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Report of the Regional Coordinating Unit (RCU) on the implementation of the Northwest Pacific Action Plan (NOWPAP)

6th NOWPAP CEARAC Focal Points Meeting

Toyama, Japan, 6-8 March 2008

12th IGM decisions

- Approved NOWPAP workplan and budget for the 2008-2009 biennium (USD 1,000,000, incl. 13% of PSC);
- Took note of the RACs evaluation report;
- Approved, in principle, NOWPAP Regional Action Plan on Marine Litter;
- Approved draft text of the NOWPAP Regional Oil and HNS Spill Contingency Plan.

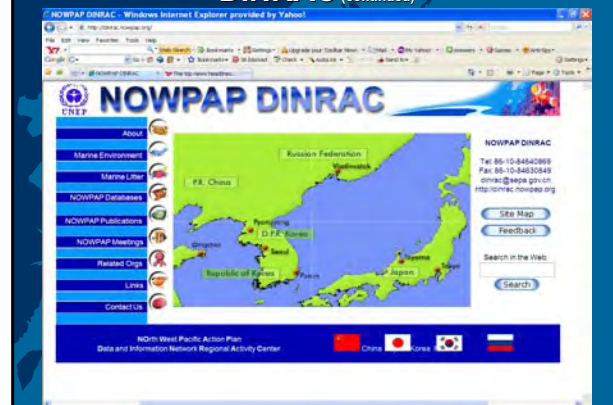
DINRAC

- Database on NOWPAP Institutions: <http://dinrac.nowpap.org/NowpapInstitution.php3>
- Database on NOWPAP Experts: <http://dinrac.nowpap.org/NowpapExpert.php3>
- Database on NOWPAP Coastal and Marine Environmental GIS and RS Applications: <http://dinrac.nowpap.org/NowpapGIS.php3>
- Database on Marine Litter: http://dinrac.nowpap.org/MALITA_Whatis.htm
- Coastal and Marine Nature Reserves: <http://dinrac.nowpap.org/NowpapNatureReserve.php3>

Reference Databases on:

- Atmospheric Deposition: <http://dinrac.nowpap.org/NowpapReferenceAD.php3>
- River and Direct Inputs: <http://dinrac.nowpap.org/NowpapReferenceRDI.php3>

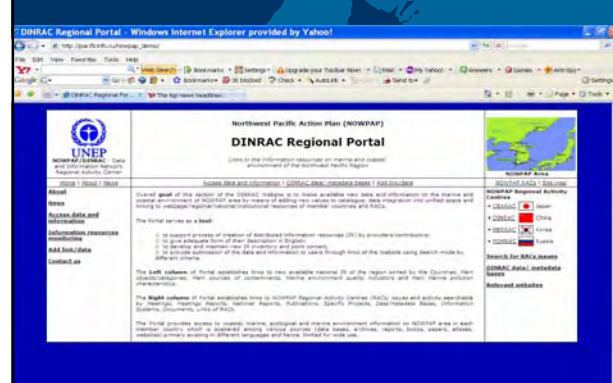
DINRAC (continued)



DINRAC (continued)



DINRAC (continued)



MERRAC

- Specific Projects on the oil spill prediction model, minimum level of preparedness and response, and HNS National Reports have been carried out by experts nominated by the NOWPAP members.
- Regional report on sea-based marine litter (based upon the national reports from the NOWPAP members).
- Guidelines for monitoring marine litter on the seabed in the North Pacific region;
- Guidelines for providing and improving port reception facilities and services for ship-generated marine litter in the North Pacific region;
- Sectoral guidelines for the marine litter management (Commercial Shipping; Passenger Ships; Recreation Activities; Fisheries);
- Brochure on sea-based marine litter.
- List of oil spill response equipment, institutions and experts in the field of marine pollution preparedness and response;
- List of oil spill accidents over 10 tons.

MERRAC (continued)

- In response to the worst oil spill disaster in the Republic of Korea occurred on 7 December 2007, the NOWPAP Regional Oil Spill Contingency Plan has been activated following a request of the Korean government.
- MERRAC has requested assistance from other NOWPAP member states in providing sorbents, coastal cleanup equipment, aircrafts and helicopters for spraying dispersants.
- Among the emergency supplies available in all NOWPAP member states, Korean government, taking into account logistical issues, accepted kind offers from China and Japan.
- More than 50 tons of sorbents were shipped from China and 10 tons arrived from Japan by air along with 7 experts.
- Staff members of MERRAC and NOWPAP RCU helped to coordinate assistance from NOWPAP member states.



POMRAC

POMRAC organized its 5th Focal Points meeting in Vladivostok in October 2007.

The following POMRAC reports were published:

- Regional Overview on Atmospheric Deposition of Contaminants to the Marine and Coastal Environment;
- State of Marine Environment in the NOWPAP Region.

POMRAC has started new activities on Integrated Coastal and River Basin Management (ICARM)

(see next slide)

From Action Plan text:

The strategy for wise management of the northwest Pacific coastal and marine environment should therefore consist of 5 main elements:

- monitoring and assessment of the environmental condition
- creation of an efficient and effective information base
- **integrated coastal area planning**
- **integrated coastal area management**
- establishment of a collaborative and cooperative framework

Building partnerships

- East Asian Seas Regional Coordinating Unit (EAS/RCU);
- North East Asian Regional – Global Ocean Observing System (NEAR-GOOS);
- GEF/UNDP/IMO Regional Programme on Partnerships in Environmental Management for the Seas of East Asia (PEMSEA);
- North Pacific Marine Science Organization (PICES);
- UNESCO/IOC Sub-Commission for the Western Pacific (WESTPAC);
- UNDP/GEF Project on the Yellow Sea Large Marine Ecosystem (YSLME).

Three of those partners above participated in International Coastal Cleanup (ICC) campaigns and workshops in Busan (Korea), September 2007.

NOWPAP RCU Busan office hosted the 2nd Yellow Sea Partnership Workshop in October 2007.

Raising public awareness

- NOWPAP homepage and RAC homepages have been maintained and constantly updated (in English, Chinese, Japanese, Korean and Russian).
- Information about NOWPAP was posted at the partners' websites and introduced in their electronic newsletters (e.g., COBSEA, PEMSEA, UNEP ROAP, YSLME).
- Several brochures, leaflets, posters about NOWPAP activities were prepared and widely distributed (in English and local languages, when appropriate).
- While attending a few global and regional meetings and local events, RACs and RCU staff contributed to increasing NOWPAP visibility and attracting public attention to marine environment conservation by introducing the NOWPAP activities.
- RACs and RCU staff also contributed articles to magazines, newspapers and newsletters.

Resource mobilization and financial support from members

- UNEP Regional Seas Programme provided USD 20,000 to organize a workshop on NOWPAP Regional Action Plan on Marine Litter (RAP MALI) in November 2007.
- The member states and local organizations also supported financially the ICC campaigns and workshops in Busan (Korea) in September 2007 and in Vladivostok (Russia) in October 2007.
- During the 12th IGM, a representative of Japan mentioned that Japanese government is willing to provide financial support to marine litter activities implemented by RACs. Currently, several proposals from POMRAC and DINRAC are being finalized.

UNEP Northwest Pacific Action Plan Regional Seas

MALITA Outcomes

Monitoring Guidelines



Guidelines for Port Reception Facilities





UNEP Northwest Pacific Action Plan Regional Seas

Sectoral Guidelines Tourism, Fishing, Shipping



Booklet on Recycling of Plastic Marine Litter

UNEP Northwest Pacific Action Plan Regional Seas

Regional Workshops and Meetings



Toyama, Japan, November 2005



1st Workshop and Working Meeting (Incheon, Korea, June 2006)



2nd Workshop and Working Meeting (Toyama, Japan, March 2007)



Rizhao, China June 2007



Busan, Korea September 2007

UNEP Northwest Pacific Action Plan Regional Seas

International Coastal Cleanup (ICC) Campaigns



Yamagata, Japan, September 2006



Rizhao, China June 2007



Busan, Korea, September 2007



Vladivostok, Russia October 2007

UNEP Northwest Pacific Action Plan Regional Seas

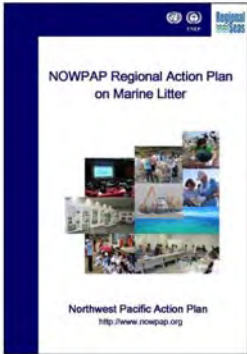
Public awareness and education

Brochures/leaflets, lectures and exhibitions





UNEP Northwest Pacific Action Plan Regional Seas



Objectives

- PREVENT ML input
- MONITOR quantities and distribution of ML
- REMOVE existing ML

Northwest Pacific Action Plan
<http://www.nowpap.org>

UNEP Northwest Pacific Action Plan Regional Seas

Thank you very much !

Report on implementation and expenditure of CEARAC activities for the 2006-2007 biennium

NOWPAP CEARAC

6-8 March 2008

Outline of CEARAC Activities for the 2006-2007 biennium

- ◆ Organization of CEARAC 4th and 5th FPMs and 3rd WG3 and WG4 Meetings
- ◆ CEARAC Projects
 - WG3
 - Booklet of "Countermeasures against HABs"
 - Pamphlet of *Cochlodinium*
 - WG4
 - Eutrophication Monitoring Guidelines by RS for the NOWPAP Region
 - RS Training
 - Development of RS information network
- ◆ CEARAC Activities on Marine Litter
- ◆ Other Intersessional Activity; RS
- ◆ Cooperation and Coordination
- ◆ Publication of CEARAC Newsletter

Main Achievements of the 4th FPM

(8-9 March 2006, Toyama, Japan)

- ◆ Reported implementation of CEARAC activities in 2005 and expenditure for the 2004-2005 biennium
- ◆ Reported intersessional activities of NOWPAP WG3(HAB) and WG4(RS)
- ◆ Approved the detailed workplan and budget of CEARAC for the 2006-2007 biennium
- ◆ Adopted the revised TORs for WG3 and WG4
- ◆ Discussed the revised TOR of CEARAC FPM and agreed to submit to 11th IGM for approval
- ◆ Decided to discuss long-term objectives of CEARAC in WG meetings and the next FPM.



Main Achievements of the 5th FPM

(18-19 September 2007, Toyama, Japan)

- ◆ Reported implementation and expenditure of CEARAC activities for the 2006-2007 biennium
- ◆ Discussed the draft workplan and budget of CEARAC activities (included 5 proposals of new activities) for the 2008-2009 biennium and agreed to submit to the 12th IGM
- ◆ Agreed on draft mid- and long-term strategies of CEARAC and goals of NOWPAP WG3 and WG4
- ◆ Discussed the draft guidelines on establishment and disbanding on Working Groups of CEARAC and agreed on the draft guidelines
- ◆ Decided to discuss on the operation of the presence WG3 and WG4 at the 6th FPM



Main Achievements of the 3rd Meeting of WG3 and WG4 (Toyama, 6-7 July 2006)

- ◆ Agreed on publishing *Cochlodinium* pamphlets in four languages; Chinese, Japanese, Korean and Russian
- ◆ Agreed on publishing an Eutrophication Monitoring Guidelines by RS for the NOWPAP Region through refining NPEC Eutrophication Monitoring Guideline by the NOWPAP Members in 2006.
- ◆ Changed the title of the booklet to “Countermeasures against HABs”, and a new chapter about toxic producing algal blooms was added.
- ◆ Agreed on conducting a RS training program on data analysis in 2007.
- ◆ Discussed the mid and long term strategies of CEARAC and mid and long term objectives of WG3 and WG4, and confirmed to continue discussing these issues.



Activities of WG3

- ◆ Booklet of “Countermeasures against HABs”
- ◆ Pamphlet of *Cochlodinium*

Booklet of “Countermeasures against HABs”

Information on countermeasures against HABs of each country was submitted and harmonized.



In book form



In CD format

Cochlodinium Pamphlet in each language

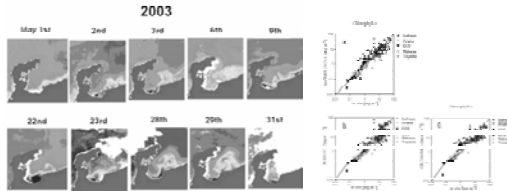
English *Cochlodinium* Pamphlet was translated into four languages by WG3 experts voluntarily.



Activities of WG4

- ◆ Eutrophication Monitoring Guidelines by RS for the NOWPAP Region
- ◆ RS Training
- ◆ Development of RS information network

Eutrophication Monitoring Guidelines by RS for the NOWPAP Region



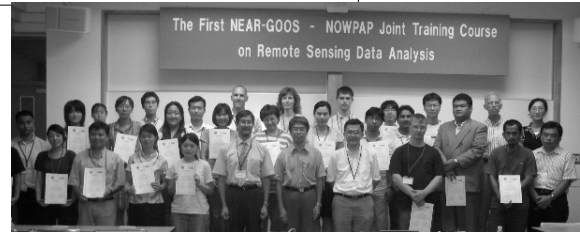
The guidelines have been approved by CEARAC FPs and WG experts, and being reviewed by a native English speaker. The guidelines were published and distributed at the 12th NOWPAP IGM.

RS training on data analysis

3-7 Sep. 2007 at Nagasaki University

23 trainees from 8 countries

10 lecturers from 5 countries



- Main topics -
RS data analysis for eutrophication, red tide and oil spill

Development of RS information network system

- North Sea area in Shandong Peninsula, China
- Ariake Bay, Japan
- South Sea, Korea
- Peter the Great Bay, Russia

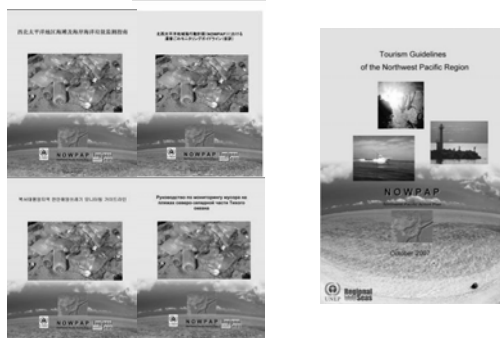
•The Marine Environmental Watch website has been registered as one of databases of NEAR-GOOS



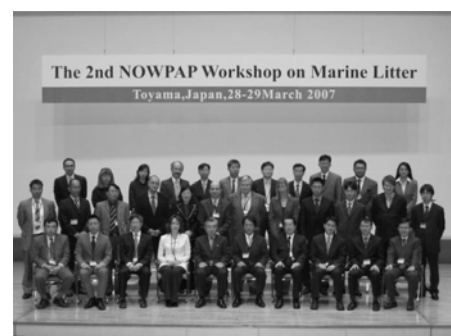
Activities of MALITA

- ◆ Guidelines for Monitoring Marine Litter on the Beaches and Shorelines of the Northwest Pacific Region
- ◆ Tourism Guidelines
- ◆ The 2nd NOWPAP Workshop on Marine Litter
- ◆ Pamphlet for reduction of marine litter
- ◆ Booklet on recycling of plastic marine litter
- ◆ Monitoring survey to raise public awareness
- ◆ Summary of the results of the marine litter monitoring on the beaches and shorelines of the Northwest Pacific region

Monitoring Guidelines and Tourism Guidelines



The 2nd NOWPAP Workshop on Marine Litter



Pamphlet for reduction of marine litter and Booklet on recycling of plastic marine litter

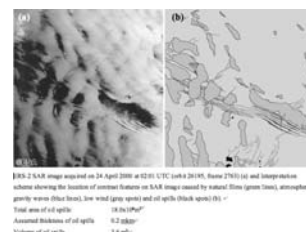


Intersessional Activity

Website on Oil spill monitoring by remote sensing

Added many SAR images
with annotations.

