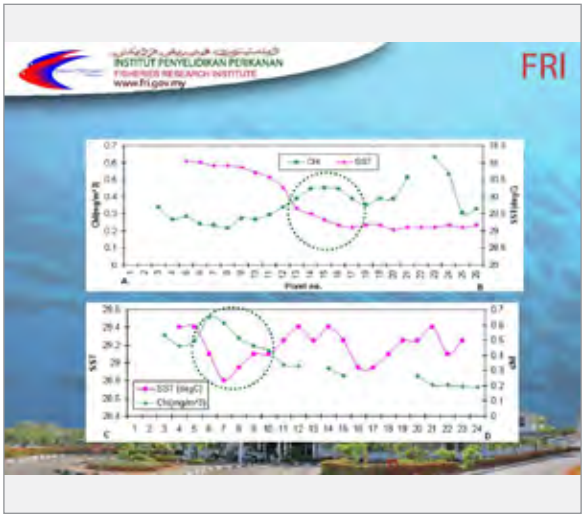

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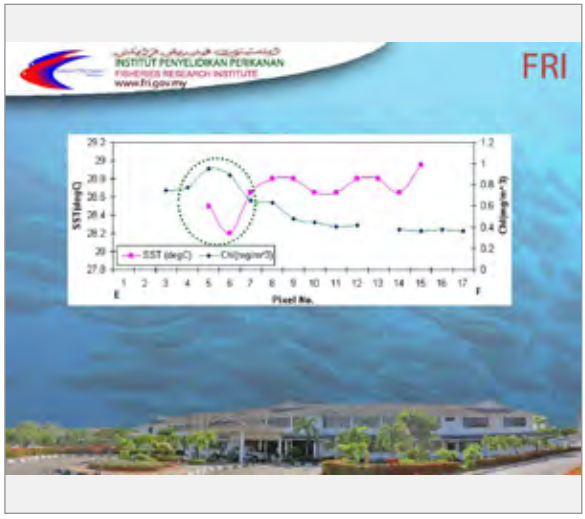

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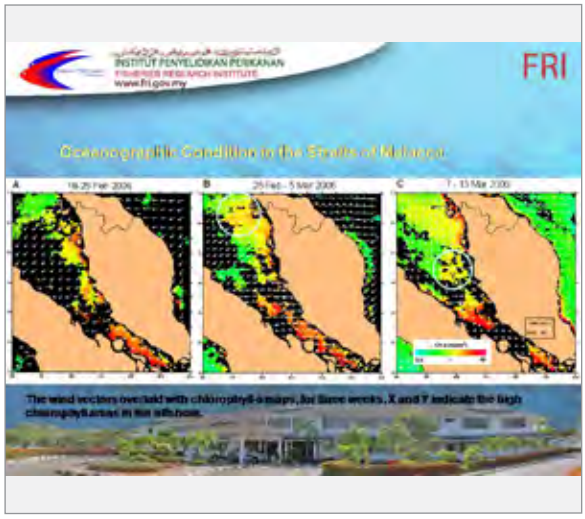

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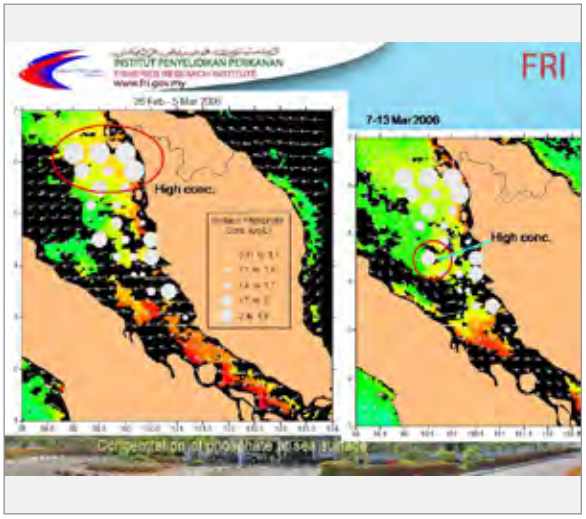

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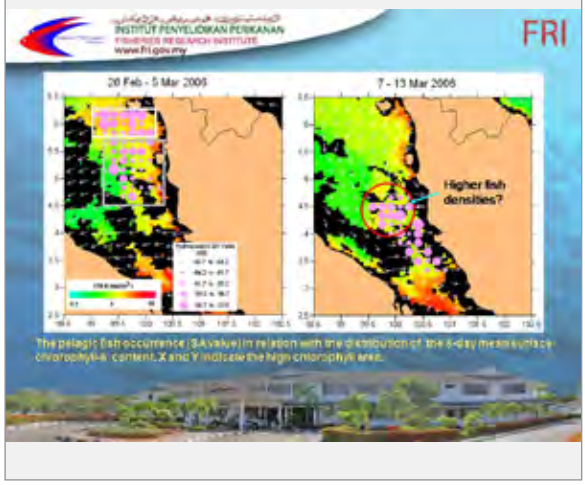

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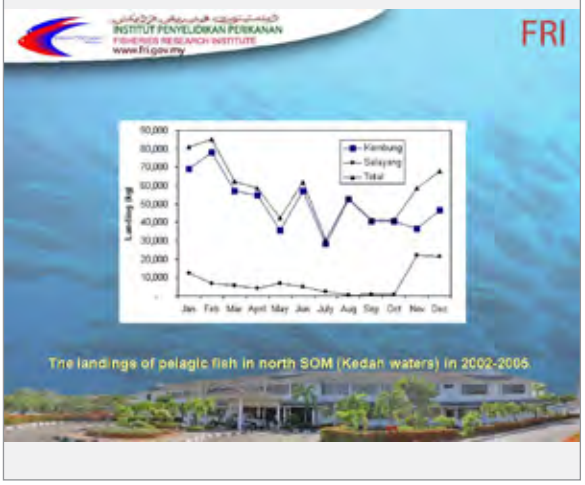

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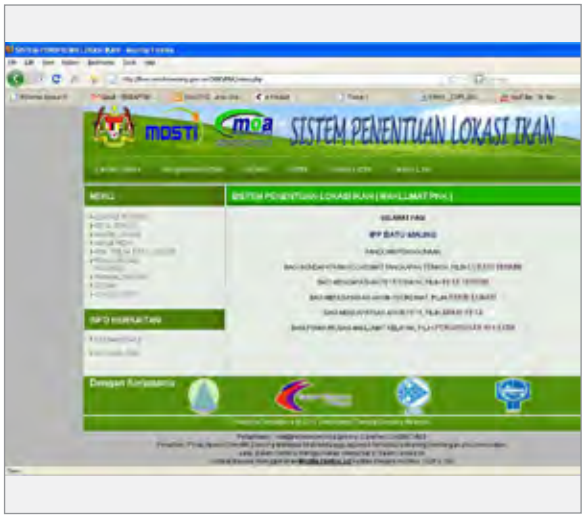

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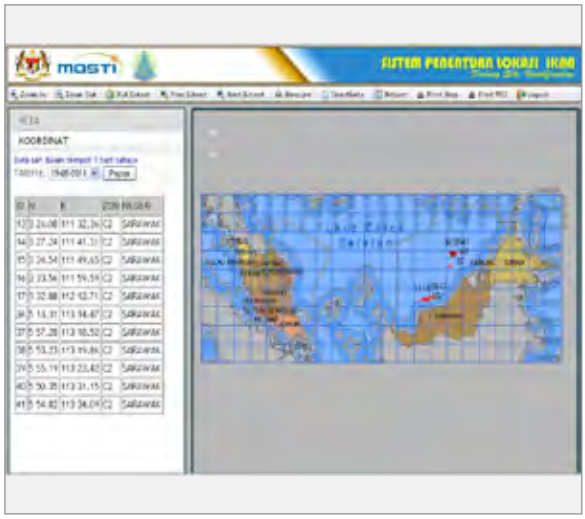

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FRI
JABATAN METEOROLOGI MALAYSIA

32


MOSTI
moa
SISTEM PENENTUAN LOKASI IKAN
SISTEM SEBARAN MAKLUMAT (MyDMS)
Dengan Kerjasama
Textmessage
From 15888
RM0.00 RSENSING: Lokasi berpotensi untuk penangkapan ikan terkini P. Timur bertarikh 01-Jun. Sila layari, http://ikan.remotesensing.gov.my:3000/
Options
Back

33


INSTITUT PENYELIDIKAN PERIKANAN
FISHERIES RESEARCH INSTITUTE
www.fri.gov.my
FRI
• Until 7 June 2011, 142 vessels have registered with this system.
19 feedbacks received, many informed the good catch.

34


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THANK YOU FOR YOUR ATTENTION

Commercial Satellite Imagery for Maritime Services

Anna Antonyuk, RDC Scanex, Russia

Dear colleagues.

The title of my presentation “Commercial Satellite Imagery for Maritime Services”. And first of all I would like to say a few words about our company: SCANEX Research and Development Center is the leading Russian company on the remote sensing market that offers a complete set of services ranging from reception to thematic processing of Earth observation images from Space. SCANEX has been operating as a private company since 1989.

And there are 3 main advantages of SANEX: first SCANEX has been manufacturing and installing compact multimission ground stations UniScan for Earth observation satellite imagery reception. 9 stations located in 4 reception centers.

And Operate on the bases of common program under common control from the Moscow center.

Second advantage is that SCANEX is the only Russian company that has signed license agreements with the Top World (Operating) Remote Sensing Operators for direct data reception from EROS-B, SPOT, Landsat, Envisat, Radarsat satellites series and also SCANEX has distribution agreements with Global Operators of high and ultra-high resolution of remote sensing from QuickBird, GeoEye, TerraSAR, etc.

And one more thing I would like to emphasize is that SCANEX has developed geo-portals on the base of Earth Observation DATA.

Here you can see our most popular web–geo–portals and the complete information Georgy will tell you later.

And now let me describe the scheme of our work:

First of all we receive satellite imagery to our ground stations UniScan, than our specialist process them in near real-time mode and after that a complete

the end information we transfer to customers via geo–portal.

And talk to maritime Services:

There are 2 main Maritime SAR-based Services: Oil Spills and Ships Routing Monitoring. SCANEX Center provides sea pollution and ship detection services in seas around Russia as you can see.

