Appendix Contents

Implementation of the Northwest Pacific Action Plan

Alexander TKALIN
Coordinator

1

9th IGM Decisions (November 2004, Busan, Korea)

- To convene an Intersessional Workshop (WS) to discuss new directions of work of NOWPAP RACs
- To develop the activity on sustainable management of marine litter in the NOWPAP region
- To discuss the proposal on the increased contributions to the NOWPAP Trust Fund during the Intersessional WS in 2005
- To conduct further consultations regarding the proposal from Japan on the expansion of geographical coverage of the NOWPAP Regional Oil Spill Contingency Plan
- To endorse in principle the concept paper on the GEF proposal "Addressing Land-Based Activities that Affect the Marine and Coastal Environment in the Northwest Pacific Region"

DINRAC

Data and Information Network Regional Activity Centre

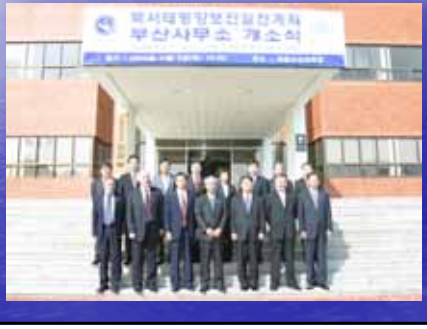
- The DINRAC has continued to develop and update its website where many documents related to NOWPAP and the UNEP Regional Seas Programme are available
- DINRAC National Reports on Data and Information Networks in the Northwest Pacific Region were published as both hard copy and CD-ROM. Report of the 3rd DINRAC Focal Points Meeting was also published and distributed in 2005
- DINRAC updated the Databases on NOWPAP Institutions and NOWPAP Experts on Coastal and Marine Environment (available on CD-ROM and on WWW)
- Currently, two DINRAC activities are under way: 1) Development of a Framework for the Creation of NOWPAP DINRAC Meta-database; 2) Study of Existing GIS-type Products (MOUs signed)
- In September 2005, DINRAC held a joint Focal Points and Expert Meeting to discuss proposals for 2006-2007 biennium

MERRAC

Marine Environmental Emergency Preparedness and Response Regional Activity Centre

- In May 2005, MERRAC 8th Focal Points Meeting was held in Daejeon, Korea, to discuss recent results and proposals for 2006-2007 biennium
- At the same time, 1st Competent National Authorities Meeting was held within the NOWPAP Regional Oil Spill Contingency Plan
- MERRAC has finalized three specific projects: on shoreline clean-up; on environmental sensitivity mapping; and on dispersant application, which will be published later this year
- MERRAC specific projects on regional mapping of vulnerable resources; on oil spill modeling; and on minimum level of preparedness, will be implemented in 2006-2007 (pending approval by the 10th IGM)
- Reports of the 2004 MERRAC Expert Meeting and 8th FPM were published and distributed in 2005

NOWPAP countries have agreed on the Regional Oil Spill Contingency Plan and signed the Memorandum of Understanding for this Plan in 2004-2005



POMRAC

Pollution Monitoring Regional Activity Centre

- The POMRAC is responsible for implementing activities under WG1 (Atmospheric Deposition of Contaminants) and WG2 (River ad Direct Inputs of Contaminants to the Marine and Coastal Environment)
- After the 9th IGM, reports of both Working Group meetings and the 2nd POMRAC Focal Points Meeting of 2004 were published and distributed
- The draft National Reports on Atmospheric Deposition of Contaminants and River and Direct Inputs of Contaminants are ready
- Regional Overviews on Atmospheric Deposition of Contaminants and River and Direct Inputs of Contaminants will be prepared in 2005-2006

Regional Coordinating Unit (RCU)

- The co-hosted RCU offices in Toyama and Busan were inaugurated in November 2004
- The recruitment of staff members for both RCU offices was completed in April 2005
- In February-March 2005, the RCU staff members have visited UNEP HQ and UNON for short training and orientation
- Now both RCU offices are fully operational and are working in close contact with National Focal Points, NOWPAP RACs, UNEP HQ, UNON and UNEP GPA office
- All NOWPAP activities are now being coordinated from Toyama and Busan offices

Contacts with Relevant Organizations, Programmes and Projects

After establishment of both RCU offices in Toyama and Busan, contacts were established with the following organizations, programmes and projects in the region:

- EAS/RCU
- GEF/UNDP/IMO PEMSEA
- GIWA
- IOC WESTPAC
- Kanazawa University Center of Excellence Programme
- NEAR-GOOS
- PICES
- UNDP/GEF YSLME Project
- UNEP/GEF South China Sea Project

(in alphabetical order)

Public Awareness

- Visits to the key ministries and organizations involved in NOWPAP activities in China, Japan, Korea and Russia
- Visits to local authorities in Toyama and Busan
- Contacts with media and environmental NGOs/NPOs
- Visitors from Korea, Japan and from abroad
- Participation in local and regional meetings to increase public awareness about NOWPAP
- NOWPAP website is now being developed and will be launched before the end of 2005

The work to increase awareness of general public regarding NOWPAP activities will be continued by the RCU (as well as by RACs). For example, contacts with NGOs are being developed within the marine litter initiative

NOWPAP Intersessional Workshop

The Workshop was held on 25-26 July in Seoul, Korea. The WS report was distributed among member states

GEF PDF-B Proposal

The GEF PDF-B proposal on the Assessment and Management of Land-Based Activities in the NOWPAP region is being finalized by UNEP DGEF in close consultations with the GEF Secretariat, UNEP RS and UNEP GPA offices and NOWPAP RCU. The final project concept was circulated among NOWPAP National Focal Points and members of e-mail discussion group in June 2005

Other Issues

- According to the 9th IGM decisions, the proposal on Marine Litter Activity (MALITA) has been developed by UNEP consultant and NOWPAP RCU. The MALITA proposal was discussed and agreed in principle at the NOWPAP Intersessional WS in July 2005.
- The documents related to NOWPAP-2 project (legal issues) were retrieved from Nairobi for further consideration. The current status and proposal on possible future actions was discussed NOWPAP Intersessional WS in July 2005. Now the regional overview on legal issues is being updated by the NOWPAP Member States.
- The year 2005 is critical for NOWPAP. According to the decisions of last NOWPAP IGMs, the directions of work of NOWPAP RACs should be re-considered and modified as necessary in order to ensure the future success of NOWPAP. New directions for the RACs activities were discussed and agreed in principle at the NOWPAP Intersessional WS in July 2005.

Thanks for your attention!

Report on Implementation of CEARAC Activities for 2004-2005

NOWPAP/CEARAC

Outline of CEARAC Activity for 2004-2005

- Organization of CEARAC 2nd & 3rd FPM and 2nd WG3/WG4 Meeting
- Preparation of the National Reports of WG3/WG4
- Preparation of the Integrated Reports of WG3/WG4
- Publication of CEARAC Newsletter
- Other Intersessional work; HAB and RS
- Cooperation and Coordination

Main Achievements of 2nd FPM

(15-17 March 2004, Toyama)

- **Presentations by participants on activities of HAB and RS**
- **ToR of WG3/WG4 approved**
- **Review of WG3/WG4 Workplan**
- **Workplan and Budget for CEARAC 2004-2005 discussed**

NOWPAP RCU Toyama Office Inauguration Ceremony (1st Nov. 2004)


UNEP
10:00 장소 : 국립수산과학원
NOWPAP RCU Busan Office
Inauguration Ceremony
(2nd Nov. 2004)


9th IGM in Busan (2-4 Nov. 2004)


(11-12 Oct, 2004, Beijing, China)
英 杰 交 流 中 心
International Workshop on Marine Remote Sensing In Northwest


The First International Workshop on HAB in the Northwest Pacific Region


Intersessional Workshop of the Northwest Pacific Action Plan
25-26 July 2005, Seoul, Republic of Korea


The Second Meeting of NOWPAP Working Group 3 (HAB)

Main Achievements of 2nd WG3 Meeting

(25-26 Nov. 2004, Qingdao)

- **Review on the Preparation of National Reports**
- **Discussion of workplan for 2004-2005**
  - **National/Integrated Reports**
  - **HAB Reference Database**
  - ***Cochlodinium* Corresponding Group**
- **Discussion about the Contents of Integrated Report**

Main Achievements of 2nd WG4 Meeting

(14-15 Oct. 2004 Beijing)

- **Review on the Preparation of National Reports**
- **Discussion of workplan for 2004-2005**
  - **National/Integrate Reports**
  - **Development of the Portal Site on remote sensing**
  - **Development of the Web Site on RS for Oil Spill Monitoring**
- **Discussion about the Contents of Integrated Report**

Workplan and Budget

- **The 2nd CEARAC FPM in March 2004**
- **CEARAC made a slight change in the allocation of its budget**
  - **Focusing on National and Integrate reports**
- **The 9th Intergovernmental Meeting approved on this revised workplan and budget US$150,000 for the 2004-2005 biennium.**

CEARAC Budget and Expenditure for 2004-2005(1/3)

In US$

Activity	Date & Venue	Budget	Expenditure
Organization of 2nd FPM	Mar. 2004, Toyama	24,000	19,183
CEARAC Newsletter	Aug. 2004	2,000	2,005
Preparation of the National Report of WG3	June2004-Mar. 2005	16,000	16,000
Preparation of the National Report of WG4	June2004-Mar. 2005	16,000	16,000
Organization of 2nd WG3 (HAB)	Nov. 2004, Qingdao	18,000	17,875
Organization of 2nd WG4 (RS)	Oct. 2004, Beijing	15,000	13,838

CEARAC Budget and Expenditure for 2004-2005 (2/3)

In US$

Activity	Date & Venue	Budget	Expenditure
Harmonization of the National Report of WG3	Summer 2005	3,000	3,000
Harmonization of the National Report of WG4	Summer 2005	3,000	3,000
Organization of CEARAC 3rd FPM	Sep. 2005	23,000	(23,000)
CEARAC Newsletter	Summer 2005	2,000	(2,000)
Preparation of the Integrated Report of WG3	Throughout 2005	5,000	5,000
Preparation of the Integrated Report of WG4	Throughout 2005	5,000	5,000

(expected)

CEARAC Budget and Expenditure for 2004-2005 (3/3)

In US$

Activity	Date & Venue	Budget	Expenditure
Printing National/Integrate reports of HAB, RS	By the end of 2005	4,000	(11,818)
Intersessional work	Throughout 2004-2005	6,000	(8,034)
Cooperation and Coordination of CEARAC activities	Throughout 2004/5	8,000	(4,247)
TOTAL		150,000	150,000

(expected)

Report of NOWPAP WG3 (HAB) Intersessional Activity

September 15, 2005
CEARAC

1. Overview of Activities of WG3

(1) Compiling of Reports on HABs for the NOWPAP Region (National Reports and Integrated Report)

(2) Establishment of HAB Reference Database

(3) Activities of *Cochlodinium* Corresponding Group (CCG)

2nd NOWPAP WG3 Meeting

2.1 National Reports on HABs

Concept of National Reports

- To gives basis for creating common understanding of situation of Harmful Algal Blooms (HAB) in each country
- To form a starting point of the discussion about monitoring, assessment, and policy concerning HAB for marine environmental conservation in the NOWPAP Region

Contents of National Reports

I. INTRODUCTION
II. USED DATA AND INFORMATION
III. RESULT
1. Situation of HAB Occurrence
2. Information of Monitoring
3. Progress of Researches and Studies to Cope with HAB
4. Publications including newly obtained information
5. Training Activity to Cope with HAB
6. National Priority for Future Activities to Cope with HAB
7. Suggested Activities for NOWPAP Region

NR on HABs in China

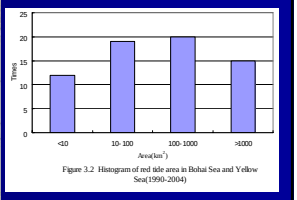
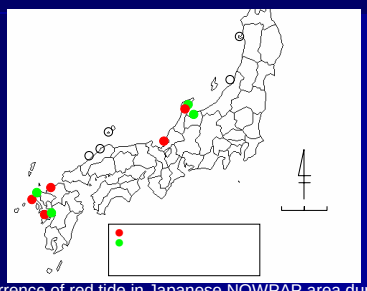


Figure 3.2 Histogram of red tide area in Bohai Sea and Yellow Sea(1990-2004)

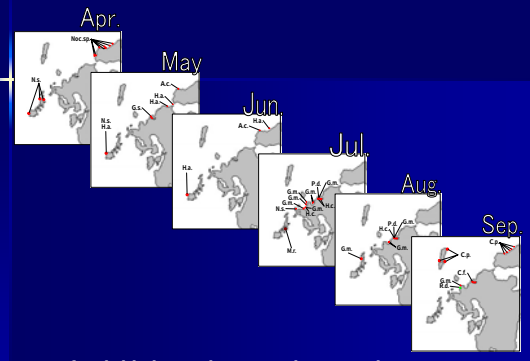
The Key Red Tide Monitoring Zone in Coastal China

NR on HABs in Japan



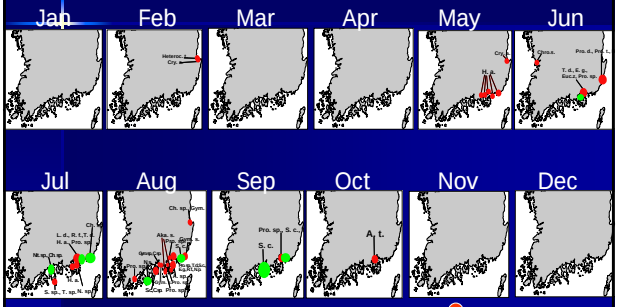
Occurrence of red tide in Japanese NOWPAP area during 1999-2002 at selected regular monitoring stations.