Added list of new literature
related to oil spill
monitoring by RS.



Cooperation and Coordination(1/2)

Participation in NOWPAP IGM, Workshop and other RACs FPM

- ◆ the 1st NOWPAP Workshop on Marine Litter and the 1st NOWPAP Regional Meeting on Marine Litter. (Incheon, Korea, 8-9 June, 2006)
- ◆ PICES 15th Annual Meeting (Yokohama, Japan, 13-22 October, 2006)
- ◆ 4th Korean-Japan Workshop on Ocean Color Remote Sensing (Cheju, Korea, 19-20 December 2006)
- ◆ 1st COBSEA Marine Litter Workshop (Jakarta, Indonesia, 8-9 May 2007)
- ◆ NOWPAP International Coastal Cleanup (ICC) in Sakata, Japan (29-30 September 2006), in Rizhao, China (27-28 June 2007) and in Busan, Korea (29-30 September 2007)
- ◆ Advances on Satellite Oceanography: Understanding and Monitoring of Asian Marginal Seas (50-th Sputnik Anniversary) (Vladivostok, Russia, 3-6 October, 2007)

Cooperation and Coordination(2/2)

Cooperation with other RACs and Organizations

- ◆ The 4th International Workshop on Remote Sensing of the Marine Environment in the Northwest Pacific Region
- ◆ The State of Marine Environment Report in the NOWPAP Region
- ◆ Assistance to POMRAC for organizing ICARM

Publication of Newsletter



The use of CEARAC budget for the 2006-2007 biennium(1/3)

| Activity | Date & Venue | Expenditure (expected) in US\$ |
|--|-----------------------------|--------------------------------|
| Organization of CEARAC 4 th FPM -organizing the meeting -publishing the meeting report | Mar.2006; Toyama, Japan | 17,560 1,908 |
| Organization of 5 th FPM -organizing the meeting -publishing the meeting report | Sep. 2007; Toyama, Japan | 20,650 2,000 |
| Organization of 3 rd Meeting of NOWPAP WG3 and WG4 -organizing the meeting -publishing the meeting report | November 2006 | 27,679 4,000 |
| WG3 (HAB) -Making a Booklet of "Countermeasures against HABs" -Publication of <i>Cochlodinium</i> pamphlet in four languages | Throughout 2006 and 2007 | 22,000 4,245 |

**The use of CEARAC budget
for the 2006-2007 biennium(2/3)**

| Activity | Date & Venue | Expenditure in US\$ |
|---|-----------------------------|------------------------|
| Publication of RS Guidelines | Throughout 2006 and 2007 | 14,800 |
| -Eutrophication Monitoring Guideline | | 16,300 |
| -RS Training | | |
| Intersessional work | Throughout 2006 and 2007 | 3,000 |
| -Website on Oil spill monitoring by remote sensing | | 3,000 |
| -Preparing Documents for 6 th FPM | | |
| Cooperation and Coordination of CEARAC activities | Throughout 2006 and 2007 | 4,400 |
| -2006 | | 4,550 |
| -2007 | | |
| Publication of CEARAC Newsletter | Autumn 2006 and 2007 | 1,908 |
| -Third issue | | 2,000 |
| -Fourth issue | | |
| Sub-total | | 150,000 |

**The use of CEARAC budget
for the 2006-2007 biennium (3/3)**

| Activity | Date & Venue | Expenditure in US\$ |
|---|-----------------------------|------------------------|
| CEARAC Activities on Marine Litter | Throughout 2006 and 2007 | 3,594 |
| -Monitoring Guideline | | 6,000 |
| -Tourism Guideline | | 2,906 |
| -Pamphlet for the reduction on marine litter | | 4,000 |
| -Booklet on recycling of plastic marine litter | | 3,000 |
| -Summary of the result of marine litter monitoring | | |
| Sub-total | | 19,500 |
| TOTAL | | 169,500 |

Revision of the proposed workplan and budget of CEARAC activities for the 2008-2009 biennium

NOWPAP CEARAC
6-8 March 2008

Outline of CEARAC Activities for the 2008-2009 biennium

- Organization of CEARAC 6th & 7th FPM and 4th WG3 and WG4 Meetings
- CEARAC Projects
- Cooperation and Coordination
- Publicity activities

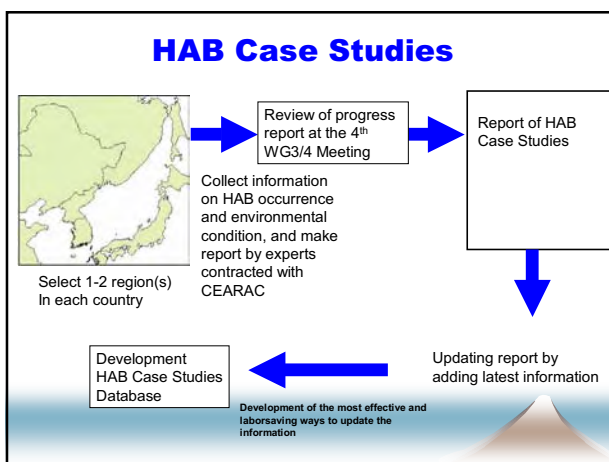
Organization of CEARAC 6th & 7th FPM and 4th WG3 and WG4 Meetings

- CEARAC 6th FPM, 6-8 Mar. 2008
- 4th WG3 and WG4 Meetings, Summer 2008
- CEARAC 7th FPM, Sep. 2009

CEARAC Projects

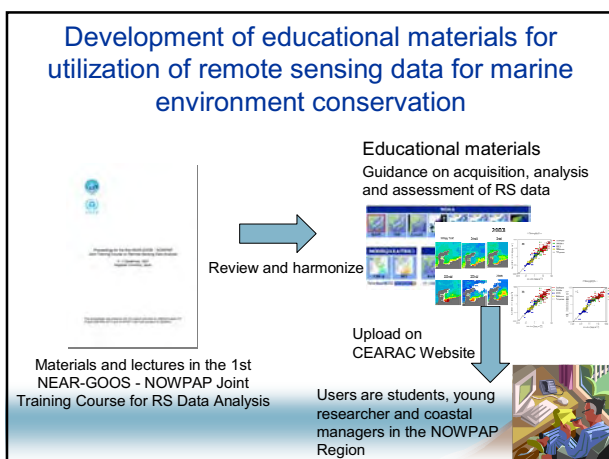
- WG3 -HAB case studies
- HAB Integrated Website
- WG4 -educational materials for utilization of remote sensing data for marine environment conservation
- 2nd training course on remote sensing data analysis
- joint activity of WG3 and WG4
- procedures for assessment of eutrophication status including evaluation of land based sources of nutrients for the NOWPAP Region

HAB Case Studies



HAB Integrated Website

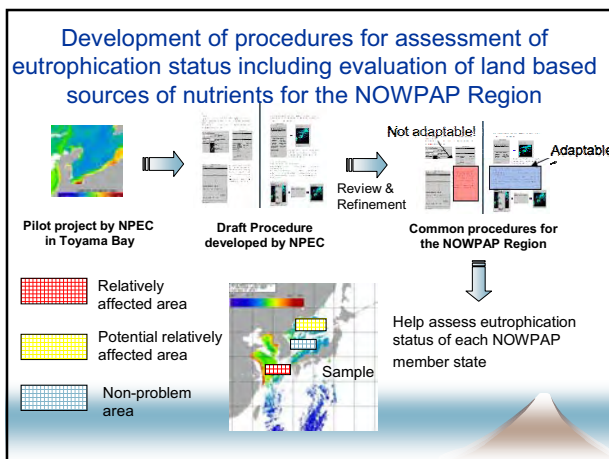
| Categories | Contents |
|---------------------------------|--|
| Occurrence and monitoring | Integrated Report National Reports Reports of HAB Case Studies |
| Mitigation | Booklet of Countermeasures against HABs |
| Reference database | HAB Reference Database |
| Event database | Database of HAB Case Studies |
| RS techniques for HABs | HAB Case Studies |
| Hot topics in the NOWPAP region | Cochlodinium Website HAB concerned items in the HAB Case Studies |
| Links | Database of HAB occurrence and monitoring in the NOWPAP region Database of HAB occurrence and monitoring in the other region Taxonomic information of HABs Other reference database |



Organization of the 2nd training course on remote sensing data analysis

- ◆ Follow-on of the 1st RS training course on data analysis

Lecture + Hand-on exercises



Cooperation and Coordination

Publicity activities

Proposed workplan and budget of CEARAC for the 2008-2009 biennium (1/3)

| Activity | Planned Budget (US\$) | | | Tentative Time |
|---|-----------------------|--------|--------|-------------------------|
| | 2008 | 2009 | Total | |
| Organization of CEARAC FPM | 18,000 | 18,000 | 36,000 | Mar. 2008 Sept. 2009 |
| Organization of WG3(HAB) and WG4(RS) meetings | 31,000 | - | 31,000 | Summer 2008 |
| Specific Projects | 43,000 | 12,000 | 55,000 | |
| WG3 (HAB) | | | | |
| -HAB Case Studies | 8,000 | 2,000 | 10,000 | |
| -HAB Integrated Website | - | 10,000 | 10,000 | |
| WG4 (RS) | | | | |
| -educational materials for utilization of Remote Sensing data for coastal environment conservation | 10,000 | - | 10,000 | |
| -2nd training course on Remote Sensing data analysis | 15,000 | - | 15,000 | |
| WG3 and WG4 (joint) | | | | |
| -procedures for assessment of eutrophication status including evaluation of land based sources of nutrients for the NOWPAP Region | 10,000 | - | 10,000 | |

Proposed workplan and budget of CEARAC for the 2008-2009 biennium (2/3)

| Activity | Planned Budget (US\$) | | | Tentative Time |
|---|-----------------------|-------|---------|----------------|
| | 2008 | 2009 | Total | |
| Intersessional work | 3,000 | 3,000 | 6,000 | |
| Cooperation and Coordination of CEARAC activities | 4,000 | 4,000 | 8,000 | |
| Publicity activities | 2,000 | 2,000 | 4,000 | |
| Sub-total | | | 140,000 | |

**Proposed workplan and budget of CEARAC
for the 2008-2009 biennium (3/3)**

| Activity | Planned Budget (US\$) | | | Tentative Time |
|---|-----------------------|--------------|----------------|----------------|
| | 2008 | 2009 | Total | |
| CEARAC activities on RAP MALI | 4,500 | 6,000 | 10,500 | |
| -Develop public awareness materials | 2,500 | - | 2,500 | |
| -Compile and harmonize marine litter monitoring data on beaches | 2,000 | 2,000 | 4,000 | |
| -Interpret results of marine litter monitoring on beaches | - | 4,000 | 4,000 | |
| - Develop technical materials and introduce best practices on solid waste management, including removal of marine litter on beaches | In-kind | In-kind | | |
| Sub-total | | | 10,500 | |
| TOTAL | | | 150,500 | |

HAB Case Studies

CEARAC
6 Mar. 2008

Objective

Objectives of HAB Case Studies are

- (1) To establish the most effective and labor-saving ways for sharing various information on HAB occurrence
- (2) To summarize common concerned items in the NOWPAP region in the HAB Case Studies reports

Main Actions

- Selection of areas for HAB Case Studies
- Implementation of HAB Case Studies
 - Making progress report
 - Review of progress report at the 4th WG3 meeting
 - Making report (2008)
- Updating the reports (2008) of HAB Case Studies

The overview of HAB Case study

1. Introduction
2. Methodology used in the case study
3. Monitoring frame work and parameters of HAB
4. Status of HAB events
5. Status of recent HAB events and results of environmental monitoring
6. Eutrophication monitoring with satellite image
7. Conclusion
8. References

*Attachment (Records of HAB events)

Example of Case Studies report using data of Nagasaki Prefecture

This example is prepared by using the report (2007) of Nagasaki Prefectural Institute of Fisheries

1. Introduction

1.1 Objective

The main objective of the case study

1.2 Definitions and rules used in the HAB Case Studies

Definitions the terms used in the case study

1.3 Overview of the target sea area

1.3.1 Location and boundary

Geographic boundary of the target sea area

1.3.2 Environmental/geographical characteristics

Ocean currents, topography, etc.