And operative products are supplied via Kosmosnimki web-portal for clients.

There are integral maps in the Black Sea, Finish Bay and Caspian Sea.

Here you can see oil spills which are detected as red polygons and ships are detected as yellow points.

SCANEX has also experience in illegal fishery monitoring in Federal Nature Protection Area in the Caspian Sea - Maluy Zhemchezhnuy Island closed for fishing activity.

In order to carry out monitoring firstly we created an Integral Map of Shipping Activity in the Northern Part of Caspian Sea.

And on numerous occasions vessels and vessel spills were detected on the images.

TRANZAS company joint with SCANEX RDC demonstrated the possibility of vessel identification on SAR images by displaying them together with the navigation and traffic maps using the AIS and VTMS systems on the common geospatial base.

And here you can see black triangular — this is ship detected on the AIS Map and the red points – this is ships were detected on the SAR images.

However, some ships detected on SAR images per AIS data failed to be identified. Such was the case that took place near the protected area Maluy Zhemchezhnuy Island and supposedly it was the fishing vessel.

This is the typical model of illegal fishery monitoring:

UniScan ground Stations receive information from Radarsat and Envisat satellites and combined with CLS data at to surface situation report after that the calls dat vessels receive for making the right and fast decision.

And this is the example of oil pollution near Federal Protected area. You can see oil spill and ship. This is mordeling of oil slick drifting plus 12hrs and this is show us the direction and distribution of oil slick.

The next SAR image demonstrate us 2 ships and 1 slick and using modeling 12 hrs back we found the ship that caused pollution.

Another SAR image demonstrate us 2 oil slicks and 2 ships, and using modeling we found that these oil slicks were produced from two different ships.

Another oil pollution modeling on RADARSAT–1 and ENVISAT–1 Satellites Images received 4 hrs one after another.

Red polygons mean pollution detected on Radarsat and Orange polygons — on Envisat images and modeling are marked as Violet color.

And a decision of Complex use of Optical Imagery and Satellite Imagery (SAR Images) with enables to use a new product — Very High Resolution Satellite Imagery.

This is the example of optical image delivered by EROS-B Satellites.

And another example of using Very High Resolution Imagery.

First of all we found a group of vessels which were detected and than using Very High Resolu-

tion Imagery we detected an oil platform TRIDENT-20 and support vessel near this platform. And this is model of using Very High Resolution Imagery, for example first of all we detected oil spill than we use a modeling of oil slick drifting and find the place that caused the pollution and than applied a Very High Resolution Imagery. Here you can see an oil platform and near the oil spill.

This is a Very beautiful example of oil platform and its shadow and as you can see the some purification, push which broke the ice.

SCANEX has also joint pilot projects since 2007 up to this day.

And in 2008 on the bases of SAR images the Sea Port Administration (SPA) of Novorossiysk inspected the oil tanker which arrived to Novorossiysk port in the Black Sea under the flag of Panama “Rasim Akar”.

And found the failure of the onboard water purification equipment.

The owner suffered serious losses due to unplanned forced demurrage of the ship in Novorossiysk port.

Another project in 2008 when Oil products leakage from nose section of sunk VolgoNeft–139 was detected by SAR monitoring and Ministry of transport decided to move this tanker section for utilization.

In 2009 the project of 5 Russian Seas monitoring was performed.

And the goal of the project was to collect the marine pollution by oil and petroleum products and the result of this project was that the most dirty was the Black Sea, the most clean — the Sea of Japan.

And last but not least another project for shipping control in White Sea during Harp Seals Breeding Period in March 2009-2010.

We received maps with recommended ships routes from SAR–images, detected ships and harp seals breeding zones.

SCANEX Center has developed the technology for harp seals breeding zones detection using high-resolution optical images.

First of all, holes and tracks on ice field are used as the indicators of the seals activity. And than applied a Very Higher Resolution imagery we found the probable area of Harp Seals breeding zones in the ice of the White Sea.

And in conclusion I would like to emphasize that the combination of Remote data, AIS data, oil modeling system and also attributive information everything this is the effective system for marine services, marine monitoring.

And that’s all.

1


ScanEx
About the company
ScanEx Research & Development Center
Company profile:
Small-size Ground Station
Products and Services
Software
Advantages of offered solutions:
Fast
Cheap
Streamlined
Company exists as an independent commercial structure as of 1989

2


ScanEx
ScanEx Ground Station Network For Near Real Time Satellite Monitoring
4 centers, 9 UniScan™ stations; 14 EO sats,
Over 150 passes per day, more than 600 GB data received daily

3


СканЭкс
SCANEX Ground Receiving Network
ScanEx control Center in Moscow
Moscow
Magadan
Megion
Irkutsk

4


СканЭкс
Multi-mission Solutions: 15 + 12
Direct downlink to stations in Russia
Distribution after Acquisition abroad
EROS A
CARTOSAT-1/2
EROS B
IRS-1D
FORMOSAT-2
IRS-P6 (Resourcesat-1)
SPOT 4
SPOT 5
Aqua
Landsat 5
RADARSAT-1/2
ENVISAT-1
Terra
IKONOS
QuickBird
WorldView 1/2
GeoEye-1
AI-OS
Kompsat-2
TerraSAR X / TanDEM X
COSMO SkyMed-1/2/3/4

5


Customized Web-Portals from SCANEX
*Maritime control — http://ocean.kosmosnimki.ru
*Flooding Monitoring — http://rivers.kosmosnimki.ru
Image Archive Searching — http://search.kosmosnimki.ru
Monitoring of Illegal Activity within the Nature Protected Areas — http://oopt.kosmosnimki.ru
Fires Monitoring — http://fires.kosmosnimki.ru

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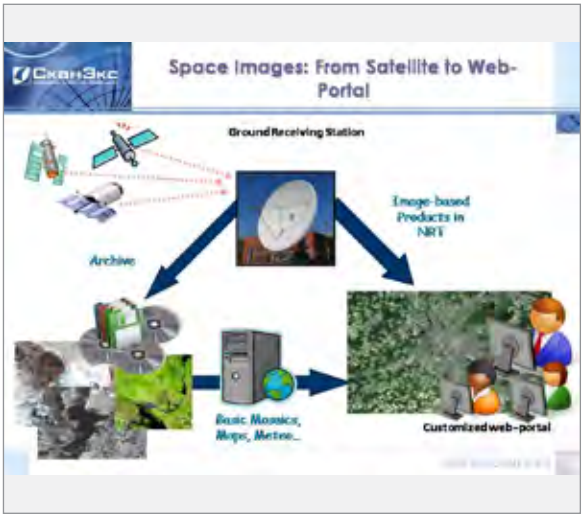
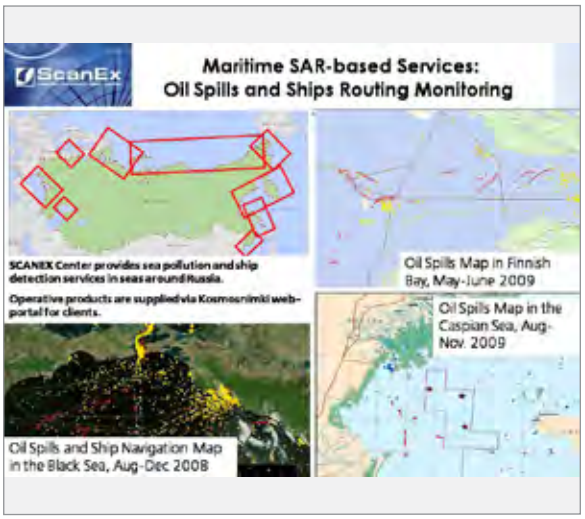

СканЭкс
Space Images: From Satellite to Web-Portal
Ground Receiving Station
Image-based Products in NRT
Archive
Basic Mosaics, Maps, Metric...
Customized web-portal

7


ScanEx
Maritime SAR-based Services:
Oil Spills and Ships Routing Monitoring
SCANEX Center provides sea pollution and ship detection services in seas around Russia.
Operative products are supplied via Kosmosnimki web-portal for clients.
Oil Spills and Ship Navigation Map in the Black Sea, Aug-Dec 2008
Oil Spills Map in Finnish Bay, May-June 2009
Oil Spills Map in the Caspian Sea, Aug-Nov. 2009

8


СканЭкс
Federal Nature Protected Area in the Caspian Sea.
Federal Protection Zone Maly Zhemchezhnuy Island closed for fishing activity.

9


СканЭкс
Integral Map of Shipping Activity in the Northern Part of Caspian Sea
Geoservice eCaspian Sea-Kosmosnimki, September-October 2010.