National Report III 1.1.4 (P.13-)



Occurrence of red tide in northern Kyushu coastal area in 2002 (extracted examples)

NR on HABs in Korea



Red tides in 2002 in Korea

NR on HABs in Russia

2.2 Integrated Report on HABs

Concept of Integrated Report

- To provide and to share information on the status of HAB in the NOWPAP Region
- To address issues to be tackled through CEARAC activities

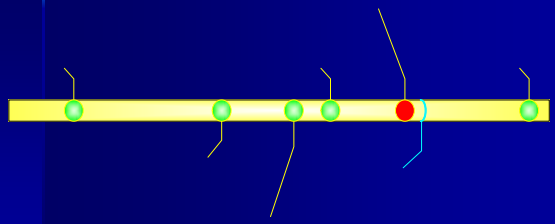
To this end,
Common HAB issues in the NOWPAP Region will be identified.

Contents of Integrated Report

2. Situation of HAB Occurrence

Broader View on HAB in the NOWPAP Region

Schedule of Issue of Reports



3. HAB Reference Database

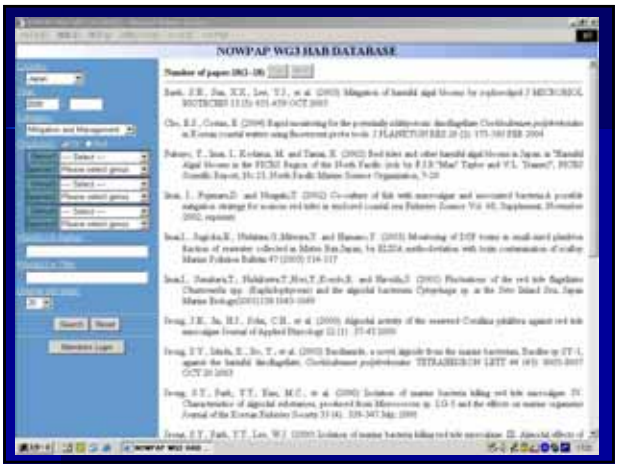
- Purpose of development of the database

To establish a focal storage of information and reference materials (papers, reports, data, etc.) which can be used as resources for scientific analyses on red tide and HAB.

- Expected use of the database
  (1) Search for the location of the reference of HAB
  (2) Exploitation of research areas
  (3) Understanding status of HAB studies

Categories of HAB Reference Database

- Occurrence and Monitoring
- Mechanism and Environment
- Physiology
- Taxonomy
- Mitigation and Management
- Others



3. HAB Reference Database

- Opened in April 2005
- http://www.cearac-project.org/wg3/hab-ref-db/
- Collected more than 1,000 literature information on HAB

	China	Japan	Korea	Russia	Total
Literature information In the database	359	440	275	76	1150

4. Activities of *Cochlodinium* Corresponding Group (CCG)

Background
- One of the concerned species in the NOWPAP region.
- The serious damages to coastal fisheries reported in Korea and Japan.
- Insufficient understanding of *Cochlodinium* to make policies against it.

Purpose
- To make a set of information on *Cochlodinium*
- To help policy makers concerning coastal fishery

Name		Organization
Songhui LU	C	Jinan University
☆ Yasuwo FUKUYO	J	Univ. of Tokyo
Yoshiharu TAKAYAMA	J	Hiroshima Fisheries Experimental Station
Kazumi MATSUOKA	J	Nagasaki University
Yasunori WATANABE	J	Fisheries Research Agency
☆ HakGyoon KIM	K	NFRDI
ChangKyu LEE	K	NFRDI
KyoungHo AN	K	NFRDI
WolAe LIM	K	NFRDI
Tatiana ORLOVA	R	Institute of Marine Biology
Marina SELINA	R	Institute of Marine Biology

Outputs of the activities of CCG

1. Website (Sep 2005)

CCG
HAB Reference Database
National Reports

2. Pamphlet (Nov 2005)

(Website + Info of NOWPAP)

Cochlodinium Homepage

- Homepage was opened in Sep 2005
- Expected users：Students, NGOs, Researchers
- http://www.cearac-project.org/wg3/cochlo-entrance/

Cochlodinium Pamphlet

P1. What is *Cochlodinium*? (Brief Explanation of *Cochlodinium*) + Brief Explanation of NOWPAP
P2. Red tide of *Cochlodinium*:
(Explanation of color and damage caused by the species)
P3. Occurrence and location of *Cochlodinium*
+ Expansion of *Cochlodinium* Red tides
P4. Countermeasures against *Cochlodinium* red tide

P5. Morphology of *Cochlodinium*

P6. Explanation of NOWPAP and CEARAC

Other Related Activities

- First International Workshop on HAB in the Northwest Pacific Region
  - June 30 and July 1, 2005
  - 30 Experts from China, Japan, Korea and Korea

Integrated Report 2005 (Draft)

CEARAC

1

1. Introduction

1.1 Definition of Words
- HAB, Red tide, Toxin-Producing Plankton

1.2 Natural Environment of the Region
- Sea Areas, Rivers, Currents

1.3 Social Environment of the Region
- Demography, Aquaculture

2

Summary of Red Tide (1)

	China (1990-2004)	Japan (1998-2002)	Korea (1999-2003)	Russia (1992-2003)
No. of events	84 events	150 events in Kyushu	**304 events**	23 events
Cell density	*Noctiluca scintillans*: 49,000 cells/ml *Skeletonema costatum*: 72,000 cells/ml *Ceratium furca*: 1,250 cells/ml *Gymnodinium* sp.: 300,000 cells/ml	*Gymnodinium mikimotoi* recorded highest density at 117,980 cells/ml.	*Cochlodinium polykrikoides* recorded highest density every year. Maximum density was 48,000 cells/ml in 2003.	*Eutreptiella gymnastica* recorded highest density at 30,900 cells/ml.
Bloom size	**<10km²: 18%** **10-100km²: 29%** **100-1,000km²: 30%** **>1,000km²: 23%**	<1km²: 51% 1-100km²: 48% >100km²: 1%	<1km²: 56% 1-100km²: 19% >100km²: 24% Large blooms mostly by *C. polykrikoides*	***N. scintillans* and *Prorocentrum mnimum* blooms exceeded 1km².**

3

Summary of Red Tide (2)

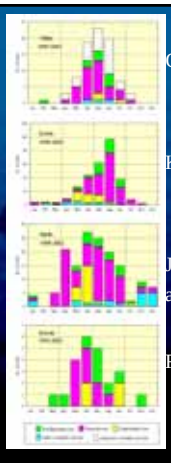
	China	Japan (1998-2002)	Korea (1999-2003)	Russia (1992-2003)
Duration	Most less than a week. However, *Ceratium furca* bloom lasted for 40 days in 1998. *Eucampia zodiacus* and *Chaetoceros socialis* bloom lasted for 20 days.	Mostly around 1 week. In Kyushu 18 out of 150 events lasted over 20 days.	Most events lasted less than 10 days except for *C. polykrikoides*, which continued for 1–2 months.	*N. scintillans* and *Oxyrrhis marina* blooms lasted more than 20 days.
Damage	Mass mortality of fish and shellfish by: *C. furca*, ***Exuviaella cordata***, *Gymnodinium* sp., *G. sanguineum*, *N. scintillans*, *Prorocentrum* sp. Most serious fishery damage in 1989 by *Gymnodinium* sp. in Bohai Bay (loss of US$ 38 million).	Mass mortality of fish and shellfish by: *Heterosigma akashiwo*, *Heterocapsa circularisquama*, *G. mikimotoi*, *C. polykrikoides*, *N. scintillans* Most serious damage recorded in 1999 by *C. polykrikoides* (loss of US$ 7 million)	*C. polykrikoides* has caused damage to fisheries for most years since 1993. Economic loss of US$ 95 million in 1995 and US$ 19 million in 2003.	No damage recorded.

4

Location of Red Tide Occurrence in the Region (1999-2002)

5

Seasonal Pattern of Red Tide Occurrence and its Peak Season



China: June – August

Korea: August

Japan: April, June and July

Russia: June and July

6

2. Situation of HAB Occurrence

Toxin-Producing Plankton Species in the NOWPAP Region

	Species name	China	Japan	Korea	Russia
PSP (5)	*Alexandrium catenella*				×
	Alexandrium tamarense		×	×	×
	Alexandrium catenella	×	×		
	Alexandrium pseudogonyaulax				×
	Alexandrium tamiyavanichii		×		
	Gymnodinium catenatum		×		
DSP (9)	*Dinophysis fortii*	×	×	×	×
	Dinophysis acuminata	×	×	×	×
	Dinophysis acuta				×
	Dinophysis caudata		×		
	Dinophysis infundibrus		×		
	Dinophysis mitra		×		
	Dinophysis ovata	×			
	Dinophysis rotundata		×	×	×
	Prorocentrum lima	×			
ASP (4)	*Pseudo-nitzschia calliantha*				×
	Pseudo-nitzschia multiseries				×
	Pseudo-nitzschia pseudodelicatissima				×?
	Pseudo-nitzschia pungens			×	×

2. Situation of HAB Occurrence

Status of Toxin-Producing Plankton and Shellfish Poisoning in the Region

	China	Japan	Korea	Russia
Affected species	PSP: Marine snail (*Nussarius succinstus*), Clam (*Soletellina diphos*, *Ruditapes phillipenensis*, *Pinna pectinata*), Mussel (*Perna viridis*)	PSP: Mediterranean blue mussel, Japanese oyster, noble scallop DSP: Mediterranean blue mussel, Japanese scallop	Information N/A	No shellfish poison reported
Damage	Nationally more than 600 people have suffered from shellfish poison since 1967. 30 fatalities from PSP.	Approx. 900 people suffered from PSP or DSP since 1976, including several deaths. No fatalities since 1980.	Stoppage of shellfish harvest in 2002 and 2003 in the southeast coast due to PSP.	No damage recorded
Mitigation measures	SOA laboratories and local fishery environmental laboratories conduct monitoring of toxin-producing plankton and shellfish poison.	Regular monitoring of toxin-producing species and shellfish toxin test. Voluntarily stoppage of shipping.	Regular monitoring of *Alexandrium* sp. and toxin test of shellfish. Harvest is stopped when the toxin level exceeds the quarantine limit.	No mitigation measures or monitoring

8

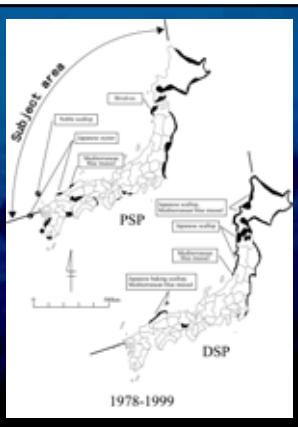
2. Situation of HAB Occurrence

Areas where Shellfish Toxin have been Recorded in Coastal China

9

2.Situation of HAB Occurrence

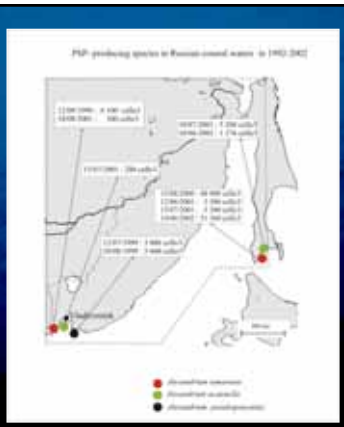
Areas in Japan that Experienced Voluntary Control due to PSP and DSP