2. Methodology used in case studies in the northwest sea area of Kyushu region

2.1 Methodology used in the case study

Type and scope of data and information used to grasp the number of HAB events

2.2 Warning/action standards against HAB events

The type of indicators that are used to warn HAB events

| | Warning/action standards (cells/mL) | | Note (Affected fish/shellfish) |
|------------------------------------|-------------------------------------|--------------|---|
| | Warning level | Action level | |
| <i>Chattonella antiqua</i> | 1 | 10 | Yellowtail, cockles etc. |
| <i>Chattonella marina</i> | 1 | 10 | Yellowtail etc. |
| <i>Chattonella globosa</i> | 10 | 100 | Amberjack |
| <i>Chattonella ovata</i> | 10 | 100 | Yellowtail, Red seabream etc. |
| <i>Karenia mikimotoi</i> | 100 | 500 | Fish, shellfish, crustaceans etc. |
| <i>Cochlodinium polykrikoides</i> | 50 | 500 | Yellowtail, Red seabream, pufferfish, Striped jack etc. |
| <i>Heterosigma akashiwo</i> | 1000 | 10000 | Yellowtail, grouper etc. |
| <i>Heterocapsa circularisquama</i> | 10 | 50 | Shellfish (mainly bivalves) |

2.3 Target HAB species

Identification of HAB species that cause fishery damage in the target and adjacent areas

| | Harmful Red-tide causative species | Toxin-Producing Plankton |
|------------------------------------|------------------------------------|--------------------------|
| Dinophyceae | ○ | |
| <i>Akashiwo sanguinea</i> | ○ | |
| <i>Karenia mikimotoi</i> | ○ | |
| <i>Cochlodinium polykrikoides</i> | ○ | |
| <i>Alexandrium affine</i> | ○ | |
| <i>Heterocapsa circularisquama</i> | ○ | |
| Raphidophyceae | ○ | |
| <i>Chattonella antiqua</i> | ○ | |
| <i>Chattonella marina</i> | ○ | |
| <i>Heterosigma akashiwo</i> | | |

3. Monitoring framework and parameters of HABs

3.1 Monitoring framework

Monitoring organizations and their monitoring areas

| Monitoring organization | Monitored sea area | |
|---|--------------------|--|
| | Sub-area | Spots |
| Nagasaki Prefectural Institute of Fisheries | Northern Kyushu | Imari Bay, Hirado, Usuka, Furue Bay |
| | Western Kyushu | Ohmura Bay, Tachibana Bay, coasts of Kitamatsu, Kujukushima, coast of Seih, Ariake Sea |
| | Remote Islands | Goto, Iki, Tsushima island |

3.2 Monitoring parameters

Parameters monitored by the monitoring organization

| Survey type | Main objectives | Monitoring parameter | | | | Monitoring frequency |
|------------------------------------|--|---|---|---|-------------------------|---|
| | | HAB | Water quality | Meteorology | Others | |
| Post-HAB survey | Monitoring of fishery damage | -HAB species (dominant/causative spp.) -Cell density -Bloom area -Water color -Fishery damage | -Water temp. -Salinity -DO | None | | Immediately after water discoloration or fishery damage is reported |
| Regular HAB monitoring survey | To check presence of HAB spp. | -All HAB species -Cell density -Water color | -Water temp. -Salinity -DO -Transparency -Nutrients -Chl.a | -Weather -Cloud cover -Wind direction/speed | | 4-5/year (June-October) |
| Regular shellfish-poisoning survey | -To check presence of HAB spp. that induce shellfish poisoning -Contamination of shellfish products | -Species that induce shellfish poisoning -Cell density -Water color | -Water temp. -Salinity -DO -Transparency | | Shellfish contamination | 12/year (1/month) |

3.3 Data and information used

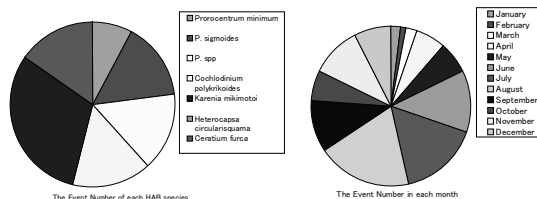
Parameters to be used for the case studies

| | Monitoring parameter | Survey type |
|---------------|---|---|
| HAB | -HAB species (dominant/causative spp.) -Cell density -Bloom area -Fishery damage | Post-HAB survey |
| Water quality | -Water temp. -Salinity -DO | Post-HAB survey |
| Others | -Water quality Transparency, Nutrients, Chl.a -Meteorology Weather, Cloud cover, Wind, direction/speed | Regular HAB monitoring survey Regular shellfish-poisoning survey |

4. Status of HAB events

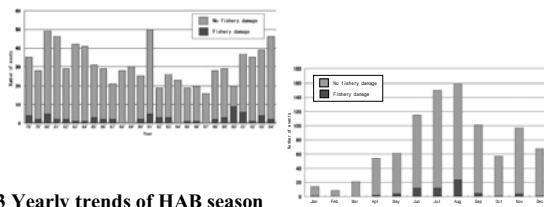
4.1 Status of HAB events from 1978 to 2007

Present a total of HAB events, HAB causative species using such graphs as below



4.2 Yearly trends of HAB events

Present the yearly trends in the number of HAB events



4.3 Yearly trends of HAB season

Present the number of HAB events for each month and then identify the main HAB periods/seasons

5. Status of recent HAB events and results of environmental monitoring

- 5.1 Number of HAB events
- 5.2 Period of HAB events
- 5.3 Duration of HAB events
- 5.4 Location of HAB events
- 5.5 Causative species
- 5.6 Maximum density of each HAB event
- 5.7 Status of HAB induced fishery damage
- 5.8 Status of target species

5.4 Location of HAB events

| Year | Sub-area | Sea area | No. of events | Causative species |
|------|---------------------|------------------------|---------------|---|
| 2006 | North Kyushu region | Imari Bay | 4(1) | <i>Ceratium furca</i> , <i>Karenia mikimotoi</i> , <i>Prorocentrum sigmoides</i> , <i>Diatoms</i> |
| | | Hirado(UsukaFurue Bay) | 1 | <i>Cochlodinium polykrikoides</i> |
| | West Kyushu region | Ohmura Bay | 7 | Cryptophyceae, <i>Heterosigma akashiwo</i> , <i>K. mikimotoi</i> , <i>Prorocentrum</i> spp., <i>P. sigmoides</i> |
| | | Tachibana Bay | 1 | <i>C. furca</i> |
| | | Kujukushima | 5(1) | <i>Strombidium</i> sp., <i>P. spp.</i> , <i>Mesodinium rubrum</i> , <i>K. mikimotoi</i> , <i>Prorocentrum minimum</i> |
| | Remote islands | Goto Island | 1 | <i>H. akashiwo</i> |
| | | Tsushima | 2 | <i>C. polykrikoides</i> , <i>M. rubrum</i> |
| | Total | | 21(2) | |

5.9 Environmental monitoring results during HAB events

| Year | Event No. | Duration | Location | Water temp. (C°) | Salinity | DO (mg/L) |
|------|-----------|-----------|-------------|------------------|----------|-----------|
| 2006 | NS-2006-1 | 2.24-3.15 | Ohmura Bay | 12.7 | 27.4 | 14.5 |
| 2006 | NS-2006-3 | 5.1-5.2 | Kujukushima | 17.7 | 33.8 | 8.6 |
| 2006 | NS-2006-4 | 5.15-5.26 | Goto | 19.5 | 27.0 | 9.5 |
| 2006 | NS-2006-5 | 5.16-6.29 | Ohmura Bay | - | - | - |
| ... | | | | | | |

5.10 Water quality parameters of regular HAB monitoring survey

Present the results of the regular HAB monitoring survey

| Survey date | Spot | Survey point | Transparency (m) | Water temp. (C°) | Salinity | DO (mg/L) | NO3-N (μM) | NO2-N (μM) | NH4-N (μM) | PO4-P (μM) | Chl.a (μg/L) |
|-------------|-----------|--------------|------------------|------------------|----------|-----------|------------|------------|------------|------------|--------------|
| 2006/6/21 | Imari Bay | 1 | 9.0 | 22.0 | 33.4 | 5.0 | 0.25 | 0.01 | 0.40 | 0.01 | 0.9 |
| 2006/6/21 | Imari Bay | 3 | 5.0 | 23.5 | 32.7 | 5.0 | 0.04 | 0.03 | 0.19 | 0.06 | 1.5 |
| 2006/6/21 | Imari Bay | 4 | 6.0 | 23.5 | 32.7 | 5.2 | 0.05 | 0.06 | 0.30 | 0.02 | 1.6 |

5.11 Meteorological observation parameters

Present the meteorological information during HAB events

6. Eutrophication monitoring with satellite image

6.1 Framework of Satellite image monitoring

Utilizable Remote Sensing Data in this region



- Data from the Marine Environmental Watch Project
Observation parameters: chlorophyll-a, sea surface temperature (SST), etc.
Available data period (chlorophyll-a): August 2002 onwards
(February 2003 onwards for MODIS (Aqua))
Observation frequency (chlorophyll-a): 1-3 per day
Resolution (chlorophyll-a): 1 km x 1 km

- Web site of 'Ocean Color Web'
NASA's web site 'Ocean Color Web' provides global Chlorophyll-a concentration data

6.2 Parameters of satellite image monitoring

| Organization | Name of system | Monitoring Parameters | Data Set available | | | | | |
|--------------|---|-----------------------|---------------------|------------------|---|------------|--------------------|-------------------------|
| | | | Sensor | Period of data | Unit of data set | Resolution | Product data level | Processing algorithm |
| NPEC | Marine Environmental Protection of Northwest Pacific Region | Chlorophyll a | MODIS (Aqua/Terra) | 2002.5-2011 | Pass | 1 km | Level 2 | JAVA GLI CH-a algorithm |
| | | SST | AHRRR (NOAA) | 2002.1-2012 | Pass | 1 km | Level 0 | Tera Scan SST algorithm |
| | | | MODIS (Aqua) | 2002.5-2011 | Pass | 1 km | Level 2 | JAXA GLI CH-a algorithm |
| NASA | Ocean Color Web | Chlorophyll a | CCZS (SeaStar) | 1978.11 - 1986.6 | Daily, & Day, Monthly, Seasonal, Annual | 4 km | Level 3 | NASA CD4 CH-a algorithm |
| | | | | | | 9 km | | |
| | | | OCTS (ADEOS) | 1996.8-1997.7 | Daily, & Day, Monthly, Seasonal, Annual | 9 km | Level 3 | |
| | | | SeaWiFS (Orbview-2) | 1997.9-2004.12 | Daily | 1 km | Level 2 | |
| | | | | | Daily, & Day, Monthly, Seasonal, Annual | 9 km | Level 3 | |
| | | | MODIS (Aqua) | 2002-2011 | Pass | 1 km | Level 1 | |
| | | | | | Pass | 1 km | Level 12 | |
| | | | | | Daily, & Day, Monthly, Seasonal, Annual | 4 km | Level 13 | |

6.3 Results of satellite image monitoring

| Year | Event No. | Duration | Spot | Sea surface chlorophyll concentration (from Marine Calendar) |
|------|-----------|-----------|-------------|---|
| 2006 | NS-2006-1 | 2.24-3.15 | Ohmura Bay |  |
| 2006 | NS-2006-3 | 5.1-5.2 | Kujukushima |  |

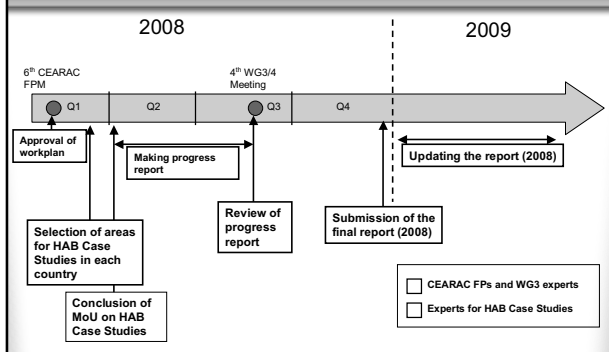
Records of HAB events in the Northwestern Sea Area of Kyushu region

[illegible]

Expected Outcome

- **Contribution to establish effective and laborsaving ways for sharing information**
- **HAB Case Studies database**
- **Sharing information on not only areas for HAB Case Studies but also other sea areas**

Schedule



Budget

| Contract | Timing | Output | To be Completed | Counterparts | Budget |
|-----------------------------|----------------|--------------------------------------|-----------------|------------------|------------|
| MoU for HAB Case Studies | 2008 end of Q1 | -Progress report of HAB Case Studies | 2008 end of Q4 | Expert of China | US\$2,000 |
| | | -Final report of HAB Case Studies | | Expert of Japan | US\$2,000 |
| | | | | Expert of Korea | US\$2,000 |
| | | | | Expert of Russia | US\$2,000 |
| MoU for updating the report | 2009 | Updated report | 2009 end of Q4 | Expert of China | US\$500 |
| | | | | Expert of Japan | US\$500 |
| | | | | Expert of Korea | US\$500 |
| | | | | Expert of Russia | US\$500 |
| Total | | | | | US\$10,000 |

HAB Integrated Website

CEARAC
6 March, 2008

Objective

Objective of HAB Integrated Website is

to provide and share following information on HAB occurrence, countermeasures, oceanographic condition and HAB related issues in order to enhance activities against HAB in the NOWPAP region

Main tasks

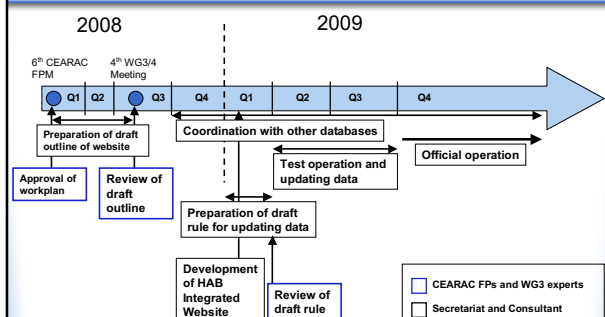
- Preparation of outline of website
- Coordination with other databases by international organizations
- Development of HAB Integrated Website
- Preparation of rule for updating data
- Test operation
- Official operation

Expected Outcome

This website can provide useful information to support actions against HABs in the NOWPAP member states.

This website contributes to exchange and share information with other regional seas and international organization.