10


СканЭкс
Integral Map of Shipping Activity near Federal Protected Area in the Caspian Sea
Web-portal eCaspian Sea-Kosmosnimki, September-October 2010.
11

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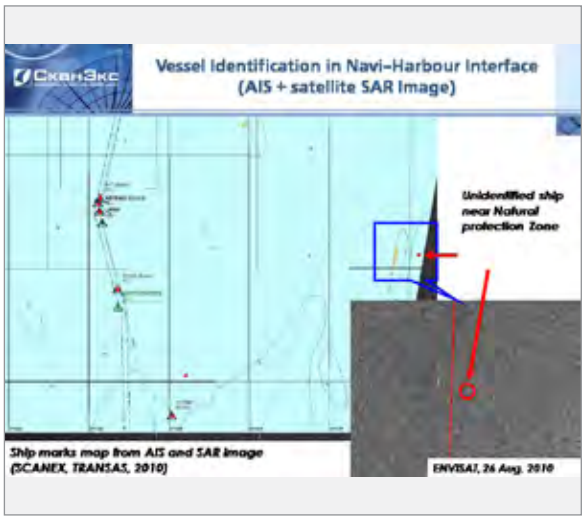
СканЭкс
Vessel Identification in Navi-Harbour Interface (AIS + satellite SAR Image)
Unidentified ship near Natural protection Zone
Ship marks map from AIS and SAR image (SCANEX, TRANSAS, 2010)
ENVISAT, 26 Aug. 2010

12


ScanEx
Illegal fishery monitoring
RADARSAT-1
ENVISAT
NOAA/Argos
Surface Situation report
Fishery vessels
Illegal fishery vessel
Coast guard vessel
13

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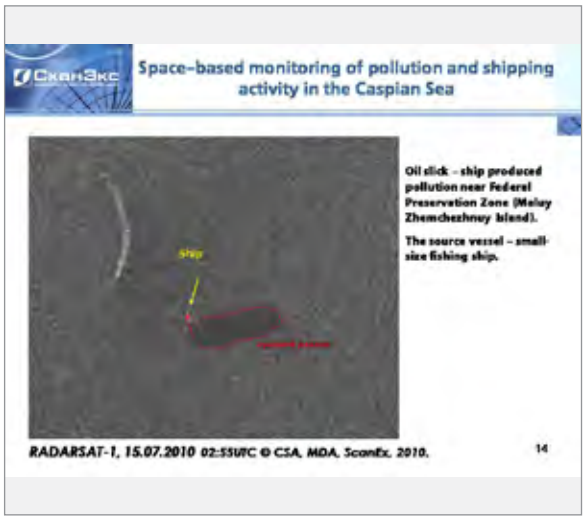

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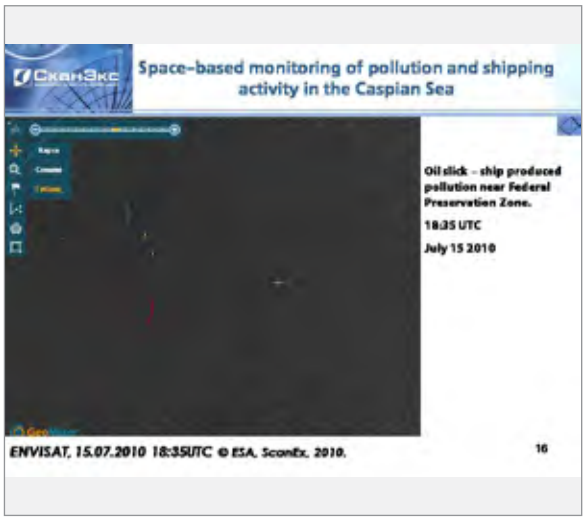

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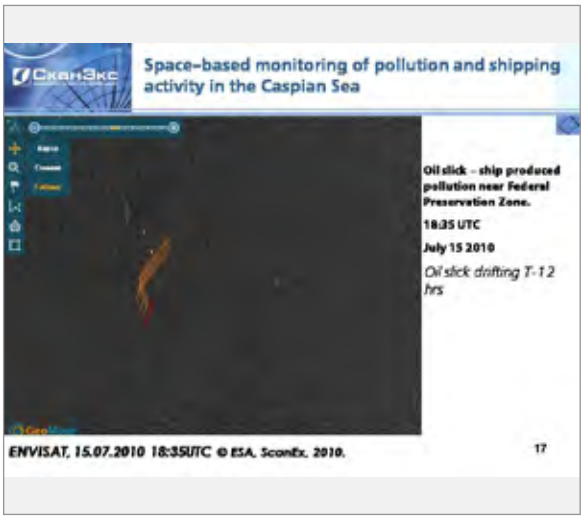

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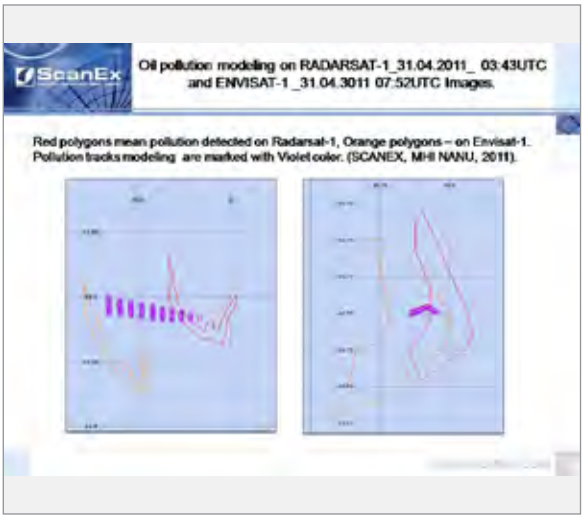

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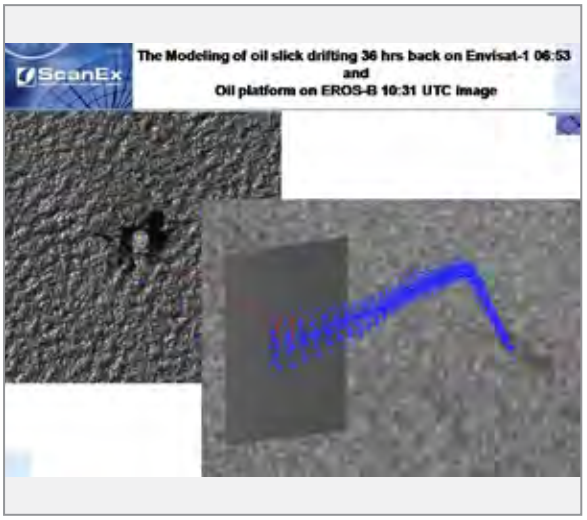

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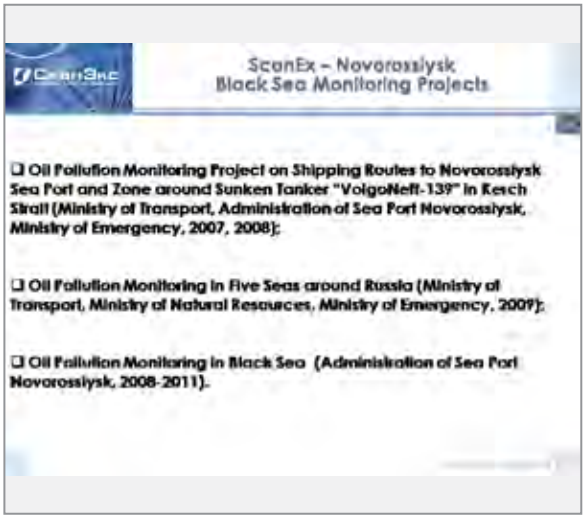

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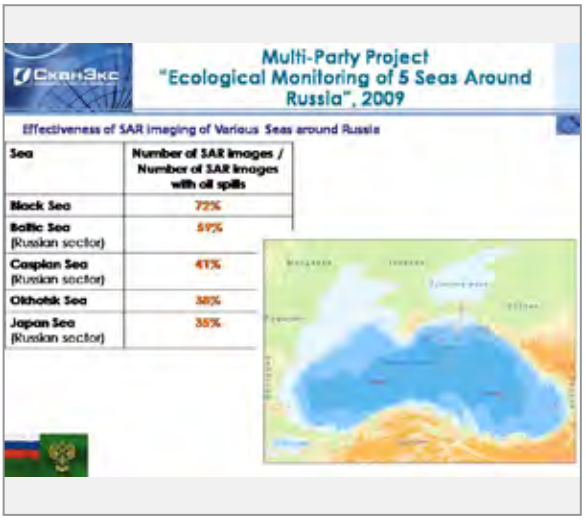

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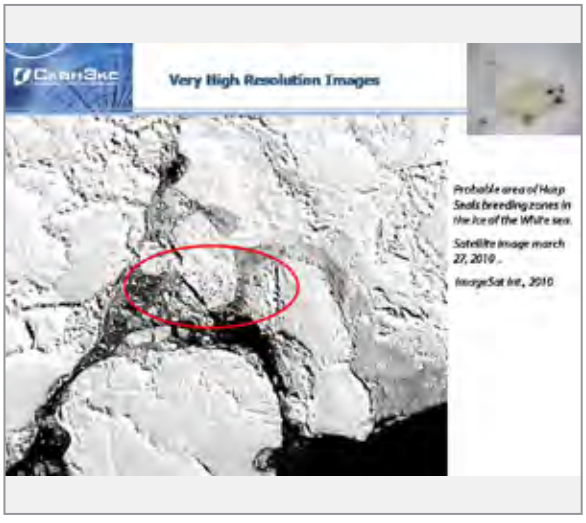

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Conclusions
1. Satellite-based service for oil pollution and marine situation monitoring is limited and works in Russia.
2. Large data storage, processing, analysis and representation are made within a web-interface, a geoportal.
3. Geoservices on operational oil pollution monitoring can be used for comprehensive solution of maritime monitoring tasks including display of navigation and ship traffic situation for detection of illegal, poaching and injured vessels, timely display of ice situation, situation in emergency affected areas, etc.
4. Remote monitoring is independent and precise, it ensures steady and prompt control of environment in dynamics, identify pollution sources and offenders.
5. In the most catastrophic cases urgent SAR monitoring ensures detection, estimation, modeling, counter measures planning and support.

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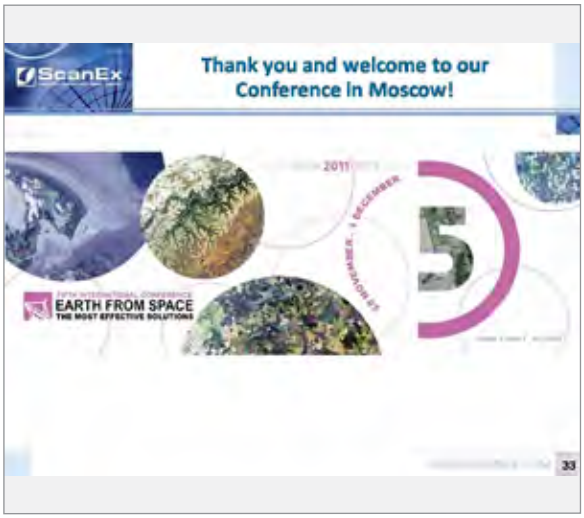
ScanEx
Thank you and welcome to our Conference in Moscow!
EARTH FROM SPACE
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www.scanex.ru
www.transparentworld.ru
Transparent World
www.kosmosnimki.ru
http://eostation.scanex.ru
EOStation - Earth Observation Station
http://catalog.scanex.ru

Use of Satellite Data and associated tools for Oil Spill Monitoring and Combat

Ruslan Kravchenko, Sales Director, Shore-Based Systems, TRANSAS MARINE PACIFIC PTE LTD (Russia/Singapore)

Good afternoon, ladies and gentlemen. My topic today is “Use of satellite data and associated tools for oil spill monitoring and combat”. Well, first question, which is very important, is “why is it important to do so”. After a year from this Deep Water Horizon disaster we can see that the water is relatively clean, but there was a lot of impact on the environment. You can see some pictures from this area and those don’t look good for the fishing industry. A few other impacts that are identified, - society contribution, first of all we don’t want oil on those sandy beaches, for example, at Bali it would be a disaster if there is any oil spill here.