10

2.Situation of HAB Occurrence

Date of Occurrence and Maximum Cell Density of *Alexandrium* Species in the Russian Coastal Waters



11

2. Situation of HAB Occurrence

Date of Occurrence and Maximum Cell Density of *Dinophysis* Species in the Russian Coastal Waters

12

2. Situation of HAB Occurrence

Date of Occurrence and Maximum Cell Density of *Pseudo-nitzschia* Species in the Russian Coastal Waters

13

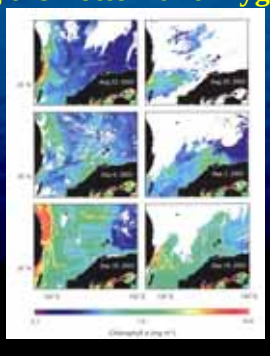
2. Situation of HAB Occurrence – Common Issues on HAB in the NOWPAP Region

Locations of *C. polykrikoides* blooms in Japan and Korea

14

2. Situation of HAB Occurrence – Common Issues on HAB in the NOWPAP Region

Movement of *C. polykrikoides* Bloom along the Tottori and Hygo Coast



15

3. Information of HAB Monitoring

Status of Red Tide Monitoring

		China		Japan			Korea		Russia
Regular monitoring	Implementing organization	SOA Branch office	SEPA/Dept. of Agriculture/ Fishery lab.	Fishery labs of prefectural governments	Kyushu Fisheries Coordination Office	Japan Coast Guard	NFRDI NFRDI Fisheries Extension Service Center	National Maritime Police Agency (NMPA)	No regular program. IMB FEB RAS (ad hoc. observation)
	Method	Vessel monitoring/ Satellite remote sensing/ Aerial monitoring	N/A	Vessel monitoring	Aerial monitoring	N/A	Cell density of *C. polykrikoides*	Aerial monitoring	N/A
	Frequency	N/A	N/A	Mainly during spring to summer.	6-8 flights during June-October	N/A	February – November	N/A	Ad hoc basis
Trace monitoring		Fishery labs conduct plankton sampling and when necessary continue tracking. SOA also participates in tracking when required.		Fishery labs conduct plankton sampling and when necessary continue tracking.			HAB Emergency Center in NFRDI collects relevant information and predict future movement of red tide. Information is then disseminated to fishermen and relevant organizations.		Not conducted

16

3. Information of HAB Monitoring

Red Tide Monitoring Sites

17

3. Information of HAB Monitoring

Status of Toxin-producing Plankton Monitoring

	China	Japan	Korea	Russia
Implementing organization	Some SOA laboratories and local fishery environmental laboratories. Monitoring network under construction.	Fishery laboratories of prefectural governments	NFRDI and Regional Maritime Affairs and Fisheries Office	No regular monitoring program. However, IMB FEB RAS and SakhNIRO conduct observations at an ad hoc basis.
Method	N/A	Cell density of *Alexandrium* species and *Gymnodinium catenatum* for PSP, and *Dinophysis* species for DSP. Target species may differ with the laboratories.	Cell density of *A. tamarense* is regularly monitored.	Cell density of certain toxin-producing plankton studied.
Frequency	N/A	Differ with the laboratories	N/A	Ad hoc basis

18

3. Information of HAB Monitoring

Status of Shellfish Poison Monitoring

	China	Japan	Korea	Russia
Implementing organization	Some SOA laboratories and local fishery environmental laboratories. Monitoring network under construction.	Fishery laboratories of prefectural governments	NFRDI and Regional Maritime Affairs and Fisheries Office	Not conducted
Method	N/A	Measurement of toxin level in the midgut gland.	Measurement of toxin level in the meat or midgut gland.	-
Frequency	N/A	At least monthly during the harvest season. Increases to weekly if high risk of poison is suspected.	At least more than once a month. Frequency increases when toxin is detected in the shellfish.	-
Shipping / harvest stoppage criteria	PSP: 80 μ g/100g of whole meat DSP: toxin must be non-detectable.	**PSP: 4MU/g,** **DSP: 0.05MU/g** **Shipping can recommence when toxicity level remain below the standard for 2 weeks.**	PSP: 80 μ g/100g meat.	PSP: 80 μ g/100g wet mollusk tissue DSP: No detection of ocadaic acid.

19

3. Information of HAB Monitoring

Toxin-producing Plankton and Shellfish Poison Monitoring Sites

20

4. Researches and Studies to Cope with HAB － Major HAB Research and Studies

	China	Japan	Korea	Russia
Mechanism of HAB occurrence	Relationship of : nutrient level with HAB, zooplankton community structure with HAB, macronutrients with HAB, *Alexandrium* sp. growth with bacteria, *A. tamarense* growth with Fe and Mn. Bloom mechanism of *A. tamarense*	Bloom mechanism of PSP inducing species (*Alexandrium* spp. and *Gymnodinium. catenatum*) Relationship of bacteria/viruses with red tide senescence Relationship of water temp., salinity and irradiance with *C. polykrikoides* growth	Relationship of zooplankton community structure with *C. polykrikoides* bloom Relationship of physico-chemical factors (water temp., salinity, irradiance and nutrient) with *C. polykrikoides* bloom	Bloom mechanism of diatom *Chaetoceros salsugineus* and *Oxyrrhis marina* Relationship of nutrient level, stratification and water temp. with recent increase of HAB
Toxicity Analysis	Bioassay	High performance LC/MC ELISA method	*C. polykrikoides*, *Alexandrium* spp., *Microcystis* spp. and *Pseudo-nitzschia* spp.	Different genetic populations of *A. tamarense*
Taxonomy	Identification of dinoflagellates by 2-dimension proteome reference map Molecular identification of *Alexandrium* spp. strains	Development of molecular biological approach to distinguish plankton population	Ultrastructure and phylogeny of micro algae by molecular biological approach	Identification of *A. tamarense* subpopulations by molecular biological approach
Mitigation measures	Coagulation rate of clay with HAB species Monitoring and forecasting of HAB by remote sensing Control of HAB using yellow clay and surfactant	Biological control of HAB using viruses, bacteria, macroalgae HAB prediction with neural network technique	Detection of HAB with molecular biological technique Control of HAB with bacteria, parasites, copepods and ciliates Control by yellow clay and surfactant Environmental impact of control agents Satellite remote sensing	N/A

21

5. Training Activity to Cope with HAB

HAB Training Courses

	Targeted personnel	Host organization	Subject
China	Personnel involved in red tide and shellfish poison in the monitoring centers of SOA	Information N/A	Lectures on red tide monitoring and toxin analysis
	Personnel from universities and research institutes involved in red tide and shellfish poison research	Information N/A	Lectures on HPLC technique for PSP and DSP detection
	Personnel from universities and research institutes involved in fisheries research	Information N/A	Lectures and discussions on disease control in aquaculture farms
	Personnel from coastal local governments involved in environmental monitoring including red tide	Information N/A	Lectures on red tide monitoring, species identification and toxin analysis
Japan	Technicians of local government fisheries laboratory	Japan Fisheries Resource Conservation Association (JFRCA)	Lectures on latest HAB information. Exercise in sampling, sample preservation, species identification, toxin analysis etc.
	Local fishermen and aquaculture operators	Local Governments	Lectures on HAB mechanism, mitigation measures, monitoring etc.
Korea	Technicians of developing countries	Korean International Cooperation Agency (KOICA)	Lectures on red tide monitoring and mitigation.
	Personnel involved in coastal zone management in local government or regional maritime affairs & fisheries	NFRDI	Lectures on red tide monitoring and mitigation.
	Lectures on HAB mechanism		
	Technicians involved in sanitation and inspection of fishery products. Personnel from private fishery companies	NFRDI	Lectures on shellfish poison

22

6. Suggested Activities for HAB in the NOWPAP Region
6.1 National Activities to Cope with HAB

Implemented National Activities to Cope with HAB

China	Japan	Korea	Russia
Regular monitoring of red tide. Use of clay spraying to control HAB (only in limited areas).	Regular monitoring of red tide, toxin-producing plankton and shellfish poison. Operation of HAB database (includes information on past HAB events). Use of clay spraying to control HAB (only in limited areas).	Regular monitoring of red tide and shellfish poison. Dissemination of HAB information to concerned organizations and fishermen through the HAB Emergency Center. Use of clay dispenser and electric clay dispenser to control *Cochlodinium* blooms. Use of automatic HAB alarm system in aquaculture farms for early detection of HAB.	No national programs implemented yet apart from HAB related research activities.

23

6. Suggested Activities for HAB in the NOWPAP Region
6.2 Suggested Activities for HAB in the Region

Suggested Future Activities for HAB

China	Japan	Korea	Russia
Development of common data and information network for HAB monitoring. （C1） Cooperation and exchange of information with other relevant organizations such as WESTPAC and PICES. （C2）	Action against *Cochlodinium* blooms, through continuation of CCG and organization of joint programs with WESTPAC/TTR （J1） Cooperation with other UNEP Action Plans (e.g. East Asia Sea Action Plan). （J2） Exchange of information with other organizations to avoid unnecessary overlaps of activities. （J3） Development of appropriate policies and technologies to control inputs of land-based nutrients into the seas of the Region. （J4）	Action against *Cochlodinium* blooms, through continuation of CCG and implementation of collaborative research programs within the NOWPAP Members. （K1） Development of appropriate policies and technologies to control inputs of land-based pollutants into the seas of the Region. （K2）	Research and analysis on the influence of land-based nutrients and pollutants on HABs in coastal zone. （R1） Cooperation and exchange of information with other relevant organizations such as WESTPAC and PICES. （R 2 ） Continuation of international training programs. （R3）

24

Common Suggested Future Activities for HAB

1. **To facilitate research and study of *Cochlodinium* through CCG activities** (J1, K1)
2. **To cooperate with other international organizations that are involved in HAB** (C2, J2, J3, R2, R3)
3. **To establish common understanding of HAB through development of a database and information network** (C1)
4. **To help make a policy on control of land-based nutrients discharge** (J4, K2, R1)
5. **To seek a collaborative work for HAB monitoring for the NOWPAP Region**

25

Suggestion for WG3 Activities from IR

- Action for Suggestion 1 and 4 should be made for "Promotion of Mitigation."
- Investigation of countermeasure against red-tide species and preventive measure should be conducted.

26

Workplan and Budget for the NOWPAP WG3 (HAB)

September 15, 2005
CEARAC

Workplan for WG3

	Phase 1		Phase 2		Phase 3	
	2002	2003	2004	2005	2006	2007
CEARAC FPM		▲(Mar)	▲(Mar)	▲(Sep)	▲(Mar)	▲(Sep)
WG3 Meeting		▲(Oct)			▲(Summer)	
Development of HAB-database		・Collection of information on the scientific publications ・Categorization of publications	Establishment of HAB Reference Database	・Addition of information from National Reports	・Collection of articles about *Cochlodinium* and mitigation ・Addition of general information	・Collection of articles about *Cochlodinium* and mitigation ・Addition of general information
Identification and prioritization of needs		・Questionnaire survey				
Information dissemination			・News Letter ・(HAB Reference Database)	・News Letter ・(*Cochlodinium* HP) ・(*Cochlodinium* Pamphlet)	・News Letter	・News Letter
Identification and analysis of important scientific		・Plan of CCG	・Establishment of CCG	・Establishment of *Cochlodinium* HP ・Disribution of Pamphlets	・Survey of prevention, control, and mitigation of *Chocidinium*	
Development of collaborative monitoring programme						
Promotion of Mitigation					・Survey of prevention, control, and mitigation of red tides	・Issue of "Booklet of Case Studies of Mitigation of Red Tides"
National Report				・Issue of National Reports		
Integrated Report				・Issue of Integrated Report		

Phase 1: Construction of a framework for WG3

	Phase 1	
	2002	2003
CEARAC FPM		▲(Mar)
WG3 Meeting		▲(Oct)
Development of HAB-database		・Collection of information on the scientific ・Categorization of publications
Identification and prioritization of needs		・Questionnaire survey
Information dissemination		
Identification and analysis of inportant scientific issue		・Plan of CCG
Development of collaborative monitoring programme		
Promotion of Mitigation		
National Report	→	Summary of Status Report
Integrated Report	→	Trial version of IR