Schedule



Budget

| Contract | Timing | Output | To be Completed | Counterparts | Budget |
|---|---------|------------------------|-----------------|--------------|------------|
| MoU for development of HAB Integrated Website | 2008 Q2 | HAB Integrated Website | 2009 end of Q4 | Consultant | US\$10,000 |
| Total | | | | | US\$10,000 |

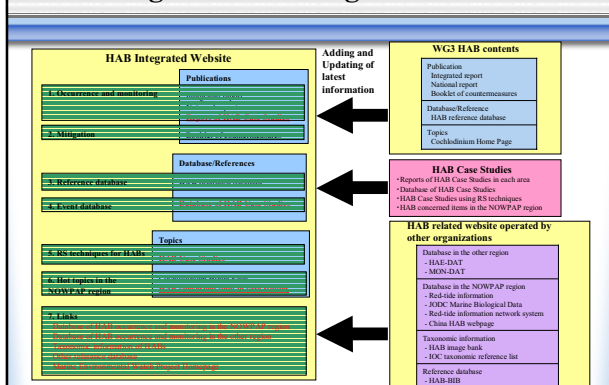
Summary of information provided in each WG3 HAB contents

| WG3 HAB Contents | Category (based on the HAB Reference DB) | Characteristics | |
|--|---|---|---|
| | | Information included | Information not included |
| National Report Integrated Report | Occurrence and Monitoring | The following HAB related information of the NOWPAP region are included: • occurrences • monitoring status • research status | HAB information outside of the NOWPAP region |
| <i>Cochlodinium</i> Home Page (include pamphlet) | Taxonomy/Physiology etc. | The following information of <i>Cochlodinium polykrikoides</i> are included: • biology (classification, life history, physiology) • occurrences • relevant literatures | HAB species except <i>C. polykrikoides</i> |
| A booklet of Countermeasure against HABs | Mitigation and Management | Examples of HAB countermeasures in and outside of the NOWPAP region | Not all HAB countermeasures are covered (e.g. indirect methods) |
| HAB Reference DB | Others | HAB related literatures that focus on the NOWPAP region | HAB related literatures that do not focus on the NOWPAP region |
| HAB Case studies | Occurrence and Monitoring/Mechanism and Environment | The following information/data in the target sea in the NOWPAP region • occurrences • observation data | HAB observation data outside the NOWPAP region |

HAB related websites operated by other organizations in the NOWPAP region

| No. | Category | Title of Website | Organizations |
|-----|---------------------------|--|--|
| 1 | Occurrence and Monitoring | HAB-DAT (harmful algal event database) | IOC/HAB, ICES, PICES |
| 2 | Occurrence and Monitoring | MON-DAT (Design and Implementation of Some Harmful Algal Monitoring Systems) | IOC/HAB, ICES |
| 3 | Occurrence and Monitoring | Red-tide information | Fisheries Agency and prefectures (Japan) |
| 4 | Occurrence and Monitoring | JODC Marine Biological (Plankton) Data | Japan Oceanographic Data Center (Japan) |
| 5 | Taxonomy | HAB image bank web site | WESTPAC/IOC (supervised by Professor Fukuyo) |
| 6 | Taxonomy | IOC Taxonomic Reference List of Toxic Plankton Algae | IOC/HAB |
| 7 | Taxonomy | Red-tide species in Kagoshima Prefecture | Kagoshima Prefectural Fisheries Technology and Development Center (Kagoshima Pref., Japan) |
| 8 | Taxonomy | Oita Prefecture Red-Tide Sheet | Oita Prefecture Marine Fisheries Research Center (Oita Pref., Japan) |
| 9 | Integration | Red-tide Information Network System | Japan Fisheries Resource Conservation Association (Japan) |
| 10 | Integration | China Harmful Algal Bloom Web pages | Chinese Academy of Sciences (China) |
| 11 | (Reference) | HAB-BIB (IOC Bibliographic HAB Database) | IOC/HAB |

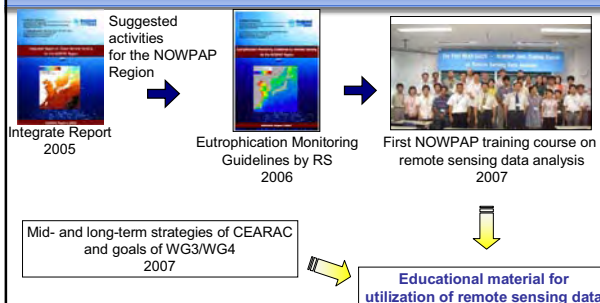
Image of HAB Integrated Website



Proposal for development of educational materials for utilization of remote sensing data for marine environment conservation

CEARAC
March 6, 2008

1. Background

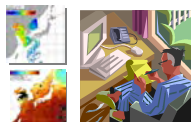


2. Objective

to develop educational materials for utilization of remote sensing data for marine environment conservation, targeting at students, young researchers and coastal managers in the NOWPAP Region.

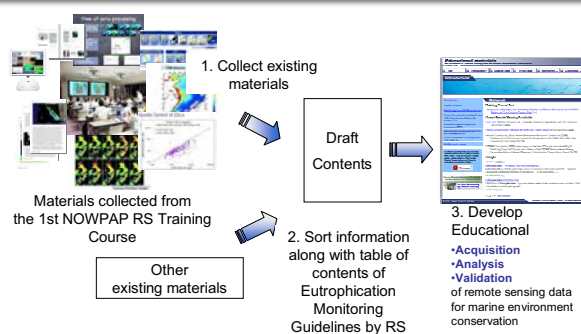


Targets



Educational materials

3. Main tasks



Draft contents of the educational materials(1/2)

1. Introduction
 - Eutrophication
 - Aquatic ecosystem
 - Harmful algal bloom (HAB) and red tide
 - Common Procedure for the Identification of the Eutrophication Status of the Maritime Area
 - National Estuarine Eutrophication Assessment (NEEA)
 - Eutrophication Monitoring Strategy for the Mediterranean Sea
 - Tools for assessment of eutrophication in the Baltic Sea
 - Satellite remote sensing
2. Satellite Data
 - 2.1 Parameters
 - Ocean color
 - Chl-a concentration
 - SST
 - 2.2 Sensors
 - Turbidity (K490)
 - Chl-a concentration
 - CZCS
 - OC2S
 - SeaWiFS
 - MODISa
 - GLI
 - MERIS
 - SST
 - AVHRR
 - MODIS
- 2.3 Obtaining data
 - Chl-a concentration
 - Ocean Color Web
 - Marine Environment Watch Homepage
 - EOL-Web
 - SST
 - Marine Environment Watch Homepage
 - Marine Remote Sensing Laboratory, NFRDI
 - Ocean Color Web
 - Turbidity (K490)
 - Ocean Color Web
- 2.4 Data processing method
 - SeaDAS
 - WIM
 - TeraScan
 - ERDAS Imagine
 - ENVI
 - BEAM
- 2.5 Region-specific issues
 - CMODIS
 - COCTS
- Turbidity (K490)
- SeaWiFS
- MODIS

Draft contents of the educational materials(2/2)

3. In situ Data
 - Calibration
 - Validation
- 3.1 Parameters and measurement method
 - Chl-a concentration
 - Nutrients
 - Temperature and Salinity
 - Transparency
 - COD
 - SS
 - CDOM
 - Water-leaving radiance
 - Phytoplankton species and pigments
 - Primary productivity
 - Weather conditions
- 3.2 Sampling plan
 - Sampling points
 - Monitoring site
 - Monitoring frequency and timing
- 3.3 Requisites for monitoring and analysis
4. Monitoring and Assessment of Eutrophication
 - Vessels
 - Positioning system
 - Navigation system
 - Analysis correlation between in situ data and satellite data
 - Evaluation of underwater algorithm
 - Understanding spatio-temporal variation
 - eutrophication
 - Evaluation of eutrophication
5. Challenges and Prospects
 - 5.1 Algorithm development
 - Region-specific algorithm
 - Positive-reverse retrieval model
 - NN models
 - Genetic algorithm
 - 5.2 Application of high-resolution satellite data
 - ALOS
 - Landsat
 - SPOT
 - 5.3 New sensor
 - MERSI
 - GOCI

Draft contents of the educational materials and training materials(1/4)

| Draft contents of the educational materials | 1 st NEAR-GOOS & NOWPAP Training Course on Remote Sensing Data Analysis Training Materials |
|---|--|
| Introduction | 1. Introduction - Remote Sensing for the Northeast Asian Seas |
| Satellite Data | |
| Parameters | 1. Introduction - Remote Sensing for the Northeast Asian Seas |
| Sensors | 1. Introduction - Remote Sensing for the Northeast Asian Seas |
| Obtaining data | 3. Introduction of Satellite Data Distribution System 15. Hands-on Practice on WIM/WAM ii. Familiarizing with satellite data distribution system |
| Data processing method | 6. Introduction to software for satellite data analysis - with a emphasis on SeaWiFS Data Analysis System 15. Hands-on Practice on WIM/WAM i. Basic exercise on WIM/WAM iii. Visualizing and projecting satellite data images |

Draft contents of the educational materials and training materials(2/4)

| Draft contents of the educational materials | 1 st NEAR-GOOS & NOWPAP Training Course on Remote Sensing Data Analysis Training Materials |
|---|---|
| In situ Data | 4. Operational Oceanographic Data Exchange and NEAR-GOOS Regional Real Time Data Base 5. Introduction of RDMDB (NEAR-GOOS) & Data Management at JODC |
| Parameters and measurement method | 7. The Optic Properties and Regional Ocean Color Algorithms for the Case-II Waters in China Seas 8. Validation of Ocean Color Remote Sensing Data in Korea 12. Measurements of Ocean Optical Properties for Sea Truth |
| Sampling plan | |
| Requisites for monitoring and analysis | |

Draft contents of the educational materials and training materials(3/4)

| Draft contents of the educational materials | 1 st NEAR-GOOS & NOWPAP Training Course on Remote Sensing Data Analysis Training Materials |
|---|--|
| Monitoring and Assessment of Eutrophication | |
| Accuracy evaluation | 2. Atmospheric Correction and Bio-optical Algorithm for Ocean Color Remote Sensing 7. The Optic Properties and Regional Ocean Color Algorithms for the Case-II Waters in China Seas 8. Validation of Ocean Color Remote Sensing Data in Korea 15. Hands-on Practice on WIM/WAM iv. Match up analysis with sea truth measurement data |
| Integration with the existing monitoring system | 10. Introduction to Eutrophication Monitoring Guidelines by Remote Sensing for the NOWPAP Region and Case Study in Toyama Bay 15. Hands-on Practice on WIM/WAM iv. Command line programs for time series analysis |

Draft contents of the educational materials and training materials(4/4)

| Draft contents of the educational materials | 1 st NEAR-GOOS & NOWPAP Training Course on Remote Sensing Data Analysis Training Materials |
|---|---|
| Challenges and Prospects | 7. The Optic Properties and Regional Ocean Color Algorithms for the Case-II Waters in China Seas 8. Validation of Ocean Color Remote Sensing Data in Korea 9. Satellite-based Red-Tide Detection/Monitoring 11. Case Studies of Red Tide 13. Monitoring of Oil Pollution with the Use of Satellite Imagery 14. Introduction to NGSST and SST Application for Monitoring of Ocean Environment 15. Hands-on Practice on WIM/WAM vi. Time series analysis of NGSST data |

Tentative design of the website for the educational materials

#1 Click introduction

#2 Select Eutrophication

Links to training text

Links to information at Ocean Remote Sensing Portal

Search results by Google

Expected alliances

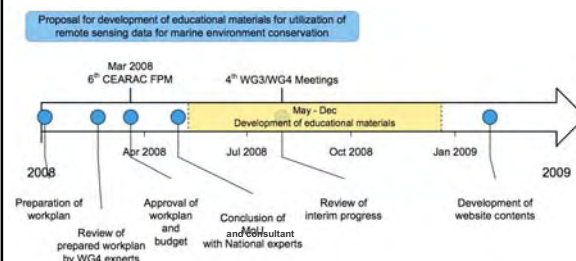
Existing materials on the Internet

- Marine Environmental Watch (NPEC)
- Ocean Remote Sensing Portal site (CEARAC)
- Web site on oil spill monitoring (CEARAC)
- IOC Ocean Teacher contents (IOC)
- NASA Ocean Color Web (NASA)
- IOCCG website (IOCCG)
- ...etc

4. Expected outcome

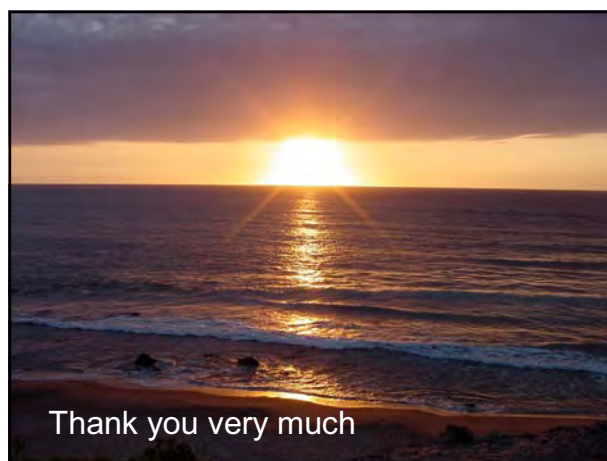
to contribute to wide use of remote sensing data among students, young researchers and coastal managers in the NOWPAP Member States. In addition, the materials will be adequately polished through feedbacks of users or experts, given from the second NOWPAP training course on remote sensing data analysis and other possible opportunities.

5. Schedule



6. Budget

| Contract | Timing | Output | To be completed | Couterpart | Budget (US\$) |
|--|---------|---|-----------------|---------------------|---------------|
| MoU for the development of educational materials | 2008 Q2 | Education a materials | 2008 end of Q4 | Expert in China | 2,000 |
| | | | | Consultant in Japan | 2,000 |
| | | | | Expert in Korea | 2,000 |
| | | | | Expert in Russia | 2,000 |
| MoU for the development of website contents for the educationa l materials | 2009 Q1 | Website contents for the education al materials | 2009 Q1 | Consultant | 2,000 |
| Total | | | | | 10,000 |

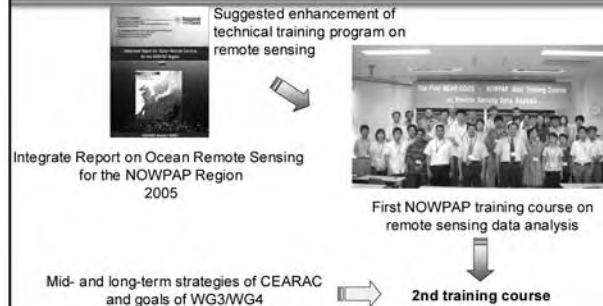


Proposal for the second NOWPAP training course on remote sensing data analysis

CEARAC

March 6, 2008

1. Background



2. Objective

to conduct an intensive training course on remote sensing data analysis for students, young researchers and coastal managers to obtain useful skills and knowledge to utilize remote sensing data in monitoring and assessment of marine environment.