In order to minimize the impact we need to find some kind of tools, which can help us to take appropriate decisions in an attempt to fight such a critical situation or to generate profits from the research and development. There is a range of companies and government organizations, which can use a technology to monitor and identify polluters such as oil platforms, ocean going vessels or others and charge those for that.

The number of oil spill sources is also quite big, among those the most common are natural, but apart from that a big number can be caused by accidental spills or other human-made spills. Well, I have a list with most of the oil spills here on this slide and as you can notice the major part of those can be caused by a tankers and the maritime industry, so one important question is, once there is an oil spill we may want to blame someone, we may also want to charge someone for that in an attempt to prevent it in future. If you look at the next picture, you can see ship movement traffic in the Adriatic Sea. There are thousands and thousands of vessels in every particular moment at sea or an ocean and if you have pollution in the middle of the ocean it will be difficult to track its source.

What are tools that can be used? Those have been mentioned quite a number of times during our seminar today and one of the can be satellite tracking. Nowadays we can identify a particular vessel by modeling and TRANSAS can offer solution for that. One of the pictures at the very bottom left side of the slide illustrates all the oil spills in the Adriatic Sea and you can see there are quite a lot of pollutions over there. A few other samples here are satellite images as oil spills can be spotted after processing satellite images. Here we can experience another problem: some images

can identify real oil spill and others can be identified wrongly. So we have two potential pollutions here and surprisingly, when the coastguard was sent to check those, one was identified as real oil spill and was confirmed and the other was not. So there is a degree of detection accuracy that should be taken into account if we are to use one source only.

What TRANSAS can offer is to overlay satellite data images and other sensors data within the electronic chart display. TRANSAS is one of two companies in the world who produce world coverage of maritime electronic charts and we have a number of solutions to the maritime industry including vessels traffic monitoring systems, which were mentioned here previously as well as various oil spill modeling software and those can be used in combination to fight the oil spill polluters.

Talking about vessel traffic monitoring one of the options which can be used for oil spill detection would be radar monitoring and we can use standard maritime radars, which are installed onboard the vessels or in vessel tracking management system to identify an oil spill. One important thing here is that such solution are only applicable for short range detection and we can only monitor oil spills within 10 miles from the radar station, definitely this is not enough, and that is why the satellite tracking can help.

The other question is what to do once you have identified an oil spill? There are a big variety of options but first of all you can use meteo-sensors and get data about tides, currents, in order to crosscheck the spill boundaries and vessels traffic situation. The vessel traffic can come from VTMS (vessel traffic monitoring system) and meteo-sensors can deliver you accurate information about actual tides and currents while you can also use generic tide and currents databases instead. Ocean temperature could also help you to do more accurate modeling and TRANSAS can offer help in form of off the shelf solutions that can integrate all the date and perform modeling and simulation tasks. Another few samples here, you can see some satellite images, as well as estimation and forecast that was created using TRANSAS software and it demonstrates how the oil spill will develop. This picture illustrates an oil spill at Libya's coastline, where one oil production facility had been actually destroyed and you can see how the situation developed and identify what are the actions that should be done in order to minimize the impact of such pollution on nature.

A big variety of tools can be used to fight oil spills, for example one can consider deployment of booms to prevent further spread of oil on the water surface, but in order to identify, which solution is most effective, you can actually use a simulation tool first. You can run a study and identify what can be the most effective combination and action plan for using various tools for oil spills response. I have few other examples here on the next slide. It is the same oil spill and using simulation of different oil spill response actions you can see the potential result of applying different oil spill response tools and tactics. Such solution can allow you to model the situation not only in real-time or forecast modes but can also allow you to do the back tracking. Using such prediction tools you can select the optimal method and after that enforce it in real life situation.

TRANSAS can supply tools but those can be used for different purposes including the real-time crisis management and also training. Training can help relevant authority to identify how to behave in oil spill or emergency situation and identify potential risks of various dangerous situations. If you are interested to find out more about particular tools please feel free to visit our website www.transas.com or contact me directly.

Another examples here is an illustration of decision support tools such as oil spill modeling software, navigation simulator, and vessel traffic monitoring system. All these can be integrated into one system and later on I'll set an example of how this can be used here in Indonesia.

As a case study we can refer to a system called CleanSeaNet and that is one of the instruments for the European Union to monitor and respond to situation with oil spill in their waters. This organization was created under EMSA — the European Maritime Safety Agency and they are provided daily with satellite images in order to monitor and respond to any of the new oil spill situations. They are also authorized to charge identified polluters. As a result the EU expect an improved clarity of the water, clean coastline and less negative effects on the fishing industry and general environment.

Another initiative is an actual crisis management center, which has been developed by TRANSAS for the Ministry of Emergency Situation Response in Russia. This system includes 8 regional centers with one main control center in Moscow. All those can do real-time simulation or management of actual response to a variety of emergency situation, including oil spill, earthquakes, pool fires, etc. I also have a short video that can tell you more about that and would like to demonstrate it now.

That video demonstrates recent trilateral training arrangements by running a joint exercise on crisis management in Russia, Finland and Estonia. This training was done using TRANSAS products installed by those three countries in order to have a tool for training or real response to emergency situation scenarios. Similar drills can be done in any country in order to improve the readiness of relative authorities and multi national cooperation in that, as long as you have products, which TRANSAS is ready to offer.

Please have a look at the next slide the question raised is how this kind of tools can be used here in Indonesia or any other country in Asia Pacific region? First of all in Indonesia Transas has already installed more than 11 vessel traffic monitoring stations and those are located in Jakarta, Semarang, Balikpapan, Belowan and other parts of Indonesia as illustrated on the map. The organization that would want to have emergency response capabilities will only need to add local sensors with relevant software to get the capability and process satellite images. That would allow both short and long range coverage for oil spill identification. I have another very interesting picture here and it tells us how are all those VTMS systems connected. The data from all the individual systems goes directly to Jakarta via existing communication links and that allow any government

institution which would be interested to get hold of this data to get access to that. What we can see is quite a good coverage for such a country like Indonesia, of course it does not cover the excess of 1000 islands that are located here but that is where satellite tracking can help. And of course, we very much look forward to expand VTMS coverage in Indonesia further with a support of DG SeaCom. It is very important to mention that in Indonesia vessel tracking monitoring solutions are already available and are from TRANSAS and the only remaining question is for relevant authority to identify potential location to house such a system and how to do it in a most cost effective manner?

Transas have installed a number of navigation simulators and that includes dedicated fishing simulators. In total there are more than 6 training centers within Indonesia, which are equipped with our products. Any of those can be easily converted or expanded into the oil spill resource management centers, to do monitoring, process the data or where you can just do training, if necessary. To sum it up we can say that at this point of time both training facilities and VTMS tools are already available and that makes Indonesia just one step away from combining those independent structures into one and that will only require some good will from authorities in Indonesia to do so.

Since we have delegates from other countries in the region I would also like to mention that similar arrangements could be done in any country in Asia Pacific. For example in Malaysia Transas has oil spill response management software available with full mission navigation and vessel traffic management simulators installed in Akademi Laut Malaysia (Malaysian Maritime Academy), and real vessel traffic monitoring system is also installed in Kota Kinabalu. So some of those tools are already available in the region and TRANSAS will be happy to expand those into more comprehensive solutions for the interested organizations.

I would also like to say that for seamless integration of satellite images with described oil spill tools Transas has a preferred partner and that is ScanEx who are the organizers of this event today. In cooperation with ScanEx we are ready to provide the best solutions for the industry.

Thank you very much for your attention.

1

WHY IS THAT IMPORTANT?

A year after the Deepwater Horizon disaster spewed oil into the Gulf of Mexico, the Florida beaches are relatively clean, the surf seems clear and the tourists are returning. But there are signs that the disaster is continuing to affect marine life in the gulf far from where humans can observe it.

The fish had dark lesions on their skin, some the size of a 50-cent piece. On some of them, the lesions had eaten a hole straight through to the muscle tissue. Many had fins that were rotting away and discolored or even striped skin. Inside, they had enlarged livers, gallbladders, and bile ducts.