Phase 2: Grasp and dissemination of information on HABs

	Phase 2	
	2004	2005
CEARAC FPM	▲(Mar)	▲(Sep)
WG3 Meeting	▲(Nov)	
Development of HAB-database	・Establishment of HAB Reference Database	・Addition of information from National Reports
Identification and prioritization of needs		
Information dissemination	・News Letter ・(HAB Reference Database)	・News Letter ・(*Cochlodinium* HP) ・(*Cochlodinium* Pamphlet)
Identification and analysis of important scientific issue	・Establishment of CCG	・Establishment of *Cochlodinium* HP ・Disribution of Pamphlets
Development of collaborative monitoring programme		
Promotion of Mitigation		
National Report	→	Issue of National Reports
Integrated Report	→	Issue of Integrated Report

Activities of WG3 suggested in National Reports

China	Japan	Korea	Russia
➢ Development of common data and information network for HAB monitoring (C1) ➢ Cooperation and information exchange with other relevant organizations such as WESTPAC and PICES (C2)	➢ Action against *Cochlodinium* blooms, through continuation of CCG and organization of joint programs with WESTPAC/TTR (J1) ➢ Cooperation with other UNEP Action Plans (e.g. East Asia Sea Action Plan) (J2) ➢ Information exchange with other organizations to avoid unnecessary overlaps of activities (J3) ➢ Development of appropriate policies and technologies to control inputs of land-based nutrients into the seas of the Region (J4)	➢ Action against *Cochlodinium* blooms, through continuation of CCG and implementation of collaborative research programs within the NOWPAP Members (K1) ➢ Development of appropriate policies and technologies to control inputs of land-based pollutants into the seas of the Region (K2)	➢ Research and analysis of influence of land-based sources of nutrients and pollutants on the HABs issues in coastal zone. (R1) ➢ Cooperation and information exchange with other relevant organizations such as WESTPAC and PICES (R2) ➢ Continuation of international training programs (R3)

Common Suggested Future Activities for HAB

1. **To facilitate research and study of *Cochlodinium* through CCG activities** (J1, K1)
2. **To cooperate with other international organizations that are involved in HAB** (C2, J2, J3, R2, R3)
3. **To establish common understanding of HAB through development of a database and information network** (C1)
4. **To help make a policy on control of land-based nutrients discharge** (J4, K2, R1)
5. **To seek a collaborative work for HAB monitoring for the NOWPAP Region**

Suggestions from IR

- Action for Suggestion 1 and 4 should be made for "Promotion of Mitigation."
- Investigation of countermeasure against red-tide species and preventive measure should be conducted.

Phase 3: Promotion of Mitigation of Red Tides for the NOWPAP Region

	Phase 3	
	2006	2007
CEARAC FPM	▲(Mar)	▲(Sep)
WG3 Meeting	▲(Summer)	
Development of HAB-database	・Collection of articles about *Cochlodinium* and mitigation ・Addition of general information	・Collection of articles about *Cochlodinium* and mitigation ・Addition of general information
Identification and prioritization of needs		
Information dissemination	・News Letter ・(HAB Reference Database) ・(*Cochlodinium* HP) ・(*Cochlodinium* Pamphlet)	・News Letter
Identification and analysis of inportant scientific issue	・Survey of prevention, control, and mitigation of *Chaclodinium*	
Development of collaborative monitoring programme		
Promotion of Mitigation	・Survey of prevention, control, and mitigation of Red-Tides ($14,000)	・Booklet of Case Studies of Mitigation of Red Tiedes ($12,000)
National Report		
Integrated Report		

Booklet of Case Studies of Mitigation of Red Tides

Contents of the Booklet (1)

1. Case Studies of proactive measures to control red tides
   - 1.1 Proactive measures in NOWPAP Members
     - 1.1.1 China
     - 1.1.2 Japan
       - 1.1.2.1 Tokyo Bay
       - 1.1.2.2 Ise Bay
       - 1.1.2.3 Seto Inland Sea (including Osaka Bay)
       - 1.1.2.4 Ariake/Yatsushiro Bay
       - 1.1.2.5 Others
     - 1.1.3 Korea
     - 1.1.4 Russia
   - 1.2 Proactive measures in the World
     - 1.2.1 United States
       - 1.2.1.1 Chesapeake Bay
     - 1.2.2 Mediterranean Sea

Contents of the Booklet (2)

2. Case Studies of countermeasures to terminate or mitigate red tides

2.1 Clay Spraying
2.2 Spraying of Chemical Substances
2.3 Biological measures (e.g. bacteria)
2.4 Evacuation techniques of aquacultures
2.5 Others (Stop of feeding, Nanno-Bubbles, Technique of treatment of Blast water、Ship for mitigation of red tide, and so on)

Breakdown of workplan 2006

1. A Japanese consultant will survey case studies of prevention, control and mitigation of red tides in Japan by the 3rd WG3 Meeting in summer 2006.
2. Based on an example of Japanese survey, experts who are recommended by FPs or WG3 experts will survey case studies in their own countries with fund from CEARAC by the end of 2006.
3. The contracted experts also will collect and categorize reference information on HABs for HAB Reference Database.

Breakdown of workplan 2007

1. A Japanese consultant will survey mitigation activities in the world (advanced countries).

2. A Japanese consultant will organize information about case studies from NOWPAP Members.

3. Booklet of case studies of mitigation of red tide will be issued at the end of 2007.

Report of NOWPAP Working Group 4 Intersessional activities

CEARAC

September 15, 2005

1. Work Plan for 2004-2005

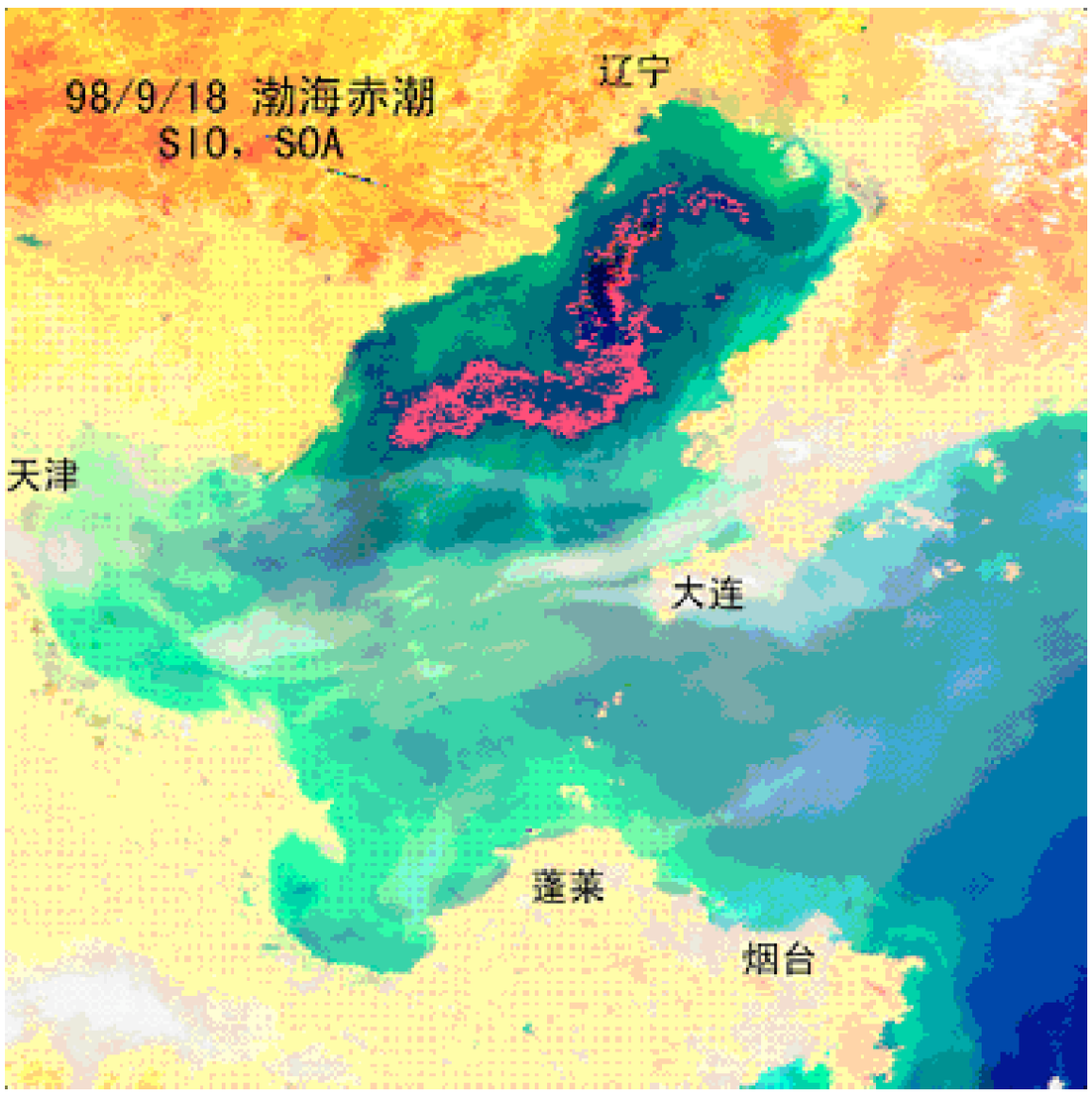
- Work plan of WG4 for 2004-2005 was discussed at the 1st WG4 meeting and finalized at the Second CEARAC FPM on February 2004
- Actions with priorities
  - National Report
  - Integrated Report
  - RS information network system

2nd WG4 in Beijing
Oct, 2004

2.1 National report

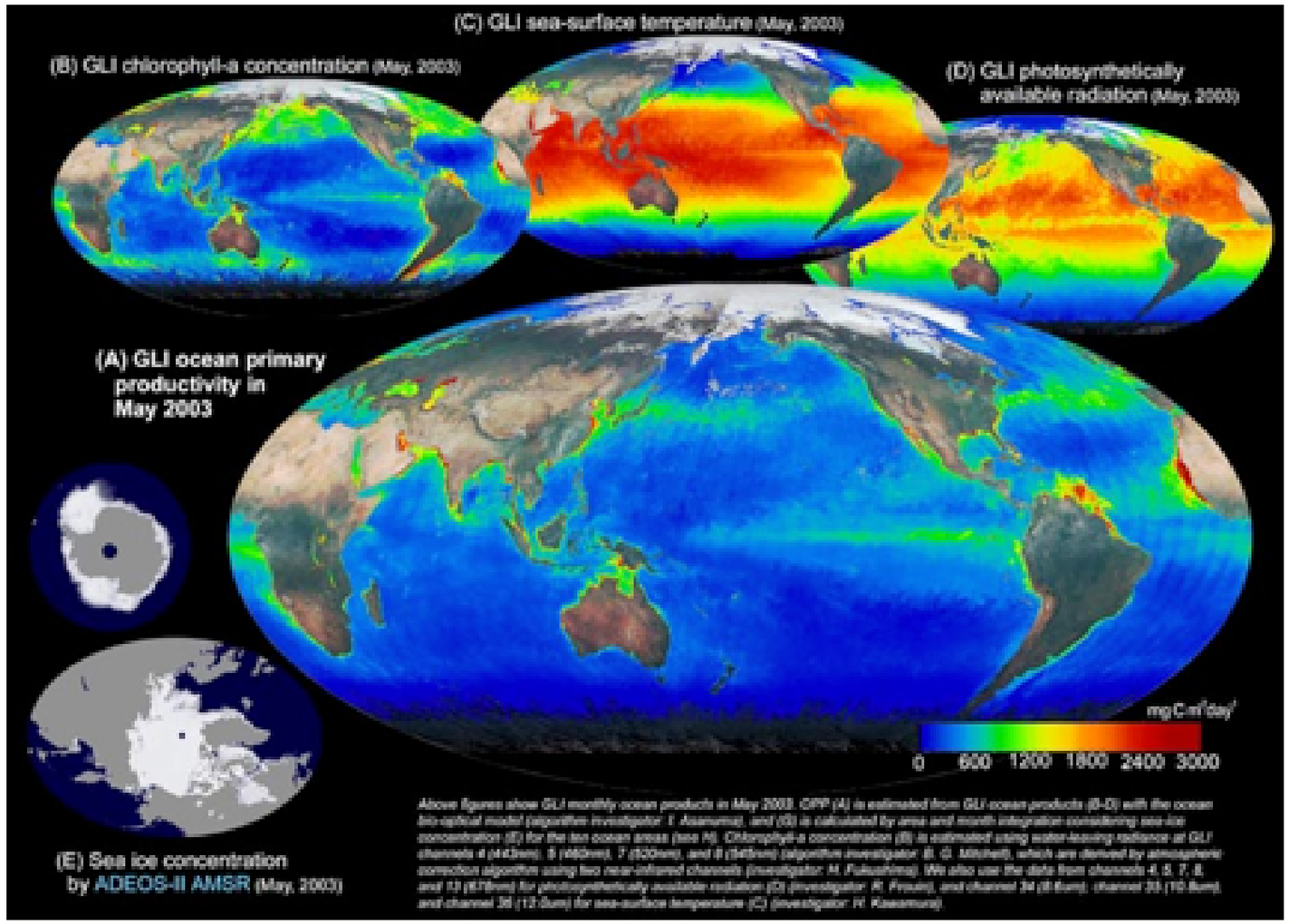
- 1 Status of remote sensing utilization in marine environmental monitoring
- 2 Case example of remote sensing application in marine environmental monitoring
- 3 Status of research and development on remote sensing technology of the marine environment
- 4 Introduction of the latest findings
- 5 Strategies/plans for remote sensing related activities
- 6 Challenges and prospects
- 7 Suggested activities for the NOWPAP Region