3. Main tasks

Review of workplan
Venue, schedule, budget

Review of syllabus
Time for each lecture

Composition of lectures and hands-on practices

Nomination of lecturers

Recommendation of potential trainees

Outline of the training course (1/3)

Composition of the training course

- Lectures -
Satellite oceanography, introduction to ocean color remote sensing, availability of satellite data, case studies of red tide, monitoring of eutrophication, validation of algorithms, monitoring of oil spill;
- Hands-on practice sessions
Operation of remote sensing software; visualizing and verification of ocean color satellite data, time series analysis of ocean color data
- Submission of case study report
Conducting case study on specific subject

Outline of the training course (2/3)

Co-organizer

KORDI (tentative)

Date and place

Oct 27-31, 2008, Korea (tentative)

Class Capacity

number trainee is limited to around 12

Cost Tuition

Tuition will be free

Transportation and accommodation fee will be borne by participant. Limited scholarship may be available depending on budget

Application procedures

Applicant submits application form with statement outlining the suitability of their backgrounds and the reason(s) for interests in the course.

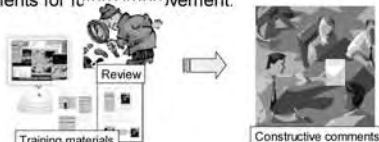
Outline of the training course (3/3)

Language

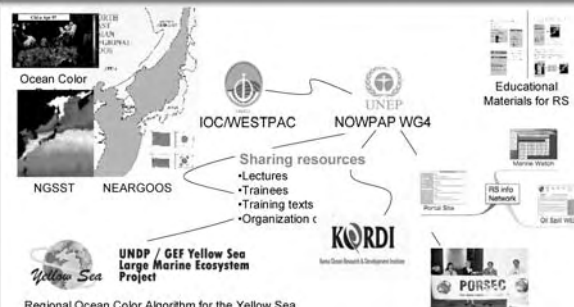
English

Obligation of the participants

All participants are requested to review training materials to be used at the training course and make constructive comments for future improvement.



4. Potential partnership with other organizations



5. Expected outcome

to contribute to capacity building of the NOWPAP Member States for utilizing remote sensing data for marine environment conservation. It is also expected to obtain useful information to consider future directions of CEARAC activities related to remote sensing.

6. Schedule

Proposal for the 2nd NOWPAP training course on remote sensing data analysis



7. Budget

15,000 US\$*

* Break down will be decided when co-organizer of the training course is found.

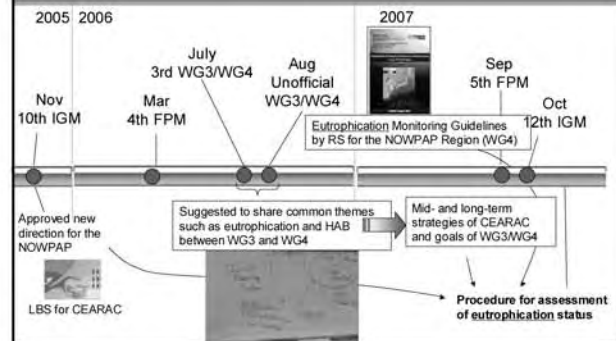
Thank you very much



Proposal for development of procedures for assessment of eutrophication status for the NOWPAP Region

CEARAC
March 6, 2008

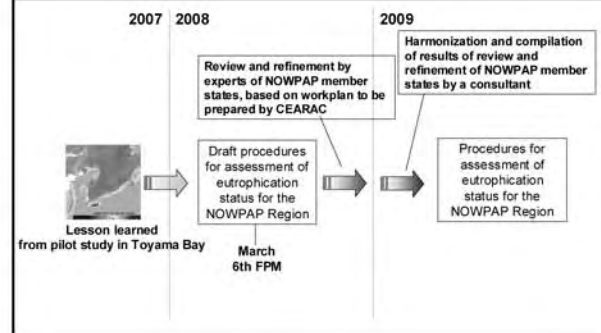
1. Background



2. Objective

to develop useful procedures for assessment of eutrophication status by utilizing remote sensing techniques that can be shared among the NOWPAP members, based on lessons learned from a pilot study conducted in Toyama Bay.

3. Main tasks



Draft procedures for the assessment of eutrophication status for the NOWPAP region

Contents

1. Introduction
2. Scope of study
3. Defining assessment criteria
4. Data processing
5. Classifying survey results
6. Review/verification
7. Conclusion/recommendation

1. Introduction

- 1-1. Background
- 1-2. Characteristics of the draft procedure
- 1-3. Overall structure

2. Scope of study

- 2-1 Defining assessment objectives
- 2-2 Setting of assessment area
- 2-3 Collection of relevant information
- 2-4 Division of assessment area into sub-areas
- 2-5 Selection of monitoring/survey results
- 2-6 Determination of assessment parameters

2-3. Collection of relevant information

The boundaries of the sub-areas were determined by considering the locations of the existing monitoring sites.



2-4 Division of assessment area into sub-areas

•To understand and assess the eutrophication status at more localized scales, the assessment area was divided into 5 sub-areas (sub-area A, B, C, D, E).



2-6. Determination of assessment parameters

2-6-1 Categorization of monitored/surveyed parameters

| | |
|--------------|--|
| Category I | Parameters that indicate degree of nutrient enrichment (e.g. T-N/T-P load, DIN/DIP, N/P ratio) |
| Category II | Parameters that indicate direct effects of nutrient enrichment (e.g. Chlorophyll-a, red tide) |
| Category III | Parameters that indicate indirect effects of nutrient enrichment (e.g. DO, fish kill, COD) |
| Category IV | Parameters that indicate other possible effects of nutrient enrichment (e.g. Shellfish poison) |

2-6. Determination of assessment parameters

Example of assessment parameters

| Category | Description | Parameters |
|----------|---|---|
| I | Parameters that indicate degree of nutrient enrichment | Nutrients load (N/P and river discharge) Nutrients concentration in winter (DIN, DIP) N/P ratio in winter TN and TP |
| II | Parameters that indicate direct effects of nutrient enrichment | Chlorophyll-a concentration (ship) Chlorophyll-a concentration (satellite) Number of red tide occurrence |
| III | Parameters that indicate indirect effects of nutrient enrichment | Dissolved oxygen Change of benthos and kills Fish kill COD |
| IV | Parameter that indicate other possible effects of nutrient enrichment | Shellfish poison |

3. Defining assessment criteria

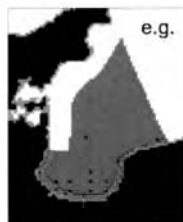
- 3-1 Defining identification criteria for each data
- 3-2 Defining classification criteria for each parameter
- 3-3 Defining classification criteria for each parameters category
- 3-4 Defining classification criteria for area/sub-area

4. Data processing

- 4-1 Setting the data processing procedure
- 4-2 Data screening
- 4-3 Sorting data into sub-areas

4-2 Data screening

Erratic data should be excluded through the defined procedure.



Red areas near shore were excluded from satellite data

5. Assessment process and results

•Assessment process

(A) Identify survey results by each site based on the defined identification criteria for each data

↓ Based on (A)

(B) Classify survey results by each parameter based on the defined classification criteria for each parameters

↓ Based on (B)

(C) Classify survey results by each parameters category based on the defined classification criteria for parameters category

↓ Based on (C)

(D) Classify survey results by each area/sub-area based on the defined classification criteria for area/sub-area.

5. Assessment process and results

Results of all sub-areas

6. Review/Verification of results

Verification of results by remote sensing

- Top 10 pixels in chl-a variability range for entire period
- Existing monitoring points for chl-a concentration



7. Conclusion/Recommendation

Provide conclusion and recommendation based on the assessment results

Example:

- More detailed surveys required
- Increase of monitoring sites
- Readjustment of assessment area

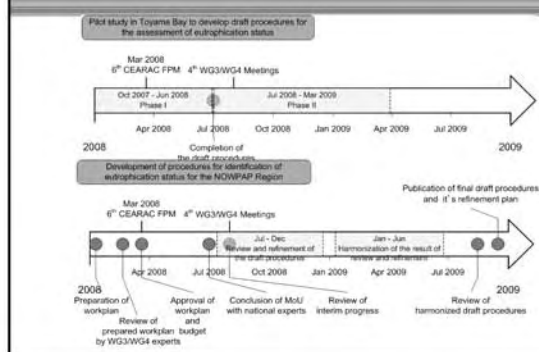
Expected partners for the development

OSPAR Commision
HELCOM (Helsinki Commission)
MAP (Mediterranean Action Plan)

4. Expected outcome

to contribute to assessment of eutrophication status, including evaluation of land based source of nutrients, by utilizing remote sensing techniques in each NOWPAP member state.

5. Schedule



6. Budget

| Contract | Timing | Output | To be completed | Counterpart | Budget(US\$) |
|---|---------|---|-----------------|-----------------------------|--------------|
| MoU for refinement of the draft procedures by national experts | 2008 Q2 | Refined procedures | 2008 end of Q4 | Expert in China | 2,000 |
| | | | | Consultant/ Expert in Japan | 2,000 |
| | | | | Expert in Korea | 2,000 |
| | | | | Expert in Russia | 2,000 |
| MoU for harmonization of refinement results of NOWPAP member states on the draft procedures | 2009 Q1 | Harmonized procedures based on refined procedures from NOWPAP member states | 2009 Q1 | Consultant | 2,000 |
| Total | | | | | 10,000 |

The Sixth NOWPAP CEARAC Focal Points Meeting
Toyama, Japan, 6-8 March 2007

**Work plan for updating and modification
of website on oil spill monitoring**

Leonid M. Mitnik

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Vladivostok, Russia, mitnik@poi.dvo.ru

Summary by Month: Last 12 Months

| Month | Daily Avg | | | | Monthly Totals | | | | | |
|-----------------|-----------|-------|-------|--------|----------------|--------|--------|-------|-------|-------|
| | Hits | Files | Pages | Visits | Sites | KBytes | Visits | Pages | Files | Hits |
| <u>Aug 2007</u> | 355 | 210 | 242 | 173 | 4213 | 200587 | 5364 | 7513 | 6524 | 11035 |
| <u>Jul 2007</u> | 309 | 141 | 211 | 151 | 3199 | 126138 | 4703 | 6550 | 4393 | 9582 |
| <u>Jun 2007</u> | 360 | 157 | 187 | 101 | 1452 | 88132 | 3055 | 5627 | 4729 | 10827 |
| <u>May 2007</u> | 489 | 333 | 360 | 106 | 1258 | 69240 | 3308 | 11174 | 10335 | 15183 |
| <u>Apr 2007</u> | 507 | 343 | 320 | 120 | 1456 | 115641 | 3616 | 9609 | 10296 | 15220 |
| <u>Mar 2007</u> | 418 | 281 | 250 | 112 | 1307 | 87907 | 3477 | 7754 | 8730 | 12958 |
| <u>Feb 2007</u> | 408 | 247 | 241 | 95 | 1610 | 93893 | 2677 | 6754 | 6927 | 11446 |
| <u>Jan 2007</u> | 440 | 217 | 217 | 103 | 1387 | 93415 | 3195 | 6743 | 6745 | 13664 |
| <u>Dec 2006</u> | 428 | 192 | 205 | 75 | 873 | 88131 | 2338 | 6357 | 5977 | 13276 |
| <u>Nov 2006</u> | 283 | 175 | 131 | 37 | 507 | 60748 | 1134 | 3949 | 5252 | 8507 |
| <u>Oct 2006</u> | 304 | 133 | 123 | 36 | 564 | 56090 | 1121 | 3841 | 4152 | 9432 |
| <u>Sep 2006</u> | 336 | 247 | 223 | 39 | 834 | 30564 | 1183 | 6703 | 7434 | 10093 |
| <u>Aug 2006</u> | 370 | 225 | 259 | 49 | 918 | 30658 | 1521 | 8055 | 7005 | 11475 |
| <u>Jul 2006</u> | 574 | 485 | 476 | 24 | 417 | 30595 | 746 | 14762 | 15050 | 17801 |

Outlines

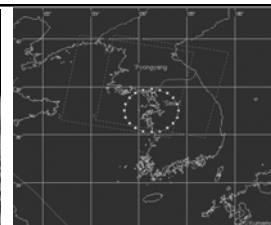
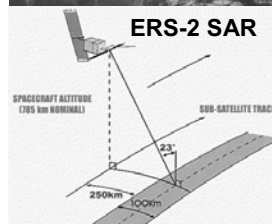
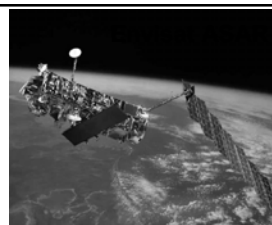
1. Motivation.
2. Recent disasters
3. Spills and slicks
4. SAR images of NOWPAP area.
Yellow Sea, East-China Sea, Japan/East Sea
5. ALOS PALSAR.
6. Updating CEARAC website and European projects
7. Conclusion.