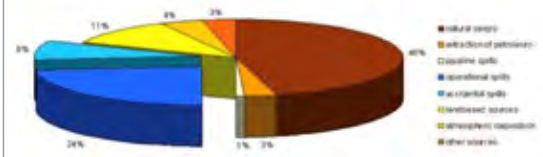
2

WHY IS THAT IMPORTANT? (con'd)

- **Society contribution (safety, environment protection)**
- **Minimizing damage in case of incident (claims for inadequate reaction on emergency situation)**
- **Generating profit for training centers (added value) and government**

3

OIL SPILL SOURCES

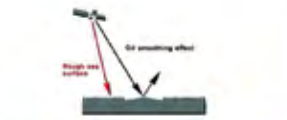


4

OIL SPILL TYPES AND VESSEL TRAFFIC

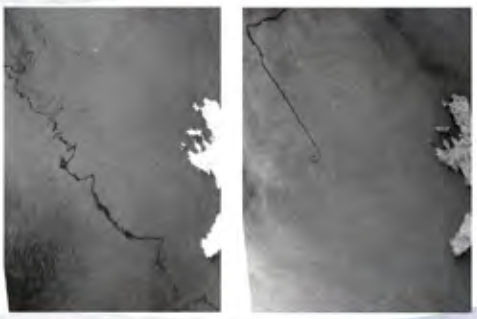
5

SATELITE TRACKING



6

SATELITE IMAGES



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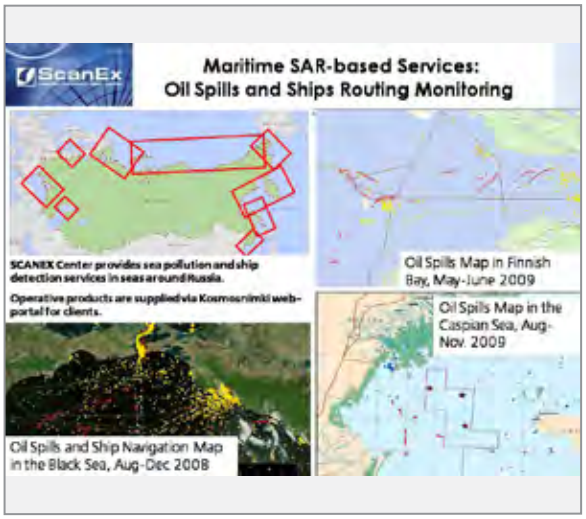
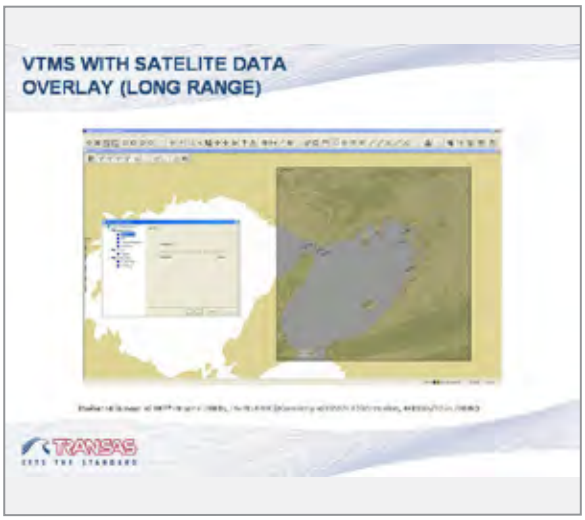
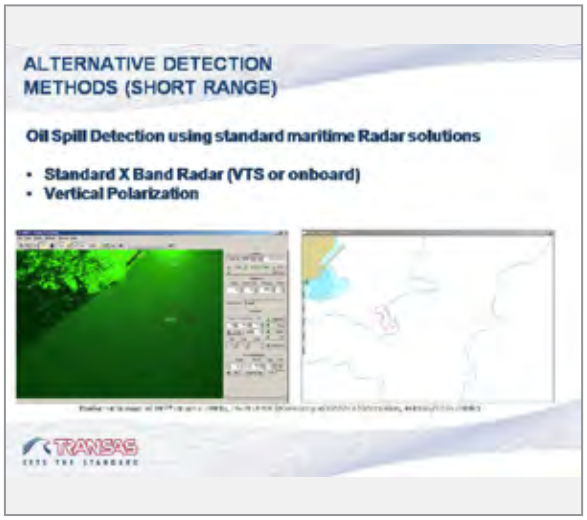

ScanEx
Maritime SAR-based Services:
Oil Spills and Ships Routing Monitoring
SCANEX Center provides sea pollution and ship detection services in seas around Russia.
Operative products are supplied via Kosmosnimki web-portal for clients.
Oil Spills Map in Finnish Bay, May-June 2009
Oil Spills Map in the Caspian Sea, Aug-Nov. 2009
Oil Spills and Ship Navigation Map in the Black Sea, Aug-Dec 2008

8


VTMS WITH SATELITE DATA
OVERLAY (LONG RANGE)
TRANSAS

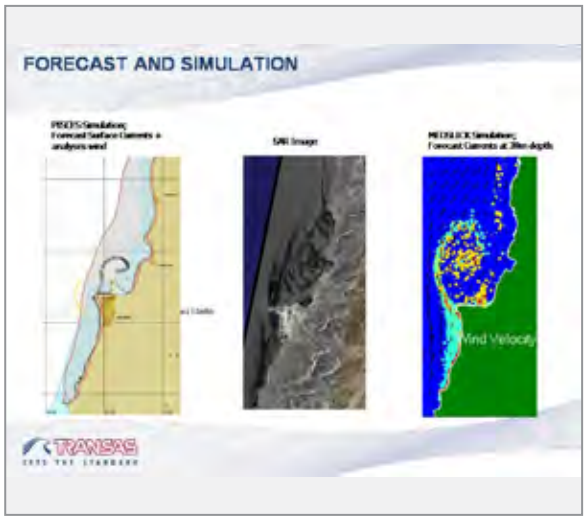
9


ALTERNATIVE DETECTION
METHODS (SHORT RANGE)
Oil Spill Detection using standard maritime Radar solutions
• Standard X Band Radar (VTS or onboard)
• Vertical Polarization
TRANSAS

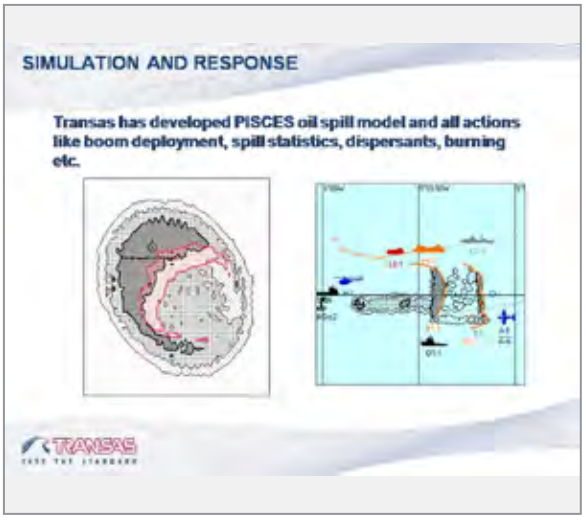
10


RESPONSE PLANNING AND
BACKTRACKING
VTS Records
TRANSAS

11


FORECAST AND SIMULATION
Wind Velocity
TRANSAS

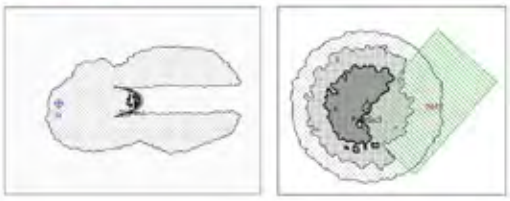
12


SIMULATION AND RESPONSE
Transas has developed PISCES oil spill model and all actions like boom deployment, spill statistics, dispersants, burning etc.
TRANSAS

13

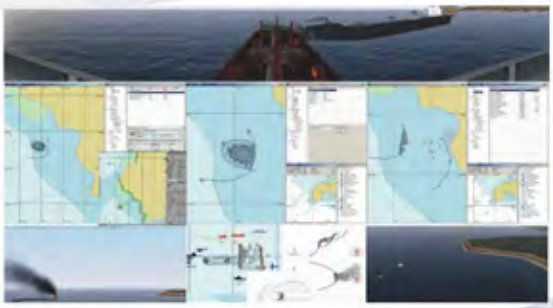
SIMULATION AND RESPONSE

Transas has developed PISCES oil spill model and all actions like boom deployment, spill statistics, dispersant application, burning etc.



14

TOOLS FROM TRANSAS



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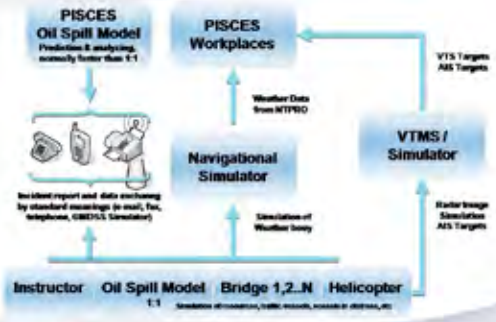
HOW TRANSAS CAN HELP?



16

Case Study 1 – EUROPE
CleanSeaNet by EMSA

CleanSeaNet service in Europe was created by EMSA to monitor ship-source pollution and introduce of penalties, including criminal penalties, for pollution offences. EMSA has been tasked to 'work with the Member States in developing technical solutions and providing technical assistance in relation to the implementation of this Directive, in actions such as tracing discharges by satellite monitoring and surveillance'.

EMSA Homepage
European Maritime Safety Agency

17

Case Study 2 – RUSSIA

TRANSAS has delivered a National Crisis Management Center for the Ministry of Crisis Situations of Russia and is ready to offer such solutions to other countries

18

Case Study 3 – G2G COOPERATION INITIATIVES

19


INDONESIA – The way forward!
Vessel Traffic Management
Port of Balikpapan
Port of Belawan Medan
Port of Panjang
Port of Jakarta
Port of Lembar
Port of Makassar
Port of Semarang
Port of Surabaya
Port of Telik Bayur
Medan
Balikpapan
Panjang
Semarang
Telik Bayur
Makassar
Jakarta
Surabaya
Lembar
TRANSAS

20


LEGEND:
TRANSAS

21


INDONESIA – The way forward!
SIMULATORS
Within Ministry of Fisheries and Marine Affairs Transas has installed a number of fishing simulators that can be further expanded with PISCES application or integrated with various VTMS sites demonstrated in the previous slides.
The list of training centers where Transas has its equipment installed is given below:
Fisheries Training Center Belawan
Fisheries school Dumai
Fisheries school Pariaman
Fisheries school Pariaman
Fisheries Training Center Semarang
Fisheries school AmbonPort of Balikpapan
TRANSAS