National Report of China



Red Tide monitoring by using SeaWiFS in 1998

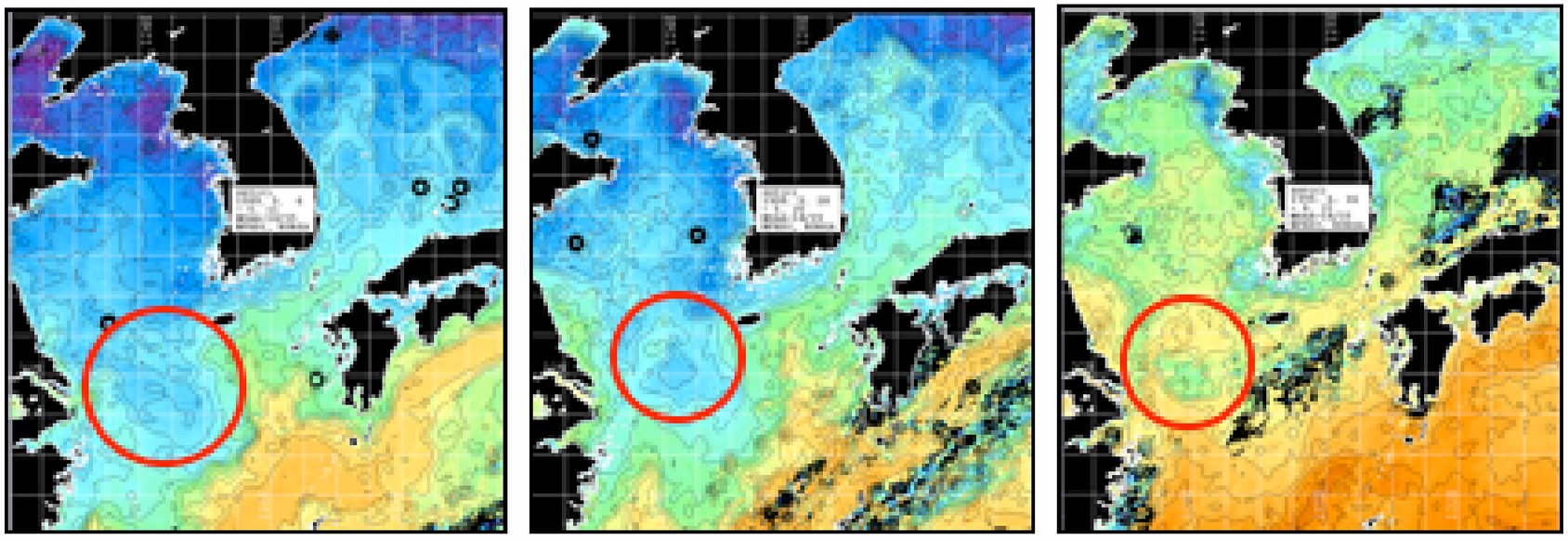
National Report of Japan



GLI ocean Primary Productivity in May 2003

Source: JAXA EORC

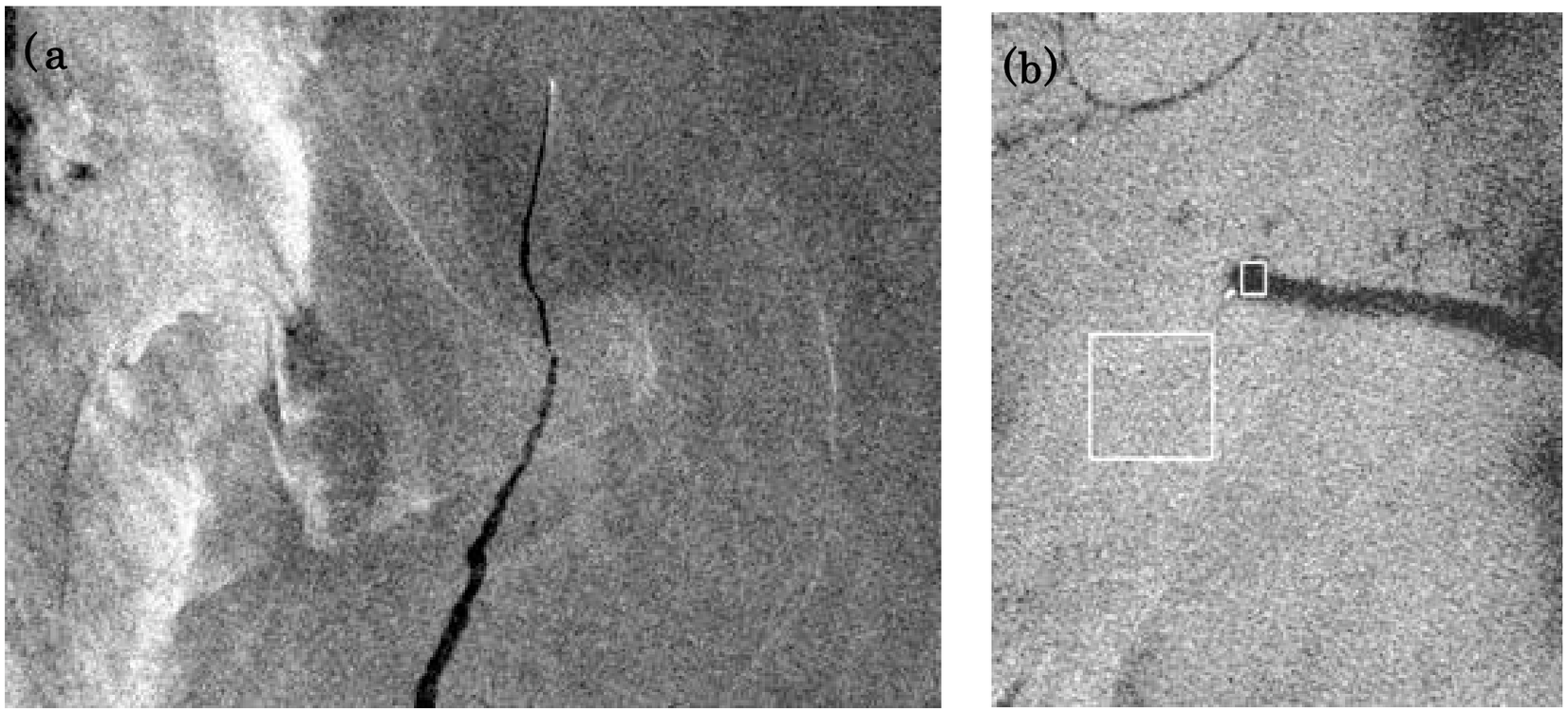
National Report of Korea



(a) (b) (c)

Formation cold core eddy was measure around the waters of Scotra Rock using the infrared thermal imageries from NOAA satellite 14 and 15. (a) Step 1 (May 6-11, 1999). (b) Step II (May 20-25, 1999). (c) Step III (June 16-22, 1999).

National Report of Russia



(a) (b)

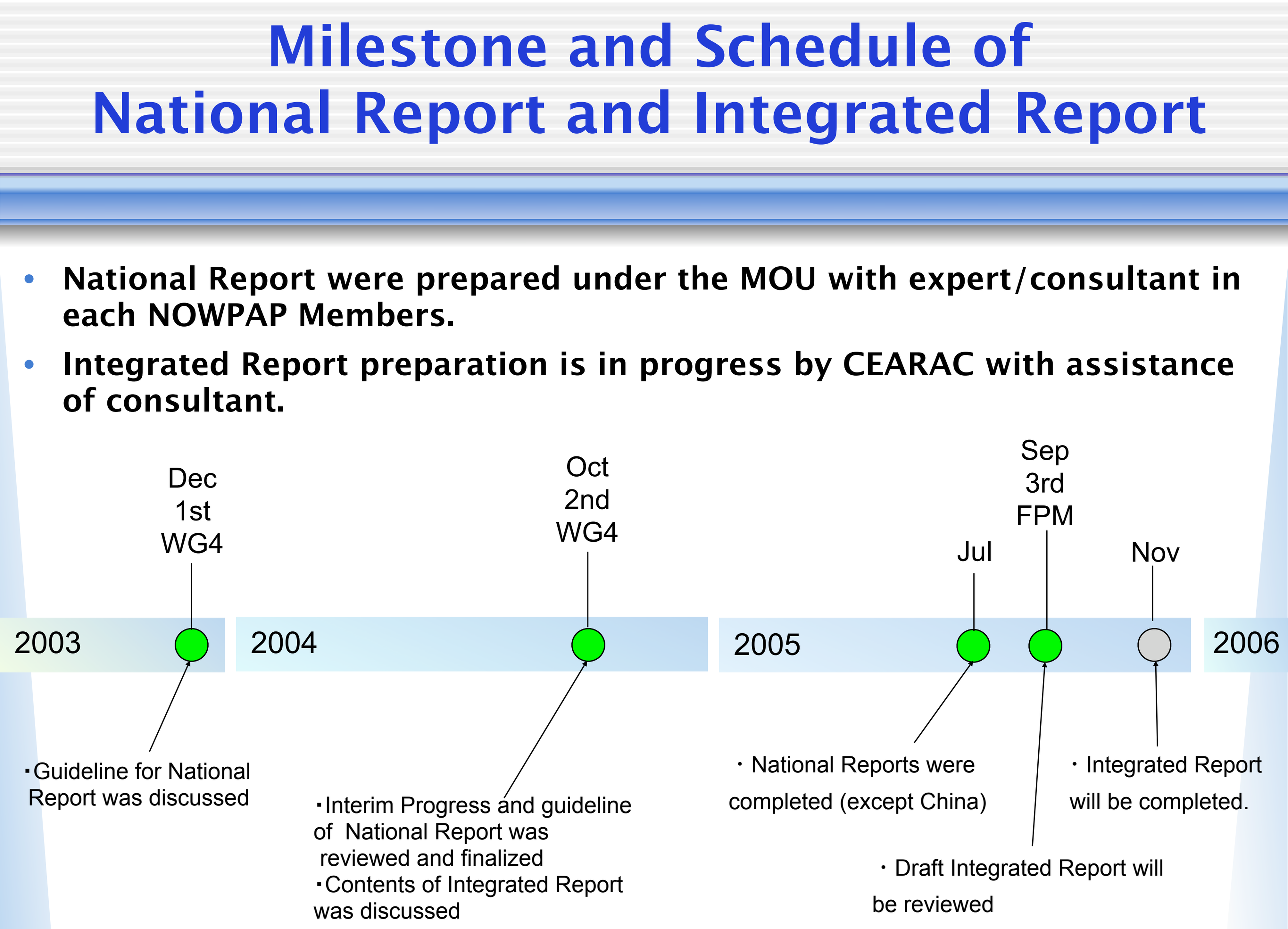
Subsections of ERS-2 SAR images for 20 May 1994 at 14:20 UTC (a) and for 23 March 1999 at 13:27 UTC (b) showing illegal discharge of oil polluted waters by ships.