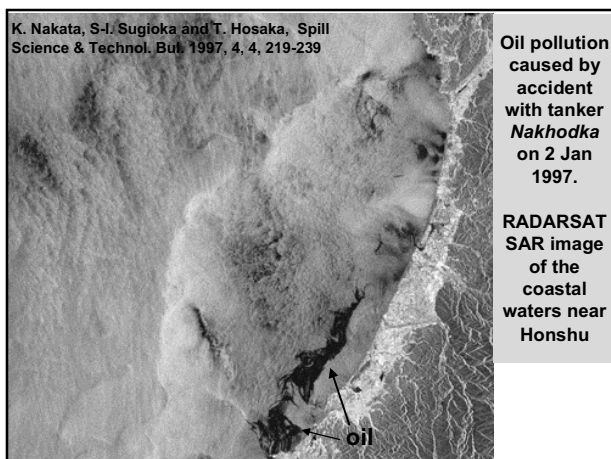
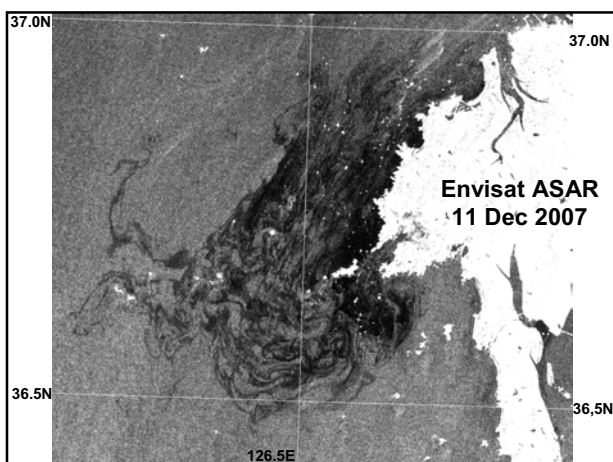
7 December 2007



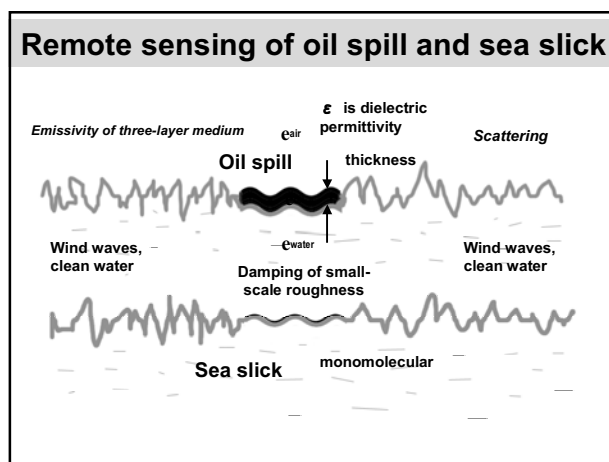
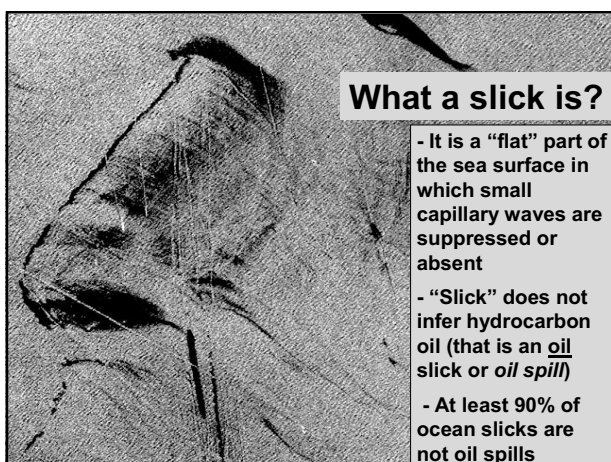
The oil spill incident occurred about 6 miles off the Taaen coastal area (36° 56.00' N, 126° 02.09' E) due to the collision of an oil tanker, the Hebei Spirit, with a towed barge, the Samsung 1, at 7:15 AM on 7 December 2007. As on 9 December, about 20 km of Taaen coast (with 10 – 30 m width) has been blackened by the spilled oil. It was reported that fishing ground (2,100 ha) and 6 beaches (221 ha) were also polluted. The thin oil slicks are also spreading on sea surface to south, about 25 nm long and 1 nm width.

Data





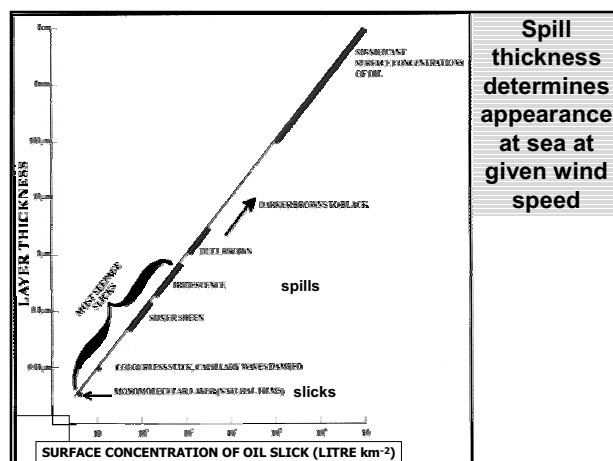
| 3. Summarizing characteristics and nomenclature for the sea slicks and crude oil spills | | |
|---|--|---|
| <small>Marine Surface Films. Physico-Chemical Characteristics, Influence on Air-Sea Interactions, and Remote Sensing, M. Gade and H. Hühnerfuss, Eds. Universität Hamburg, Germany, Springer, 2006)</small> | | |
| | Sea slicks | Crude oil spills |
| Chemical constituents | surface-active substances consisting of a hydrophilic head group and a hydrophobic tail | alkanes, cycloalkanes and aromatics with preferentially hydrophobic character, no hydrophilic head group |
| Distribution at the water surface | a) substances spread on the water surface; b) substances are being spread on the water surface; c) a sea slick is generated (or produced) at the surface | a) crude oil is spilled at the sea surface; b) a crude oil spill is generated (or producing) at the sea surface |
| Thickness | monomolecular, typically 2.4-2.7 nm | thicker layers, typically μ m-range, if freshly spilled even cm-range (in connection with accidents) |
| Origin | both biogenic (secreted by plankton or fish) and man-made | nearly in all cases man-made, in few cases oil seeps |
| Water wave damping mechanisms | resonance-type wave damping in the short-gravity-wave region, (Marangoni damping) | damping by an interfacial layer of higher viscosity |
| Microbial or photochemical transformation of constituents | relatively fast: time scale hours or few days (soluble, highly polar substances that disappear in the bulk water) | very slow: several months (weathered oil spills formation of surface active compounds slick formation around thick spill centers) |



| Comparison of properties of different kind of airborne remote sensors | | | | | |
|---|---|----------------------|----------------------|----------------------------|---------------------------------------|
| Feature name | SLAR | UV | Infrared | Microwave | Lidar (LFS) |
| Range | wide | narrow | narrow | narrow | narrow |
| Oil classification capabilities | no | no | no | no | yes |
| Sensitivity to oil film thicknesses | N.A. | > 0.1 μm | > 10 μm | 50 μm to 2.5 mm | 0.1 μm to 20 μm |
| Horizontal range from nadir @ 300m flight altitude | ± 30 km | ± 250 m | ± 250 m | ± 250 m | ± 75 m |
| Spatial resolution | 10 m (along flight track), 75 m (across flight track) | 3.5 m | 3.5 m | > 5 m | 10 m pixel-to-pixel distance |
| Detection of oil spills underneath the surface | no | no | no | no | yes |
| Operating at night | yes | no | yes | yes | yes |
| Film thickness determination | no | no | no | 50 μm to 2.5 mm | 0.1 μm to 20 μm |
| Measuring geometry | Line-by-line | Line-by-line, 160 Hz | Line-by-line, 160 Hz | Line-by-line, 20 Hz | Conical, 5 Hz (20 Hz max.) |
| Sensitivity | no | On clouds | On clouds | no | On clouds, flight altitude |

SLAR – Side Looking Airborne Radar, UV- ultraviolet
A.Samberg. Advanced oil pollution detection using airborne hyperspectral lidar technology. *The SPIE Annual Symp. on Defence and Security, 28 Mar – 1 Apr 2005, Orlando, FL, USA.*

| Bonn agreement oil appearance code | | | |
|---|-------------------------------|-------------------------------------|-------------------------|
| A correlation between the visual appearance of oil and the thickness of oil on the sea. Used to estimate spilled oil volume | | | |
| CODE | APPEARANCE | QUANTITY m^3 / km^2 | THICKNESS μm |
| 1 | SHEEN (SILVERY / GREY) | 0.04 - 0.3 | 0.04 - 0.3 |
| 2 | RAINBOW | 0.3 - 5.0 | 0.3 - 5.0 |
| 3 | METALLIC | 5.0 - 50 | 5 - 50 |
| 4 | DISCONTINUOUS TRUE OIL COLOUR | 50 - 200 | 50 - 200 |
| 5 | TRUE COLOUR | 200 - > 200 | 200 - > 200 |



| Estimating the volume of a spill | | |
|----------------------------------|-------------------|----------------------|
| | Film Thickness mm | Quantity Spread l/ha |
| Appearance | | |
| Barely visible | 0.0000381 | 0.365 |
| Silvery sheen | 0.0000762 | 0.731 |
| First trace of color | 0.0001524 | 1.461 |
| Bright bands of color | 0.0003048 | 2.922 |
| Colors begin to dull | 0.0010160 | 9.731 |
| Colors are much darker | 0.0020320 | 19.463 |

One tonne of crude oil is roughly equal to 308 US gallons, or 7.33 barrels

Why the SAR can detect an oil spill event?

- An oil spill may cover vast areas of the sea surface and damp some of these capillary waves.
- In this way, the water surface roughness is reduced and can be detected by the Normalized Radar Cross-Section (NRCS) on SAR images, since it appears as a dark area or an area in which there is an absence of sea clutter.

<http://serac.jrc.it/midiv>

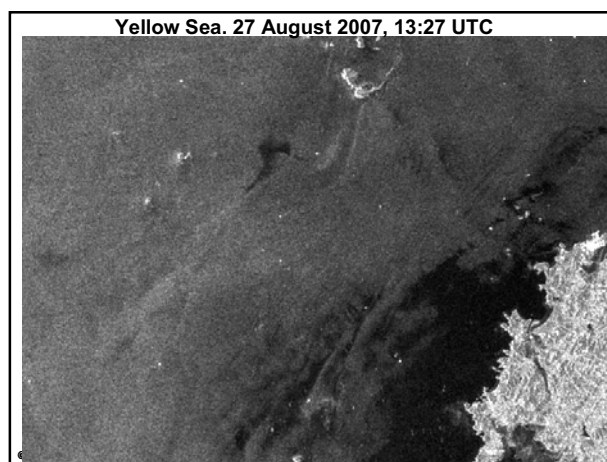
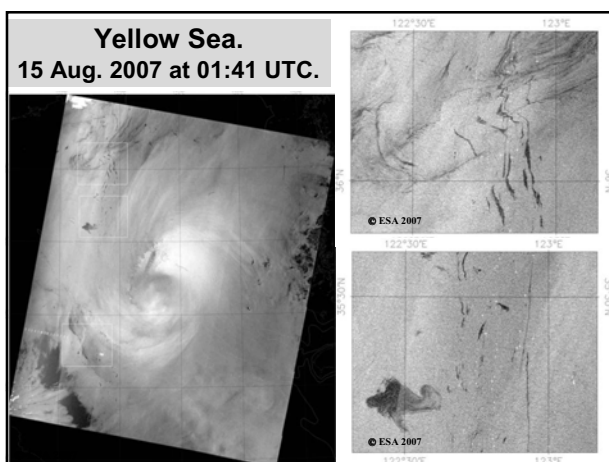
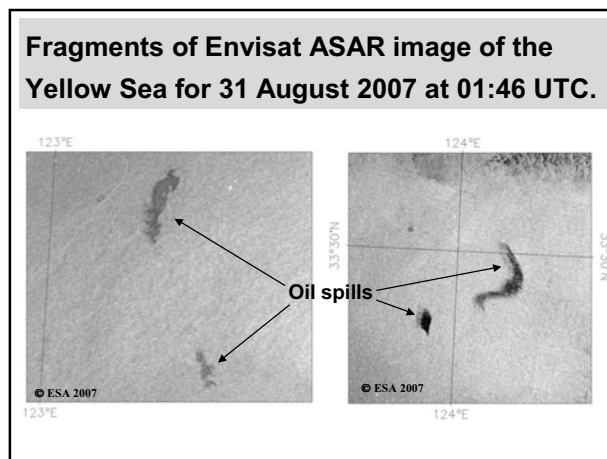
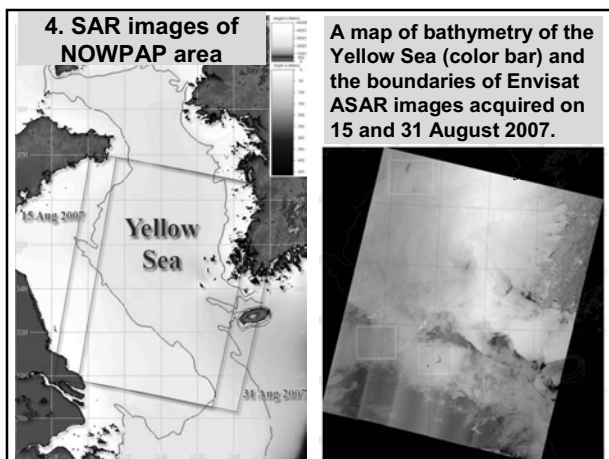
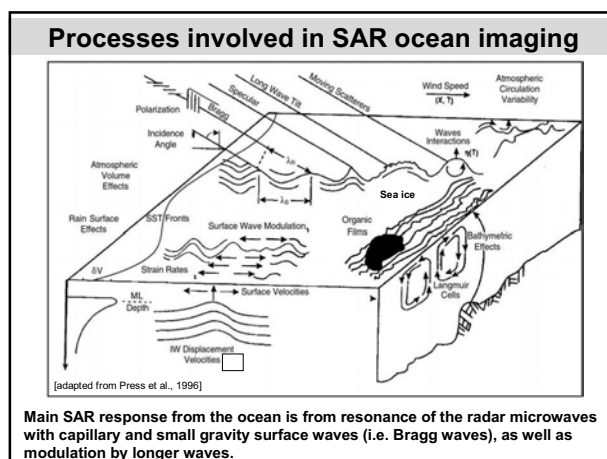
Signature of oil spills from ship discharges