Mapping of marine resources and utilization based on interview information

Dr. Kongkiat Kittiwattanawong, Phuket Marine Biological Center, Thailand

Thank you very much for giving me opportunity to give a presentation. The topic I'm going to talk may be totally different from the previous speakers, because want I'm going to talk is back to basic things. So the topic is "Mapping marine resources and utilization based on interviewed information". So, instead of looking from space, we ask local people on the ground for information. I would like to introduce a little bit of my department of marine and coastal resources. We are glad to manage marine and coastal resources to get fruitful and sustainable resources. We have policies as listed here. I'm not going to talk into details, but in order to manage the resource we have to know what kind of resource we have, where it exist and how it is going to be utilized. We also conduct ground survey to monitor for those resources and we use remote sensing to detect the live of coral reef, seagrass and other resources, like mangrove, but ….to introduce the interviewing technique to manage resources, which can be very quick and very much low cost. The…..cannot detect for the ground information, so this is the advantage of using this technique. But it is always coming highly reliable…..information we obtain from the interviewed. But it can be standardized and verified. The bottom-line here is how information can be retrieved and how to process the maps. And I'm going to speak about the case study: "Assessing distribution and abundance of Dugongs and impacts of fisheries" that can be conducted among counties in South Asia. The data can be retrieved by interview either on-site (going to a site and ask people or arrange a workshop and get information from the focus group). And by using hand-down maps of resource and the things that we add. So from these maps we get into the process of geo-reference, digitizing and putting some attributes according to information that we interviewed and after that we create digital maps. From digital map after being processed we can add a density map, which show distribution and relative abundance. In many of towns we ask people to directly make record about cycling or current directly into the map, like in this …….map. There is the fishermen … on the map, when they find dolphins , so we can …….. and after that ……distributions. And this map being used to define protected area for this village. Sometimes we also use the GPS to track the information we obtain from fishermen, like in this map showing the tracks. And now I'm going to talk about the…….information from the interviewed. This is the assessing distribution and abundance of dugongs and impacts of fisheries. Actually we have six countries all together. There is Cambodia, Myanmar,

Thailand, Vietnam, Indonesia and Malaysia. This is the standardized dugong questionnaire. This questionnaire is used among all six counties to obtain the information about catch and bycatch, fishery information, fishery prospective and other information, like distribution, habitat and sighting records. So, this shows the area of our research: Cambodia, Myanmar, Thailand, Vietnam, it does not include Indonesia and Malaysia but they are running the project. This is the example of fishing area, showing (after being processed) the distribution of the sighted dugong, showing high capability to see dugongs. And also we go the sighted record and also we can use the capture information to qualify the information. The pink color showing the distribution of dugong, so the interviewed information is very much close to the real data. This is another example of showing the seagrass habitat in the green color and after overlaying with real seagrass ground research it shows that this information is quite accurate. We got the fishing ground information in blue color. We also incorporate catching data in those areas to find out the amount of catch per unit of effort over the attached scales. We can also analyze information according to the fishing gear types, distribution of sea use by fishers. This is the analysis of….to dugong distribution. The green color is showing the seagrass and pink color is showing the distribution of dugong. And we can overlay it with fishing activities, so we can detect the risk area for dugong. We use this information to quality the information. From this we can see the number of dugong. We also use this information to detect the quantity of the……of fishing activity like in this map. Comparing fisheries, transportation and tourism activities we can see that stand for nearly 75% of all activities. So in conclusion I would like to propose that the interview information can be….. in order to quality the remote sensing data by ground survey. All of this can be used together to monitor marine resources and utilization (status and changes).

1

Department of Marine and Coastal Resources

Fruitful and sustainable of Marine and Coastal Resources

1. Policy and action planning for management of MCR
2. Proposing MCR Legislation
3. Law enforcement
4. Researches and development
5. Proposing MPA
6. Knowledge communication
7. MCR national data centre
8. International cooperation

2

Mapping Marine Resource and Utilization

What, Where & How....resources?

- Ground survey
- Remote sensing
- .....

3

Interview Information

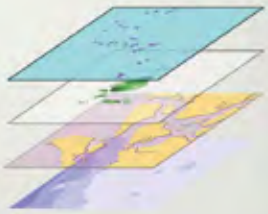
- Rapid assessment
- Low cost
- Insight detail (technology undetectable resources)
- Change monitoring
- Accuracy & Precision?
  - Standardized method
  - Verification

4

Outline

- Data retrieving
- Maps processing
- A Case study

Assessing Distribution and Abundance of Dugongs and Impacts of Fisheries



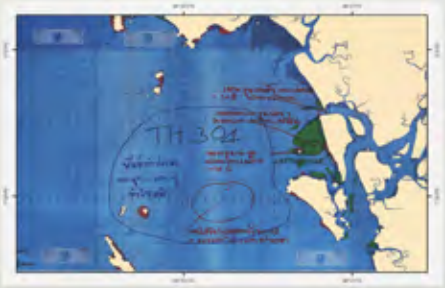
5

Data retrieving

- Interview
  +Onsite
  +Focus group
- Hand-drawn maps with attributes

6

Hand-drawn map



7

Mapping process

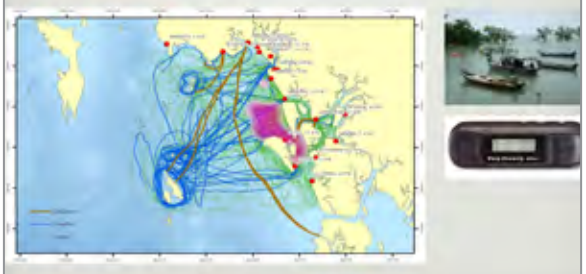
- Hand-drawn map
  - Geo-referencing
  - Digitizing & Attribute editing
- Digital map
  - Polygon densification
  - Line density
  - Point interpolation
- Density map
  (Distribution and Relative Abundance)

8

Sighting records by villagers

9

Tracking transportation activities



10

ASSESSING DISTRIBUTION AND ABUNDANCE OF DUGONGS AND IMPACTS OF FISHERIES

Cambodia, Myanmar, Thailand and Vietnam

Kongkiat Kittiwattanawong
Phuket Marine Biological Center

Abu Dhabi 4-6 October 2010

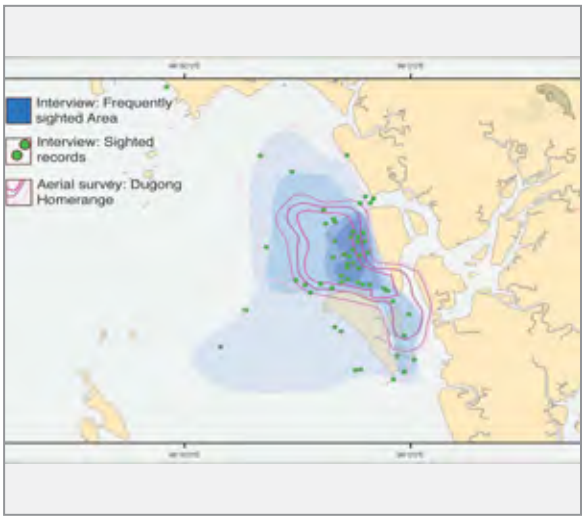
11

Standardized Dugong Questionnaire

- Modified UNEP-CMS standardized dugong catch/ bycatch questionnaire
- Interviewee Background (15)
- Dugong Catch/Bycatch (20)
- Fishery Information (11)
- Fisher perceptions (16)
- Confidential (6)
- Sighting records table
- Maps of dugongs, habitats and fisheries

12

13



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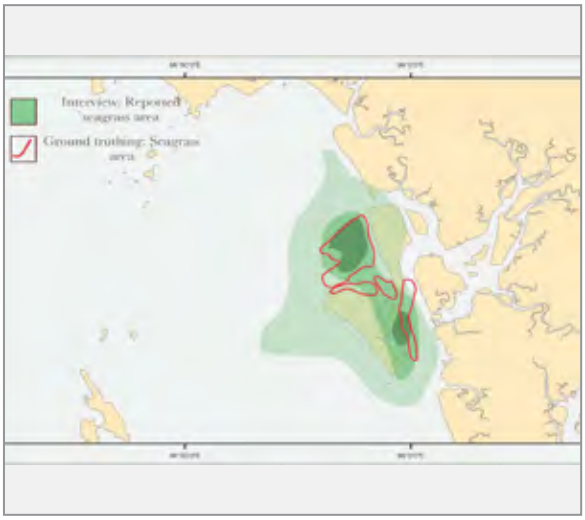

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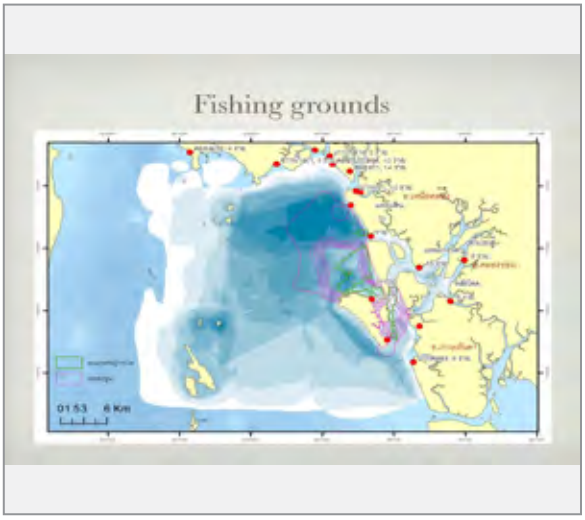

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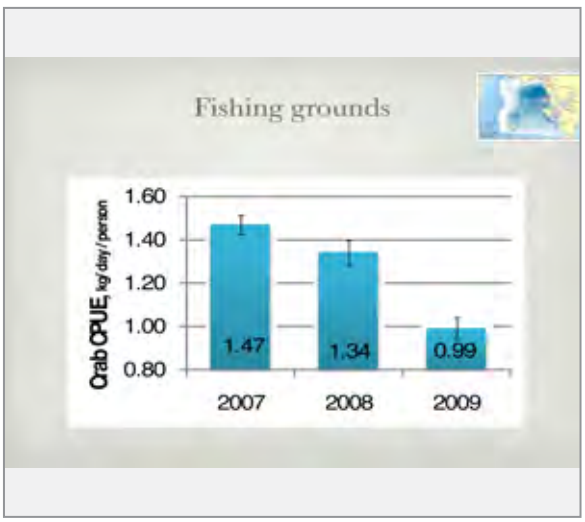

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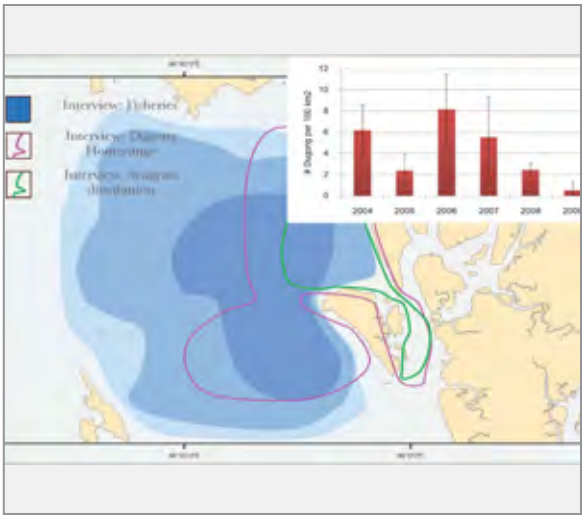