2.2 Integrated report

- *1 Introduction*
- **2 Status of remote sensing utilization in marine environmental monitoring**
- **3 Case example of remote sensing application in marine environmental monitoring**
- **4 Status of research and development on remote sensing technology of the marine environment**
- **5 Introduction of the latest findings**
- **6 Strategies/plans for remote sensing related activities**
- **7 Challenges and prospects**
- **8 Suggested activities for the NOWPAP Region**
- *9 Summary and recommendation*

Milestone and Schedule of National Report and Integrated Report

- **National Report were prepared under the MOU with expert/consultant in each NOWPAP Members.**
- **Integrated Report preparation is in progress by CEARAC with assistance of consultant.**



2.3.1 Establishment of Ocean Remote Sensing Portal Site

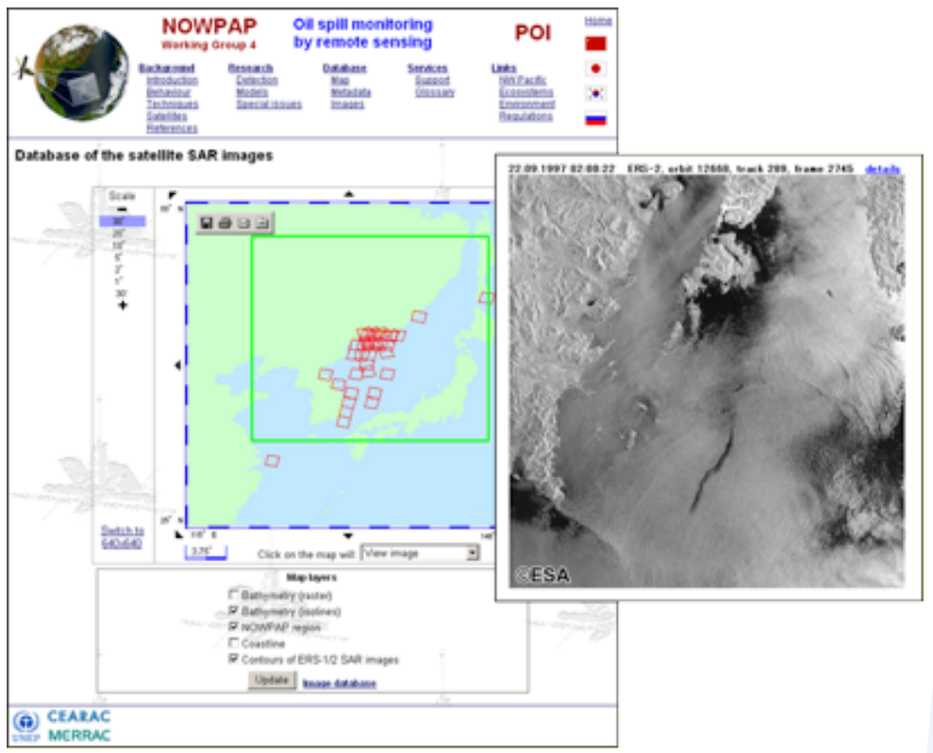
- Started its operation in April 2005.
- Provides links to websites that have data and information on marine environment monitoring by remote sensing.
- Concepts

  Effectively share data and information on marine environment monitoring by remote sensing, such as latest research development, case studies on application, future trends and so on.

Ocean remote sensing portal site
http://www.cearac-project.org/wg4/portalsite/

2.3.2 Establishment of website on oil spill monitoring

- Developed under the MOU between CEARAC and POI FEB Russia
- Started its operation in March 2005
- Provides information on oil spill monitoring by remote sensing techniques
- Contents
  - Behavior oil in the Sea
  - Physical background and the features of remote sensing
  - Examples of oil spill detection by SAR in the NOWPAP Region
  - Algorithm of oil spill detection on SAR images
  - Links to model used for simulation of oil spill process
  - POI database of satellite SAR images



Oil Spill Monitoring by Remote Sensing
http://cearac.poi.dvo.ru/en/main/about/

2.5.1 International workshops on remote sensing of the marine environment in the NOWPAP Region

- NPEC has been organizing international workshops on remote sensing of the marine environment since 1999.
- Its third workshop was held in Beijing in Oct 2004.
- Experts from NOWPAP Members exchanged information on remote sensing application, examples of marine environmental monitoring, research and development trends and so on.

- Summary of the workshop -

Status of each county was reported

Future missions were reported

Co-developing algorithm was suggested

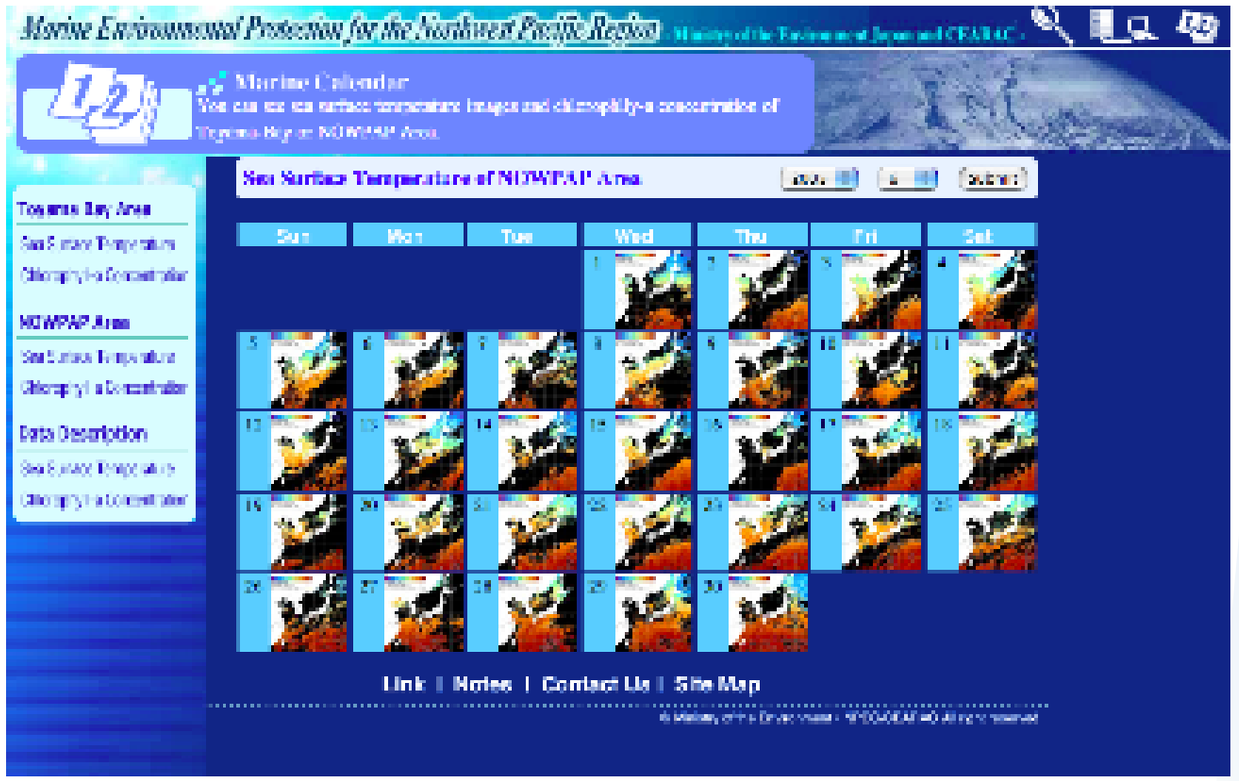
Topics on application were shared

Continuity of the workshop was supported

2.5.2 Website upgrade of Marine Environment Watch Project

- To promote NOWPAP, NPEC has been operating the Marine Environmental Watch since 2002, under the contract with the ministry of the environment of Japan.
- The system provides remote sensed data of Sea Surface Temperature and Chlorophyll a concentration.
- The data can be downloaded via the Internet for free of charge with registration.
- The website of the Marine Environment Watch Project was upgraded in March 2005 to promote utilization of satellite remote sensing data.

- New features of the upgraded website
  - Provides data processing and analysis method
  - Provides image of daily SST and chlorophyll a concentration for the NOWPAP region
  - Enables to Save your region of interest



Other related activity
Toyama Bay Project

- NPEC was designated as CEARAC and has been working on development of evaluation method for marine and coastal environment using remote sensing technique .

- A draft guideline of eutrophication in coastal area using satellite data is under development by NPEC.

Report of NOWPAP Working Group 4 Intersessional activities

CEARAC

September 15, 2005

1. Work Plan for 2004-2005

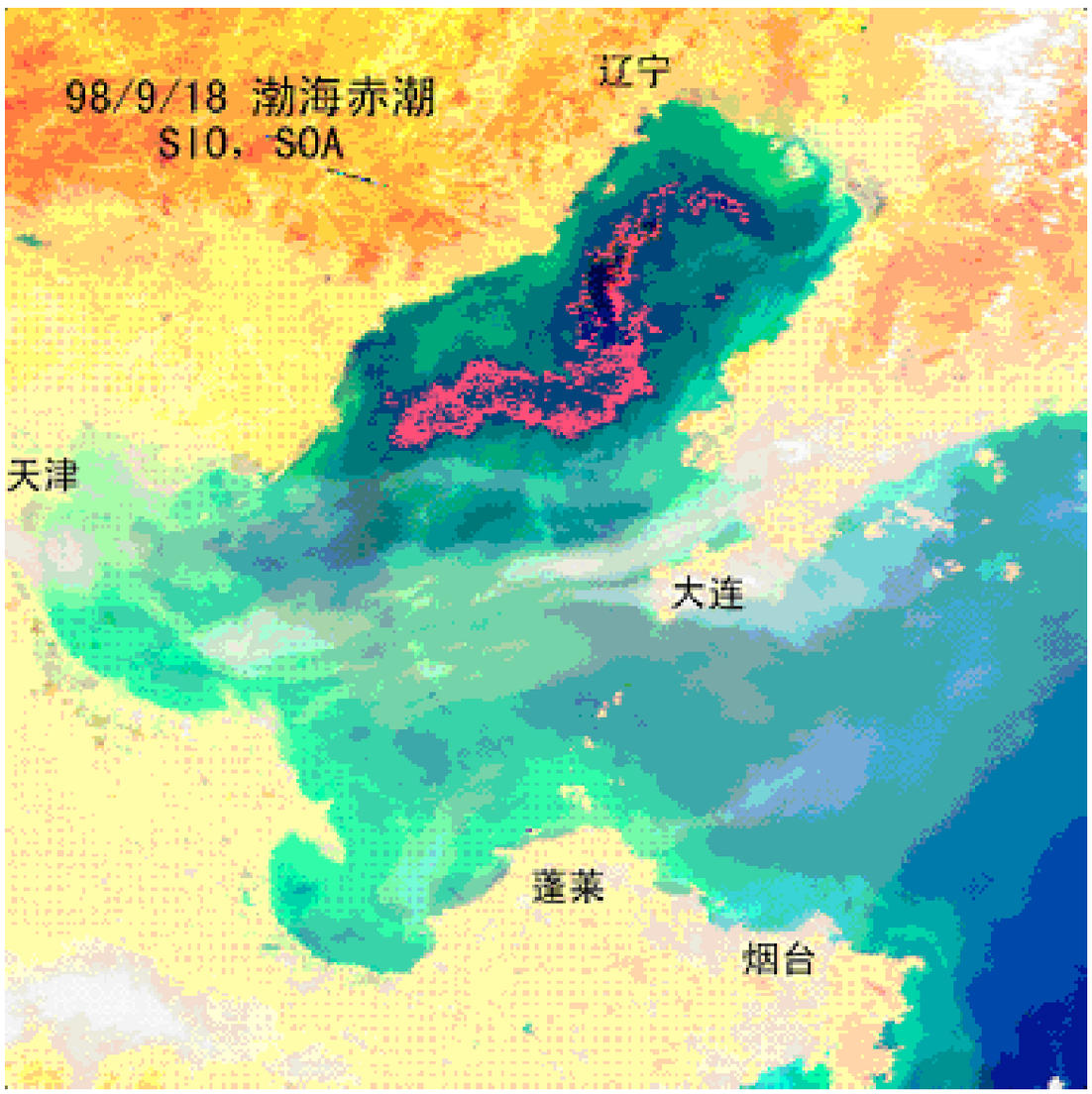
- Work plan of WG4 for 2004-2005 was discussed at the 1st WG4 meeting and finalized at the Second CEARAC FPM on February 2004
- Actions with priorities
  - National Report
  - Integrated Report
  - RS information network system