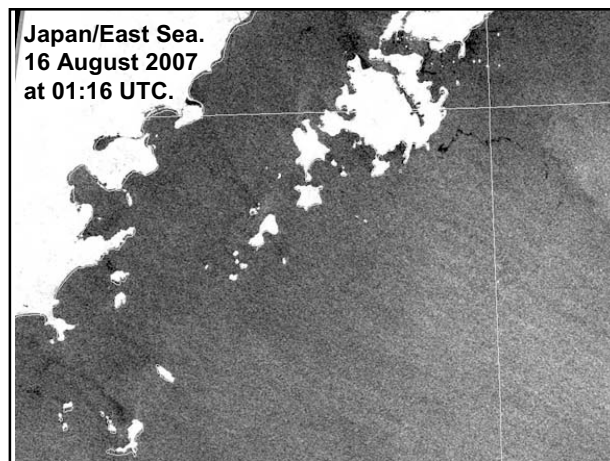
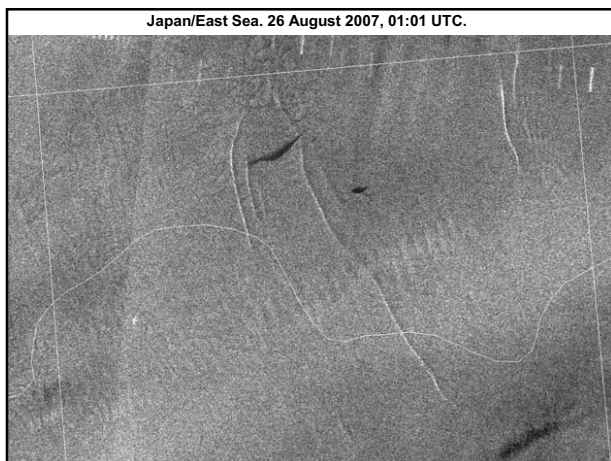
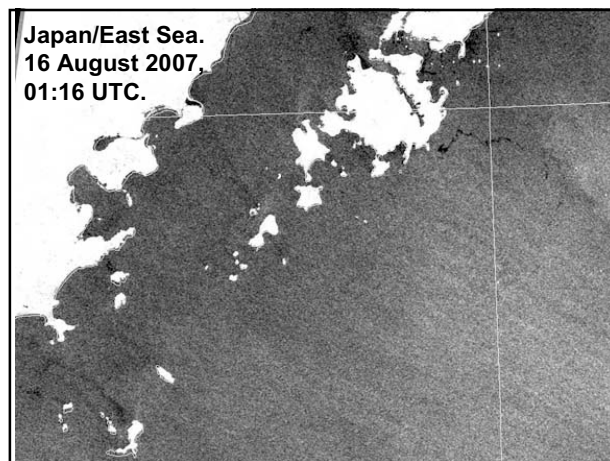
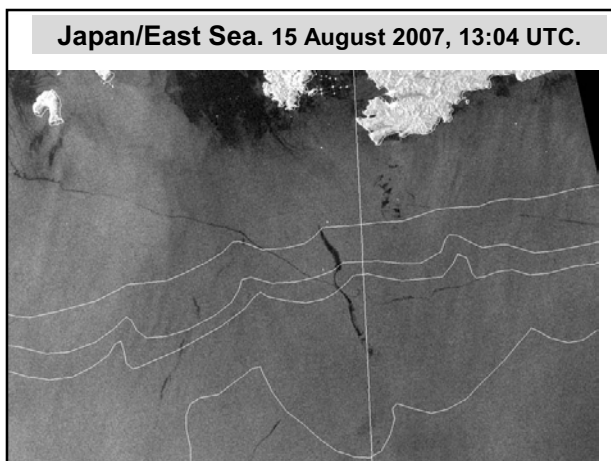
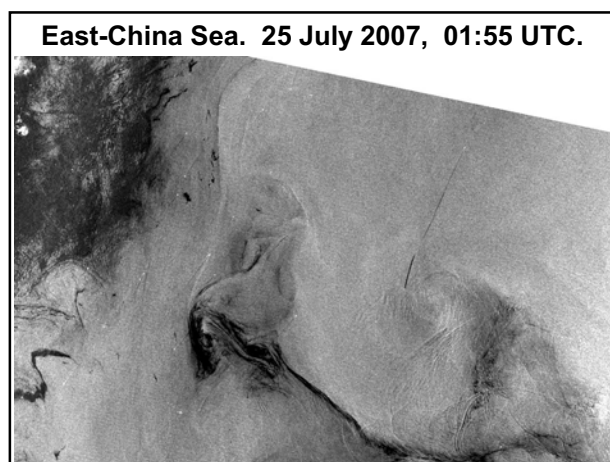
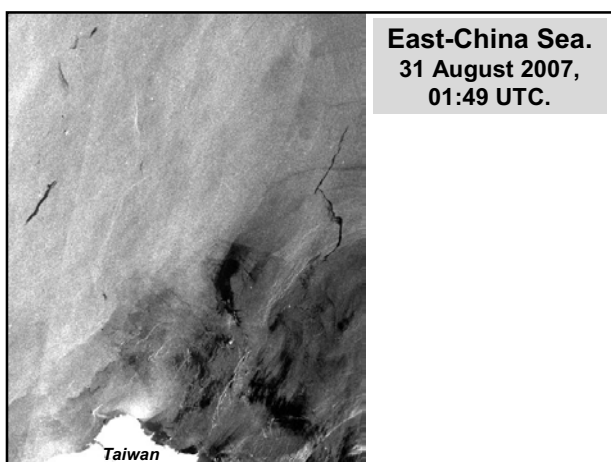
Are all dark features oil spills?

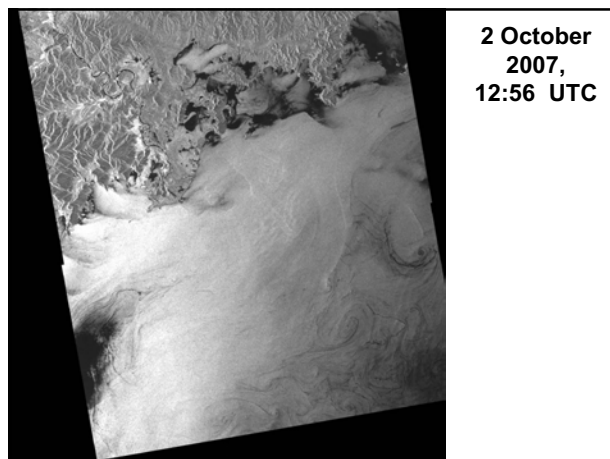
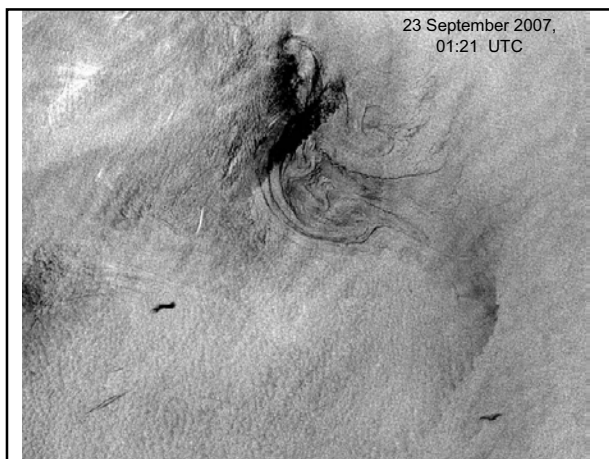
- Oil spills are not the only phenomena which can appear as a dark feature in a SAR image.
- Under certain air/sea boundary layer conditions, other sea surface manifestations of natural origin may result to SAR expressions or false targets, similar to those due to an oil spill.
- They are usually referred to as look-alikes objects.

| Look-alike | |
|-----------------------------|--|
| Natural slicks | Reflections of the bottom topography in shallow waters |
| Threshold winds (fronts), | Plumps of municipal sewage |
| Wind shadows behind islands | Wave shadows behind land |
| Calm areas | Weed beds that calm the water just above them |
| Surface currents | Grease ice |
| Internal waves | Biogenic oils |
| Rain cells | Whale and fish sperm, etc. |
| Upwelling areas | |


<http://serac.jrc.it/midiv>







5. ALOS - Advanced Land Observing Satellite

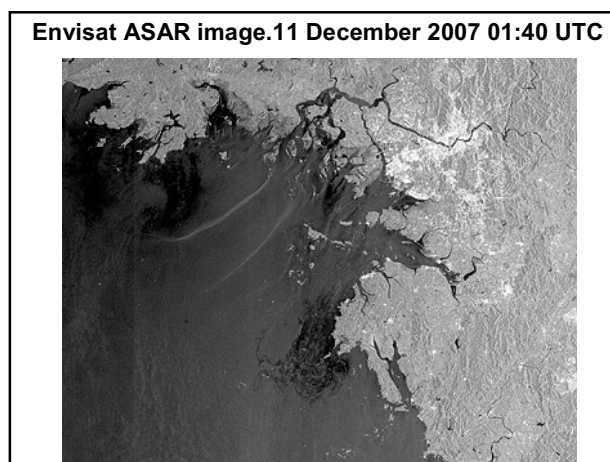
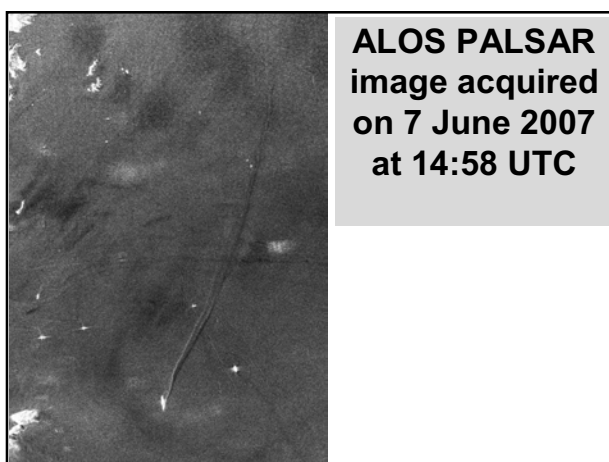
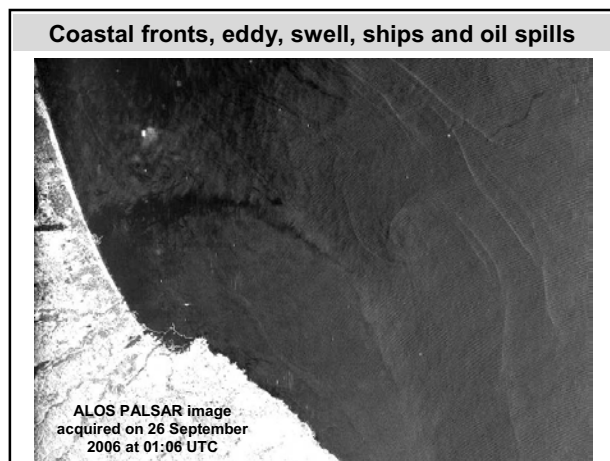


<http://www.palsar.ersdac.or.jp/e/index.shtml>

ALOS was launched
on 24 January 2006

New SARs.
Canada,
Germany, Italy

| | | | |
|--------------------------|----------------|---------|-----------|
| Center frequency, MHz | 1270 | | |
| Range resolution, m | 7 ~ 44 | 14 ~ 88 | 100 |
| Swath width, km | 40 ~ 70 | 40 ~ 70 | 250 ~ 350 |
| Polarization | VV, HH, VH, HV | | |
| Incidence angle, degrees | 8-60; 19-43 | | |



6. Updating CEARAC website and European projects

Inputs of oil to marine environment in NOWPAP region

| Types of Oil Pollution | Percentage of the total |
|------------------------|-------------------------|
| Offshore Drilling | ? |
| Large Oil Spills | ? |
| Natural Seeps | ? |
| Up in Smoke | ? |
| Routine Maintenance | ? |
| Down the Drain | ? |
| Total, tonnes | ? |

Objective of the updating and modification of CEARAC website on oil spill monitoring

- (a) Provide more than 30 new annotated satellite SAR images.
- (b) Increase resolution of SAR images.
- (c) Provide estimates of the polluted water areas and oil volumes.
- (d) Provide interpretation schemes of SAR images with indication of oceanic dynamic phenomena influencing on oil spill spreading.
- (e) Update section describing algorithms of oil spill detection
- (f) Updated information on similar projects and resources in other countries (links to the national and international projects).
- (g) Update a list of references
 - on oil spill detection/monitoring and
 - on satellite-derived fields of environmental parameters important for forecast of oil spreading and weathering.

Contents of the CEARAC website on oil spill monitoring

The following sections (pages) will be updated:

News (global and regional, tanker incidence, images, etc.) - mainly via links.
Remote sensing techniques of oil pollution detection. Comparison of their efficiency. Algorithms of interactive and automatic detection of oil spills. False alarm. Examples of oil pollution detection with the usage of different algorithms.
Database of the georeferenced satellite SAR images of the NOWPAP area.
Database of the annotated georeferenced satellite SAR images with revealed oil pollution.
Oil pollution of the NOWPAP area. The main sources of oil pollution. Current situation and tendency (search via Internet).
Oil pollution spreading models with links.
Environmental information important for oil pollution monitoring/evolution (winds, currents, ice, weather forecast) - Links to the Japan, Korea, China and Russia sources of data.
Influence of oil pollution on marine ecosystems - Links.
 International regulations on marine oil pollution – Links (UNEP)

Roles of the CEARAC website on oil spill monitoring playing in the CEARAC activities

CEARAC website will contribute to a more efficient cooperation within members in the Northwest Pacific region by providing additional fresh information on new sensors, on recently detected oil spills as well as on advanced techniques for their detection and monitoring.

Additionally, the web site can be used during the RS Training Program scheduled in 2008-2009.

The CEARAC website will continue to serve as a unified entrance into Internet resources on satellite oil spill monitoring. Internet ideology and technology allow eliminating repetitions and duplication of the information that are in the similar portals (MERRAC, UNEP) using links