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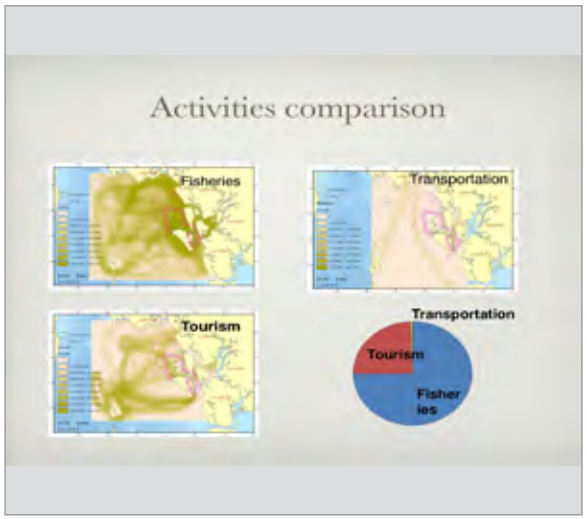
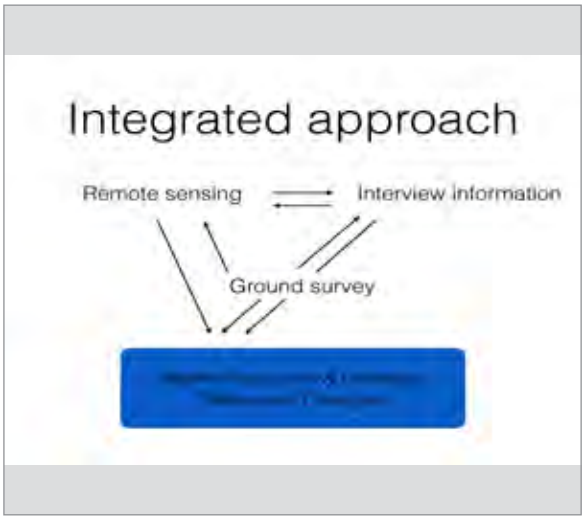

Activities comparison
Fisheries
Transportation
Tourism
Transportation
Tourism
Fisher
ies

20


Integrated approach
Remote sensing
Interview information
Ground survey

21


THANK YOU

Internet Based Technologies and Geoportals for Visualization of Satellite Monitoring Results

Georgy Potapov, Web & GIS Development Unit, RDC Scanex, Russia

Dear ladies and gentlemen, please, I'll try not to exceed the time limit in my talk. My talk is dedicated to the web-services of real-time satellite monitoring and that means I'm going to tell you about some of our project developments, which are designed fir particular objectives, when there is some thematic information need to be supplied. So for end users it means they can get access to real-time satellite monitoring data, in order to resolve such issues as land cover monitoring, natural disasters monitoring, like fires, later I'll show you several examples of the project we're currently working on, and emergency response, as well as oil pollution monitoring as it was mentioned by my colleagues. Well actually web-services mean just a way the user can get access to the information, to spatial intelligence. But what makes the difference between information itself and the web-service? You can imagine it taking as an example such familiar situation as the traffic jams. Drivers are not interested in information itself, about the traffic congestions. They want to know how to avoid it, to avoid traffic jams. So they can get closer to the solution if they use some service on their mobile application, navigation devices and systems. This service should provide they with some solution, how to get to the destination point as fast as possible. Such technologies, such solutions got impact on the market, that was very restricted former, as well as market of remote sensing and geo-informatics.

Talking about real-time services, we can talk only about near real-time data, because it takes time for processing. So you can see on this slide a very simplified scheme of the process flow we are using in our Research & Development Center, that starts with ground receiving station, which produces tons of gigabytes of raw data, than this data has to be processed, it can be processed automatically to save time, some additional information can be puted in by experts gaining quality in majority of cases. The last step, at the last point we come to, such issue on how all this data can be delivered to the end-user. For such kind of purposes we are using our own development, we develop web-GIS platform to build some services on. The user can get access to thy spatial data, to interact with, to analyze, to get some additional information and to make a decision ultimately. So one can say we develop some solutions, we produce some solutions for better decision-making support. My message based on a fact that the point of real-time data services is the time.

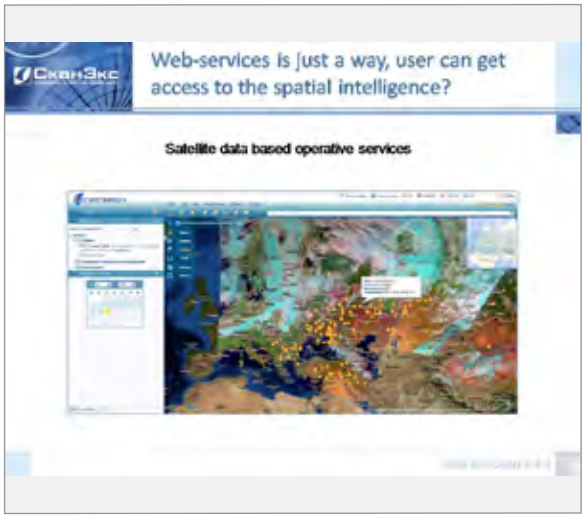
By our mind the shortest and easiest way the end user can get access to the real–time data is to publish this data on the Web.

Here we come to some examples of our projects we are working on. Most of them are publicly available. You may check by Internet addresses, some of them have authorized access due to some restrictions, policy security or commercial. In this example the service was designed and developed for the purposes of monitoring Northern Caspian for the sea surface pollution. It's beter to ask some thematic specialists to tell more about this service. Another example is ice cover monitoring that shows difference in data usage, because at this latitude there are a lot of clouds above sea, so it's very difficult to get images daily even though the typical needings of operational service is that the user needs to get imagery data daily and for quite large area of interest. So in this case we use radar imagery that does not depend on cloudiness or daylight. River flooding monitoring is also a typical case for Russian territories and it was developed for the Russian Emergency Agency, for emergency response, for natural disasters monitoring. There is another example of service for emergency response. On this image you can see the place of the aircraft fall near Smolensk. Another example is Fukushima station. In this particular case we are using high resolution imagery data taken from new generation satellites like WorldView, GeoEye, but in majority of cases there is no need to use such data, such high resolution data, because this way is very expensive. The typical objective is to get imagery daily for about hundreds of thousands square kilometers. The best way is to get this imagery data free of charge, for money saving purposes, but the only imagery that can be qualified as such imagery is MODIS imagery, called in the name of the sensor, installed on satellite crafts like Terra and Aqua. MODIS is free of charge, but there are some restrictions, depending on the resolution, originally 250 meters per pixel, but in some cases we need more detailed information, so there is also Landsat imagery that is free, but it depends on various circumstances (for each territory, for each objectives). So that's why we are trying to combine different approach, to combine different satellite programs to get streaming imagery from different satellites in order to achieve best results. I'll show you next example. This is the case of our fire monitoring service. We launched it on summer 2010. All data has been collected by MODIS (Terra/Aqua satellites) and we've also included data from SPOT and Landsat satellites - for data verification for deeper analysis made by users. Here we can see all data collected during one day only, the 1st of September, 2010. Here you can see tracks from Landsat and SPOT satellites. The data has been acquired on our network of ground receiving stations. There are three items. And the data is processed automatically and delivered to the end-users by using web-GIS technology. Here is the scheme that demonstrates that all data was collected by our network of ground receiving stations for one day for the same day — 1st of September. It makes a large amount of data. Here is a default view of fire monitoring service. You can see fire spot automatically detected by raw data, acquired from MODIS sensor. Some additional information on the basis of Landsat and SPOT can be added. You can see it is a more detailed imagery, which is acquired daily. This imagery was useful for such tasks as mapping burnt areas or verifying hot spots that have been automatically detected by MODIS imagery. Also the information was exported via different inter-

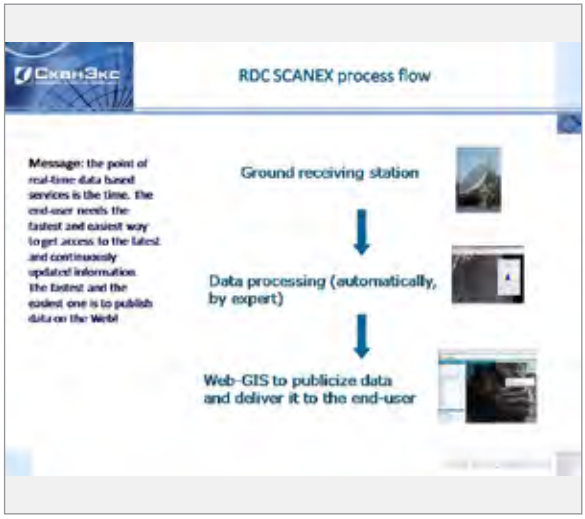
faces, via different formats, this way users can get this fire data and visualize it in such applications as Google Earth or third-party sites. The information must be available. This is the example of Don area on Landsat imagery. Actually we made some agreement with OpenStreetMap users (this is a project aimed to create free database, free map database). And we had an agreement that we provide them with detailed satellite imagery that can be integrated into mapping and editing applications for OpenStreetMap project and they can map burnt areas using this detailed imagery. The project was named as Project of the Week by this OpenStreetMap community. So I would like to finalize with several moments I would like to pay your attention to. The fastest and easiest way data can be delivered to the end-users is to publish it on the Web, so don't hesitate to do it. The limitations are well-known and are the following: the bandwidth (the more is the bandwidth — the more data we can deliver to the end-user), the availability of Internet, as well as the format, because we have to convert data to some web formats, jpeg, png, it can be lossless, but some additional information could not be extracted from combining of different channels in the bundle… But we have to choose three channels for RGB synthesis. The other problem is the lack of base data. We are going to find some kind of solution of this problem. In our future plans we are going to enlarge our maps and satellite mosaics and provide them as base maps available for third-part application services.