2nd WG4 in Beijing
Oct, 2004

2.1 National report

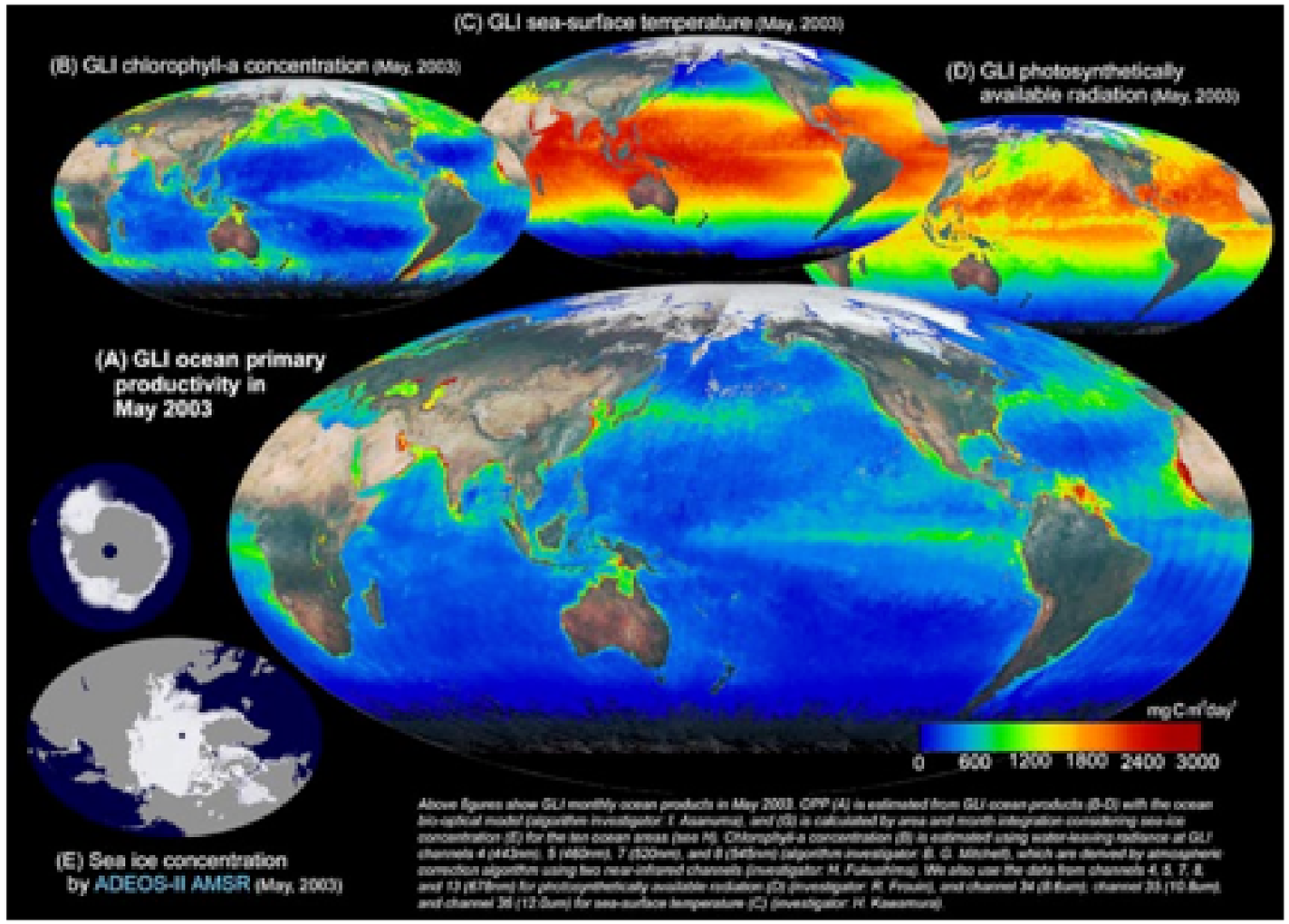
- 1 Status of remote sensing utilization in marine environmental monitoring
- 2 Case example of remote sensing application in marine environmental monitoring
- 3 Status of research and development on remote sensing technology of the marine environment
- 4 Introduction of the latest findings
- 5 Strategies/plans for remote sensing related activities
- 6 Challenges and prospects
- 7 Suggested activities for the NOWPAP Region

National Report of China



Red Tide monitoring by using SeaWiFS in 1998

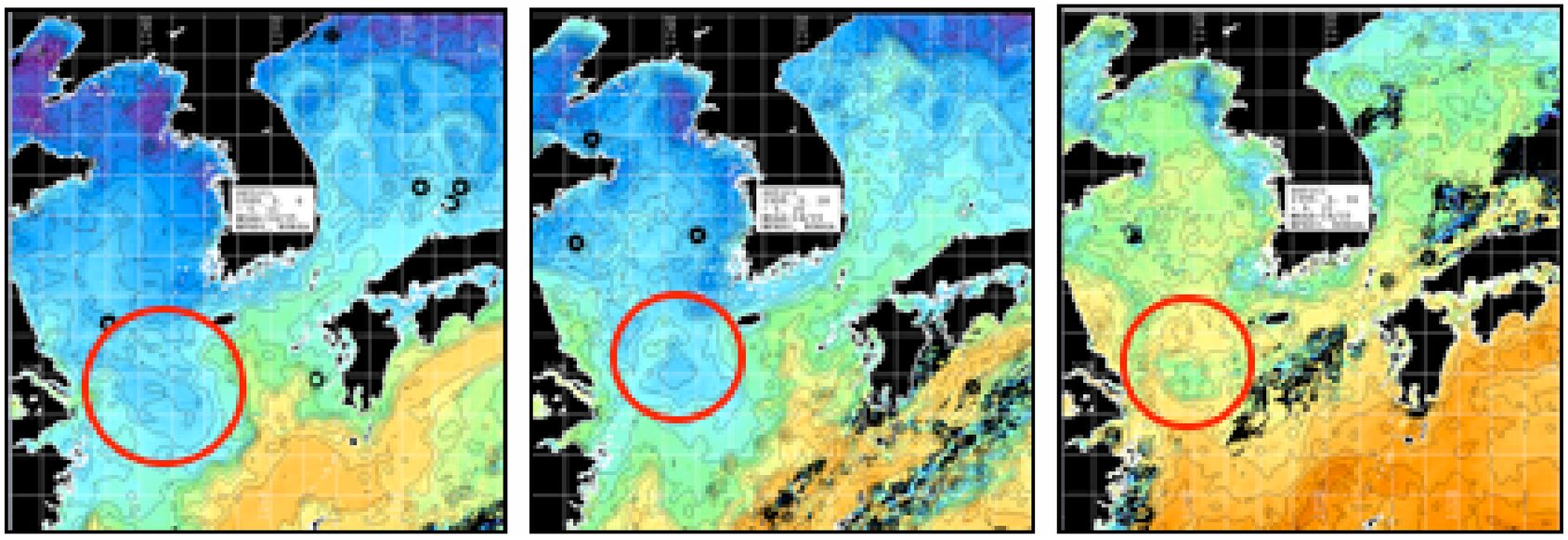
National Report of Japan



GLI ocean Primary Productivity in May 2003

Source: JAXA EORC

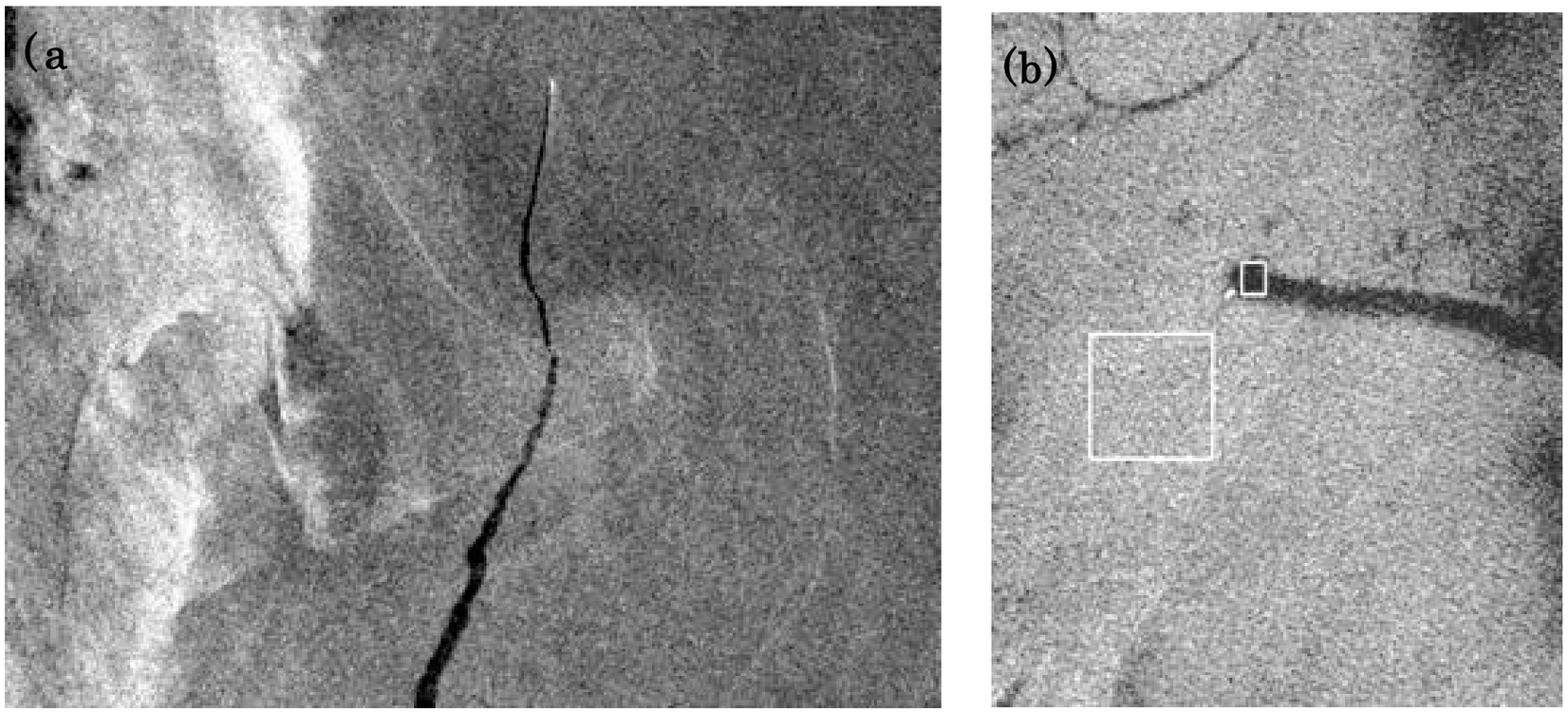
National Report of Korea



(a) (b) (c)

Formation cold core eddy was measure around the waters of Scotra Rock using the infrared thermal imageries from NOAA satellite 14 and 15. (a) Step 1 (May 6-11, 1999). (b) Step II (May 20-25, 1999). (c) Step III (June 16-22, 1999).