Contributions of the CEARAC website on oil spill monitoring to CEARAC activities

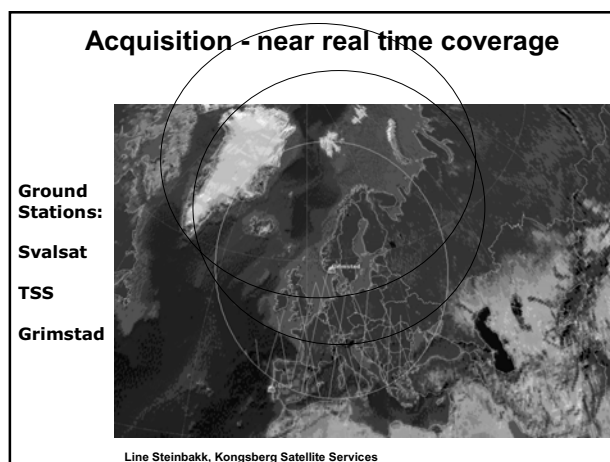
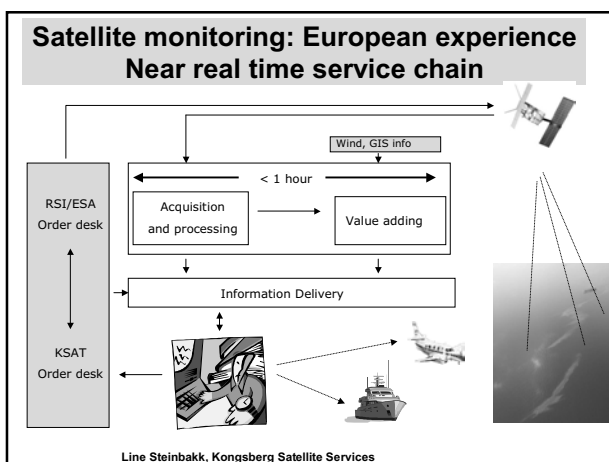
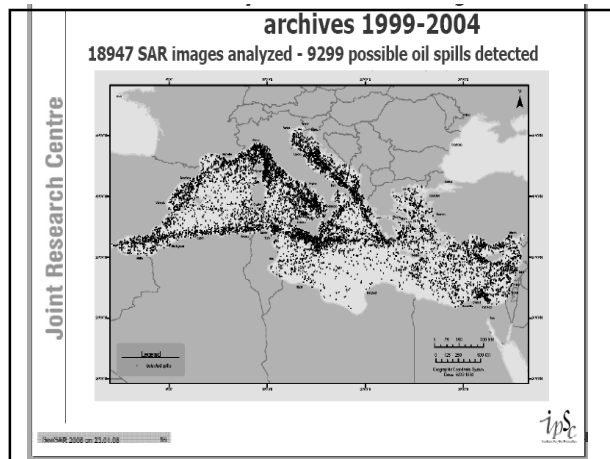
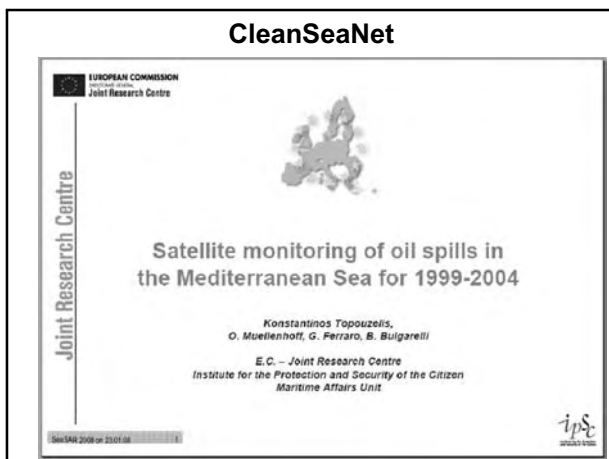
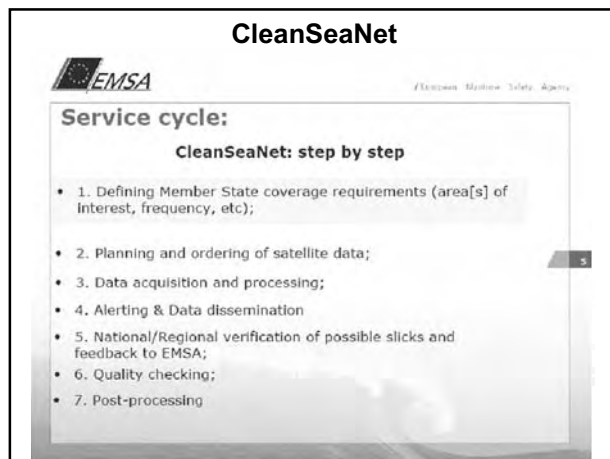
- (a) Provide information on availability of airborne and satellite-borne remote sensing instruments for oil spill monitoring in China, Japan, Korea and Russia.
- (b) Add information on environmental coastal air patrol and provide information where and how to order the satellite SAR measurements over the particular area in a case of detection of oil spill due to ship transport operation, fishery activity, river outflow as well as due to incidents (the origination of dangerous situation).
- (c) Disseminate CEARAC activities and results in the community of potential users of remote sensing techniques for marine pollution and in the public organizations.
- (d) Add links to the environmental information important for oil spill monitoring/evolution.

Contributions of the CEARAC website on oil spill monitoring to CEARAC activities

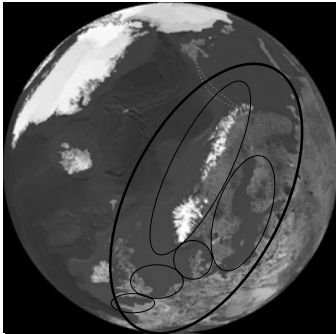
Now the POI continues to advance an Integrated Information-Analytical System (IIAS) for the Northwest Pacific Ocean. This system is realized as GIS-based on Internet/Intranet technology (<http://gis.poi.dvo.ru>). The main goal of the GIS is to raise the efficiency of scientific research in the region by coordination of activity of individual scientists and scientific teams within the Institutes of FEB RAS. In addition, POI GIS serves for data accumulation, visualization and processing.

A block of collection, storage, visualization and thematic processing of satellite information is one of the structure elements of the GIS. This block is dedicated to solving of various tasks, in particular, the development and advancement of techniques of the oceanic phenomena detection using SAR images.

The CEARAC website will continue to serve as unified entrance into Internet resources on satellite oil spill monitoring. Internet ideology and technology allow eliminating repetitions and duplication of the information which is in similar portals (MERRAC, UNEP) using links and mirror sites.



North-European Service



Line Steinbakk, Kongsberg Satellite Services

- Today there are four separated services
- Customers requires one joint service
- KSAT is merging existing services into one North-European Oil spill service
- The joint service will be available for paying customers in the:
 - Barents Sea
 - Baltic
 - North Sea
 - English Channel

7. Conclusions (lessons for NOWPAP region)

- Today the satellite-based oil monitoring service is in operational use by most of the key end-users in North Europe
- The multinational concept trials have been successful and have reduced the main bottlenecks for further service development
- With such a concept established throughout Europe service costs and information can be shared among regional, national and international authorities.

Line Steinbakk, Kongsberg Satellite Services

CEARAC Marine Litter Activities based on RAP MALI

CEARAC
6 March, 2008

Background

In the 2008-2009 biennium, NOWPAP continues activities on marine litter based on the NOWPAP Regional Action Plan on Marine Litter (RAP MALI).

CEARAC will implement marine litter activities based on the RAP MALI and contribute to solve the marine litter problem in this region

Outline of RAP MALI

The goal of RAP MALI is

To improve the quality of the marine and coastal environment of the Northwest Pacific region by addressing the marine litter problem through cooperation and partnerships.

Three objectives

- To prevent the marine litter input into the marine and coastal environment
- To monitor the quantities and distribution of marine litter
- To remove existing litter that was already discarded, disposed and abandoned

Assigned activities and allocated budget to CEARAC in RAP MALI

| Activities | Deadline | Participant | Budget (US\$) |
|---|-----------|-------------|---------------|
| 1. Prevention of marine litter inputs to marine and coastal environment | | | |
| 1.3 Information, education, outreach and public awareness | | | |
| Develop public awareness materials | Aug. 2008 | CEARAC | 2,500 |
| 2. Monitoring of marine litter quantities and distribution | | | |
| 2.3 Compilation of data from national monitoring programmes | | | |
| Compile and harmonize marine litter monitoring data on beaches (provided by member states) and submit collected data to DINRAC | 2008-2009 | CEARAC | 4,000 |
| 2.5 Collection of marine litter monitoring on beaches | | | |
| Interpret results of marine litter monitoring on beaches | 2009 | CEARAC | 4,000 |
| 3. Removing existing marine litter and its disposal | | | |
| 3.3 Research activities related to marine litter | | | |
| Development technical materials and introduce best practices on solid waste management, including removal of marine litter on beaches | July 2009 | CEARAC | In-kind |
| Total | | | 10,500 |

1. Develop public awareness materials

Objective:

To develop public awareness materials which will enhance to prevent and reduce marine litter in the NOWPAP region.

CEARAC will develop public awareness material using the results of RAP MALI activities done by CEARAC.

This material will be uploaded to CEARAC marine litter website (<https://www.npec.or.jp/umigomportal/en/>)

Budget: US\$2,500

Target date: August 2009

2. Compile and harmonize marine litter monitoring data on beaches (provided by member states) and submit collected data to DINRAC

Objective:

To develop data set which makes it easy to refer and search information on monitoring survey of marine litter conducted in the NOWPAP member states.

Budget: US\$4,000

Activity period: 2008-2009

Compilation and harmonization of submitted monitoring results

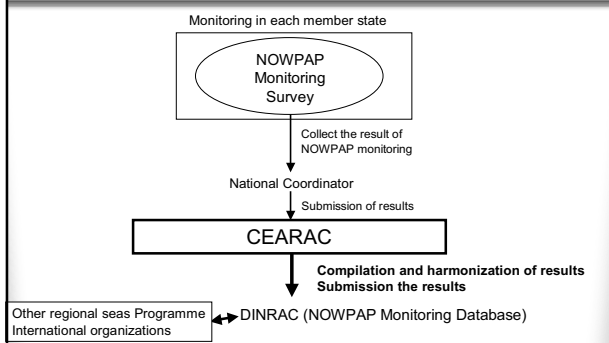


Image of compilation and harmonization

| Monitoring No. | Location of monitoring | Survey area | Number of participant | Major monitoring items | Sort items | Using datasheet |
|----------------|-------------------------|-------------------|-----------------------|------------------------|----------------------------|-----------------|
| China-1 | Haizhiyun Bathing Beach | 1km | 50 | | 6 categories by activities | ICC |
| Japan-1 | Iwasehama beach | 200m ² | 50 | | 8 items by materials | NPEC |
| Korea-1 | Dejong Bathing Beach | 100m ² | 50 | | 10 items by materials | MOMAF |
| Russia-1 | Muchke Bay | 100m ² | 50 | | 6 categories by activities | ICC |

3. Interpret results of marine litter monitoring on beaches

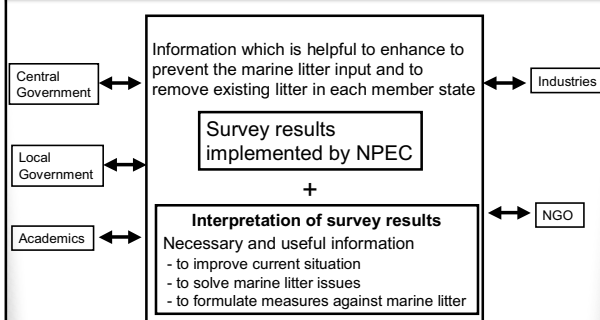
The objective:

To provide the existing survey results with its interpretation added, which is helpful to enhance to prevent the marine litter input and to remove existing litter in each member state.

Budget: US\$4,000

Target date: Summer 2009

Interpretation of survey results implemented by NPEC



4. Develop technical materials and introduce best practices on solid waste management, including removal of marine litter on beaches

The objective:

To develop technical materials and introduce best practices on solid waste management, including removal of marine litter on beaches .

CEARAC will translate the report which will be published by the Ministry of the Environment, Japan to English to share the useful technologies and information among the NOWPAP member states.

Budget: In-kind

Target date: July 2009

How to implement CEARAC activities in the future

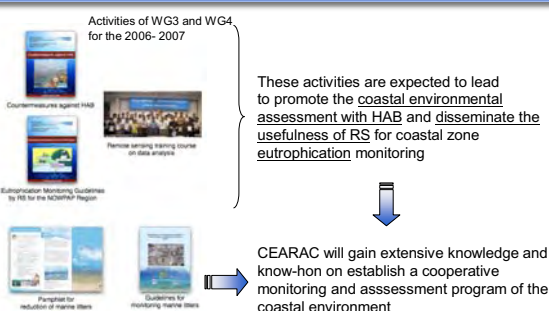
CEARAC
March, 2008

1. Background

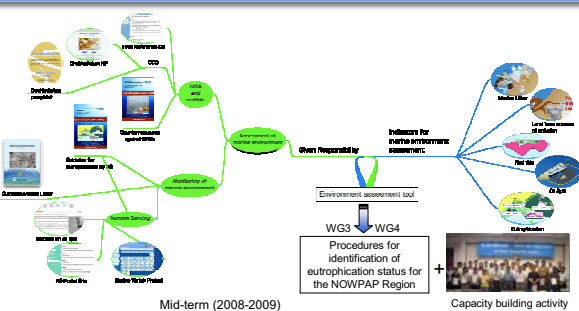
1. New direction in IGM10
2. Evaluation of the RAC's performance in 2002-2005
3. Mid and long term strategy of CEARAC and objectives of NOWPAP WG3 and WG4

resolution of 12th IGM--- cut down the budget

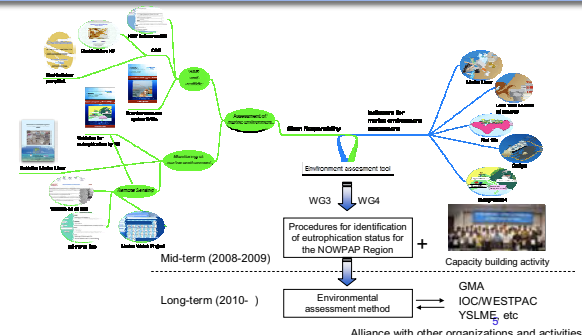
Mid-term strategy of CEARAC



2.2 Mid-term strategy of CEARAC



Long-term strategy of CEARAC



What is priority of CEARAC activities? (1/2)

| | 2006-2007 | 2008-2009 | 2010- |
|----------------|---|--|--|
| WG3 | <ul style="list-style-type: none"> • Publication of booklet of countermeasures against HABs | <ul style="list-style-type: none"> • Implementation of HAB case studies • Establishment of HAB Integrated Website | <ul style="list-style-type: none"> • Operation of HAB Integrated Website • Revision of the Integrated Report |
| WG4 | <ul style="list-style-type: none"> • Publication of eutrophication monitoring guidelines by remote sensing • 1st training course on remote sensing data analysis | <ul style="list-style-type: none"> • Educational materials for utilization of remote sensing data for coastal environment • 2nd training course on remote sensing data analysis | <ul style="list-style-type: none"> • Establishment and operation of integrated RS database • Revision of the Integrated Report |
| Joint Activity | | <ul style="list-style-type: none"> • Procedures for identification of eutrophication status | <ul style="list-style-type: none"> • Development of environment assessment method for NOWPAP |

What is priority of CEARAC activities? (2/2)

| | 2006-2007 | 2008-2009 | 2010- |
|----------------------|---|--|-------|
| Marine litter issues | <ul style="list-style-type: none"> -Monitoring Guideline on beaches -Tourism Guideline -Pamphlet for the reduction on marine litter -Booklet on recycling of plastic marine litter -Summary of the result of marine litter monitoring -2nd NOWPAP ML workshop (in-kind) | <ul style="list-style-type: none"> •Development of public awareness materials •Compilation and harmonization of ML survey data •Interpretation of ML survey results on beaches •Development of technical materials on solid waste management | •??? |

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How to cut expenditure and streamline activities

- reduce the number of meetings or hold them back-to-back
- reduce the number of meeting participants
 - reduce the number of FPs / WG experts
 - reduce the number of Working Groups
- find partner(s) which hold meeting at the same time
- reduce the number of printing materials

Which options are possible ways for us ?

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What is the new implementation structure of CEARAC

- remain WG3 and WG4, while cutting operation cost
 - Combine WG3 and WG4 and reduce cost
- Disband WG3 and WG4 and establish a new WG

How to deal with marine litter issues in each RACs?

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