The next one important thing I'd like to pay your attention to — the effectivity of operative services need to be considered in the context of subject matter of the task resolved with their assistance. And the operational monitoring services let us set establishing access to spatial intelligence in near real-time mode and in the form most demanded by users, as it was mentioned in the example with traffic jams. Thank you for your attention!

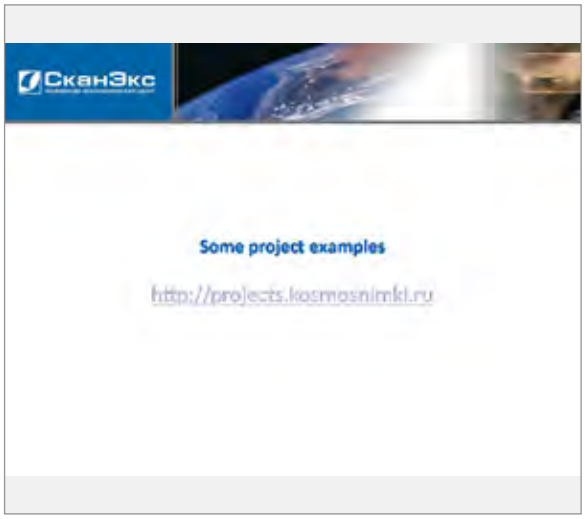
1


СканЭкс
Web-services is just a way, user can get access to the spatial intelligence?
Satellite data based operative services

2


СканЭкс
RDC SCANEX process flow
Message: the point of real-time data based services is the time. The end-user needs the fastest and easiest way to get access to the latest and continuously updated information. The fastest and the easiest one is to publish data on the Web!
Ground receiving station
Data processing (automatically, by expert)
Web-GIS to publicize data and deliver it to the end-user

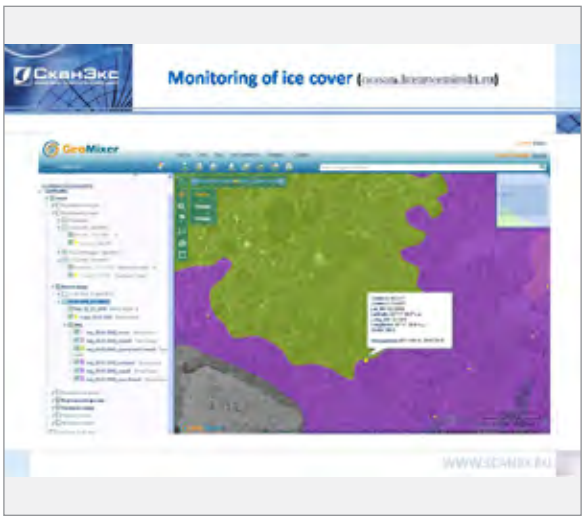
3


СканЭкс
Some project examples
http://projects.kosmosnimki.ru

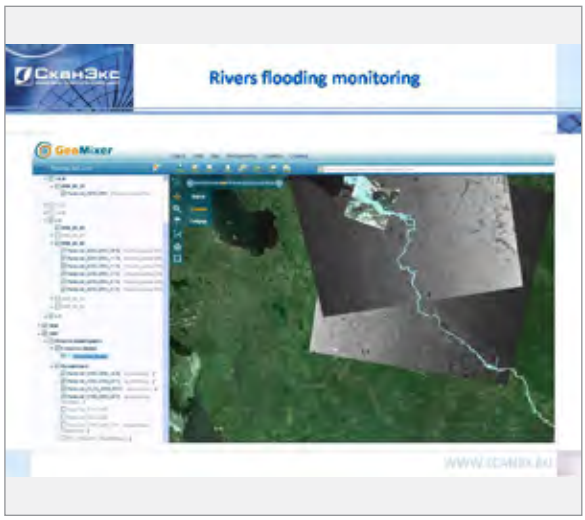
4


СканЭкс
The oil pollutions monitoring
GeoMixer

5


СканЭкс
Monitoring of ice cover
GeoMixer

6


СканЭкс
Rivers flooding monitoring
GeoMixer

7


Emergency response

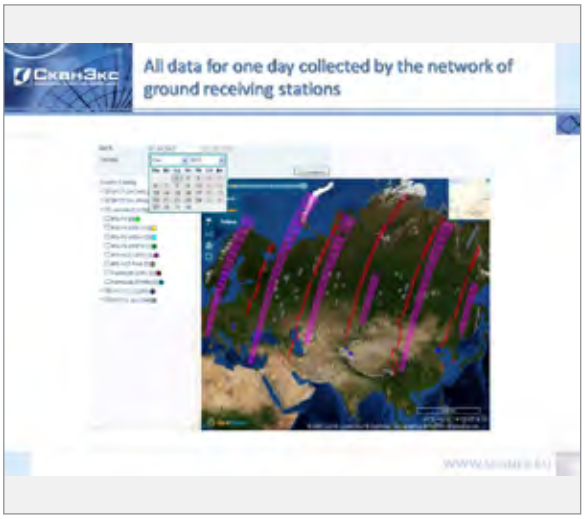
8


Fire monitoring

9


All data, collected for one day (01.09.2010)
FIRES.KOSMOSNIMKI.RU – 01.09.2010

10


All data for one day collected by the network of ground receiving stations

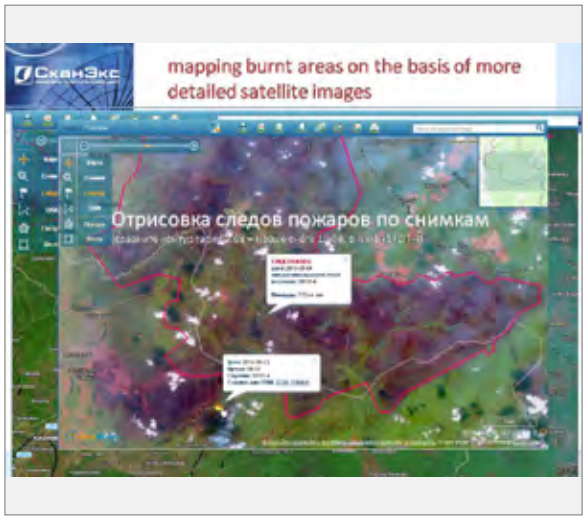
11


Fires.Kosmosnimki.Ru

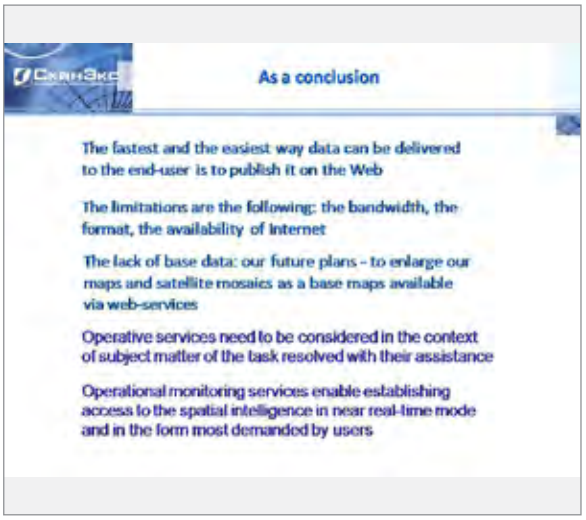
12


The information must be available

13


mapping burnt areas on the basis of more detailed satellite images
Отрисовка следов пожаров по снимкам

14


As a conclusion
The fastest and the easiest way data can be delivered to the end-user is to publish it on the Web
The limitations are the following: the bandwidth, the format, the availability of Internet
The lack of base data: our future plans – to enlarge our maps and satellite mosaics as a base maps available via web-services
Operative services need to be considered in the context of subject matter of the task resolved with their assistance
Operational monitoring services enable establishing access to the spatial intelligence in near real-time mode and in the form most demanded by users

Break-out Groups Discussion Results and Recommendations

Group 1 “Remote Sensing and Sea Oil Pollution”
Facilitator: Dr. Vladimir Gershenzon (RDC SCANEX, Russia)

1. To emphasize the importance of oil spill monitoring from the point of view of climate change as well as practical needs of fishing, coastal zone protection (tourist recreation, etc.)
2. Ask space industry to smooth the way how to move from pilot projects to national /international project scale.
3. Ask APEC about prolongation of dialogue between APEC member and other organizations on how to put in practice necessary regulations and organizations procedures.

Group 2 “Remote Sensing and IUU fishing”
Facilitator: Dr. Konstantin Zgurovsky (WWF Russia)

1. Find a way to reduce the cost of satellite data.
2. Analyze the issue of sensitive data protection during satellite image capturing and distribution (information on main fishing zones).
3. Find the solution to discover vessels that are not equipped with any VMS.
4. Creation of integral system on discover, report, proof and evidence and punishment measures between fishing companies, governmental institutions in order to make the fishing vessels (IUU) responsible.
5. Information exchange between all APEC members on best practices using Remote Sensing.
6. Establishment of close relations between fishing agencies and R&D centers of applied space technology.
7. Vessels and fish products transportation traceability.

Group 3 “Remote Sensing and Climate Change Impact on Fishery and Marine Biodiversity”
Facilitator: Dr. Geoffrey Muldoon (WWF Indonesia).

1. Increase emphasis on data sharing. How to share and deliver information to fisheries stakeholders (fisheries industry private sector, fisheries agencies).
2. Increase collaboration on sharing of satellite data between APEC economies especially in relation to transboundary fishery management issues.
3. Blue carbon has been identified as a possible mitigation tool. This needs improved baseline mapping (mangrove, seagrass) by which to measure the changes.

Supplementary ideas:

1. Use of satellite data to make better links between fishery productivity and protection of fish stocks (eg. protection of nursery grounds, aggregation sites).
2. Economic analysis of benefits versus costs of increased investment in satellite data to be used as policy advocacy tool.

Pictures


APPLICATION OF SATELLITE DATA
FOR SUSTAINABLE FISHERY
SUPPORT IN APEC


EXIT


APEC
Asia-Pacific Economic Cooperation
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