National Report of Russia



(a) (b)

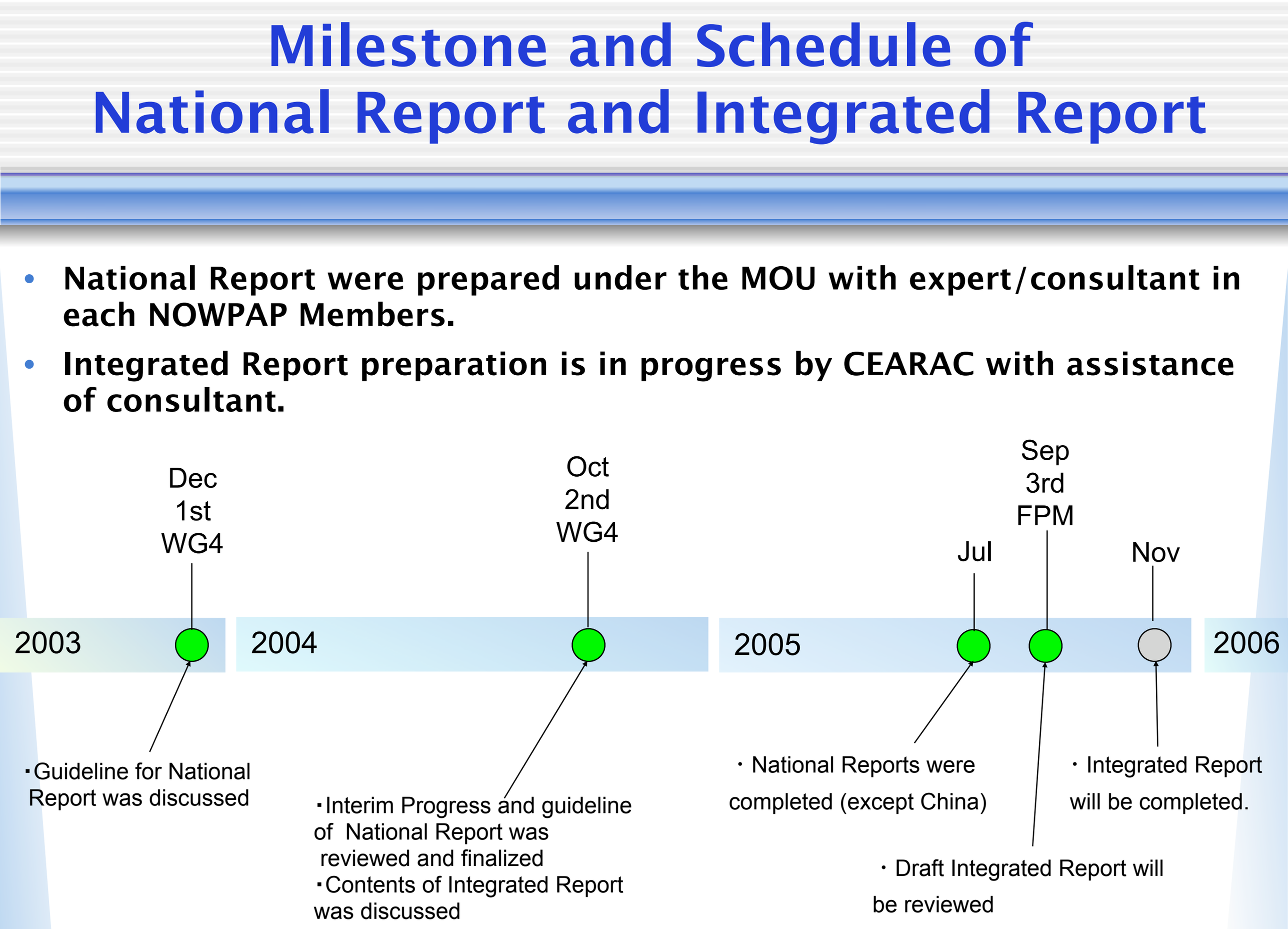
Subsections of ERS-2 SAR images for 20 May 1994 at 14:20 UTC (a) and for 23 March 1999 at 13:27 UTC (b) showing illegal discharge of oil polluted waters by ships.

2.2 Integrated report

- *1 Introduction*
- **2 Status of remote sensing utilization in marine environmental monitoring**
- **3 Case example of remote sensing application in marine environmental monitoring**
- **4 Status of research and development on remote sensing technology of the marine environment**
- **5 Introduction of the latest findings**
- **6 Strategies/plans for remote sensing related activities**
- **7 Challenges and prospects**
- **8 Suggested activities for the NOWPAP Region**
- *9 Summary and recommendation*

Milestone and Schedule of National Report and Integrated Report

- **National Report were prepared under the MOU with expert/consultant in each NOWPAP Members.**
- **Integrated Report preparation is in progress by CEARAC with assistance of consultant.**



2.3.1 Establishment of Ocean Remote Sensing Portal Site

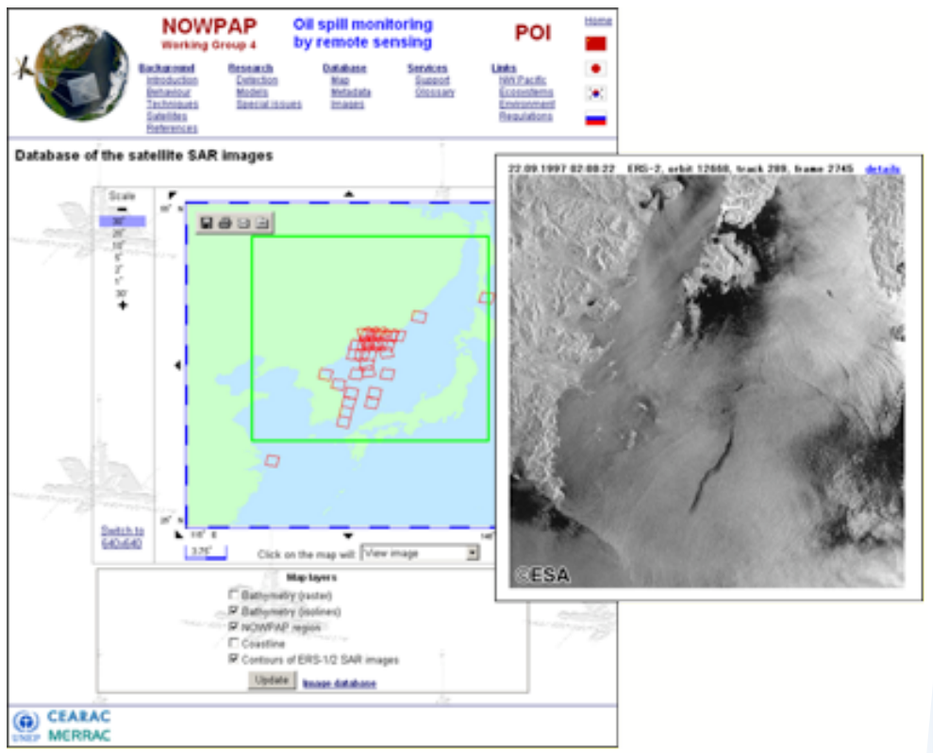
- Started its operation in April 2005.
- Provides links to websites that have data and information on marine environment monitoring by remote sensing.
- Concepts

  Effectively share data and information on marine environment monitoring by remote sensing, such as latest research development, case studies on application, future trends and so on.

Ocean remote sensing portal site
http://www.cearac-project.org/wg4/portalsite/

2.3.2 Establishment of website on oil spill monitoring

- Developed under the MOU between CEARAC and POI FEB Russia
- Started its operation in March 2005
- Provides information on oil spill monitoring by remote sensing techniques
- Contents
  - Behavior oil in the Sea
  - Physical background and the features of remote sensing
  - Examples of oil spill detection by SAR in the NOWPAP Region
  - Algorithm of oil spill detection on SAR images
  - Links to model used for simulation of oil spill process
  - POI database of satellite SAR images



Oil Spill Monitoring by Remote Sensing
http://cearac.poi.dvo.ru/en/main/about/

2.5.1 International workshops on remote sensing of the marine environment in the NOWPAP Region

- NPEC has been organizing international workshops on remote sensing of the marine environment since 1999.
- Its third workshop was held in Beijing in Oct 2004.
- Experts from NOWPAP Members exchanged information on remote sensing application, examples of marine environmental monitoring, research and development trends and so on.

- Summary of the workshop -

Status of each county was reported

Future missions were reported

Co-developing algorithm was suggested

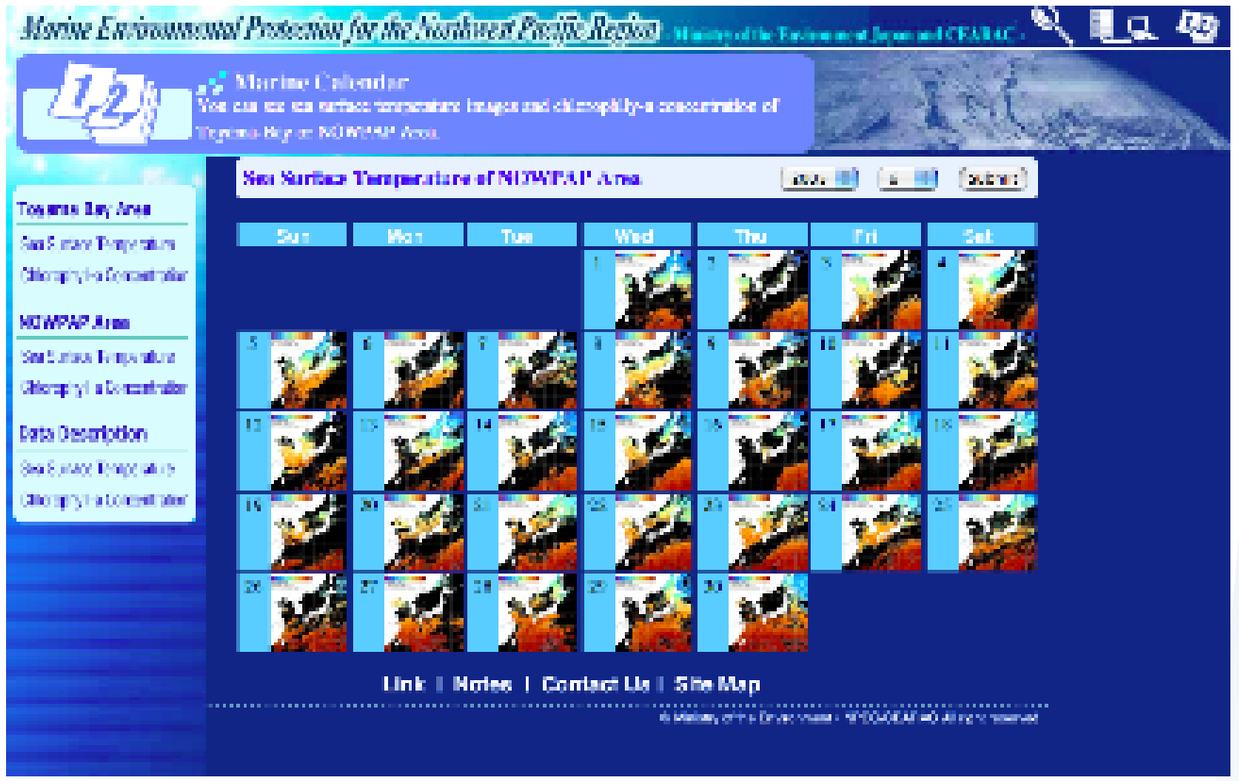
Topics on application were shared

Continuity of the workshop was supported

2.5.2 Website upgrade of Marine Environment Watch Project

- To promote NOWPAP, NPEC has been operating the Marine Environmental Watch since 2002, under the contract with the ministry of the environment of Japan.
- The system provides remote sensed data of Sea Surface Temperature and Chlorophyll a concentration.
- The data can be downloaded via the Internet for free of charge with registration.
- The website of the Marine Environment Watch Project was upgraded in March 2005 to promote utilization of satellite remote sensing data.

- New features of the upgraded website
  - Provides data processing and analysis method
  - Provides image of daily SST and chlorophyll a concentration for the NOWPAP region
  - Enables to Save your region of interest



Other related activity
Toyama Bay Project

- NPEC was designated as CEARAC and has been working on development of evaluation method for marine and coastal environment using remote sensing technique .

- A draft guideline of eutrophication in coastal area using satellite data is under development by NPEC.

Draft Work Plan and Budget for the NOWPAP Working Group 4 (Remote Sensing)

CEARAC

September 15, 2005

1. Objective and background

- Preparation of Integrated Report is now in progress based on the contents of National Reports in CEARAC.

- Adding one page of summary and recommendation to Integrate Report was agreed among WG4 members and the CEARAC secretariat, which includes the recommendation of activity for WG4.

- The followings are the details of the work plan suggested in Integrated Report.

2.1 Refinement of guideline being prepared by NPEC

- Background
  - A draft guideline of eutrophication in coastal area using satellite data is under development by NPEC.
  - However, it is difficult to utilize as it is because of difference of surroundings in each country.
  - It is necessary to have experts from the NOWPAP Region to review and refine this guideline, in order to fits in the situation in each region.

2.1 Schedule for refinement of guideline being prepared by NPEC

- Breakdown of work plan
  - WG4 to
    - Review and refine the guideline prepared by NPEC
    - Localize the guideline for each country including translation
    - Adding case studies to the guideline

The above work may be conducted under MOU with CEARAC

2.1 Schedule for refinement of guideline being prepared by NPEC

- Breakdown of Work plan and schedule

Work plan	Schedule	
- Reviewing of the draft guideline - Localizing guideline including translation to Chinese, Korean and Russian - Adding case study of each country - Distribution of the guideline	Aug 2005	Submission of the draft outline of guideline of NPEC to WG4 members
	Sep 2005 3rd FPM	Reporting the draft outline of guideline of NPEC to the 3rd FPM
	March 2006 4th FPM	Completion of the guideline of NPEC
	Summer 2006 3rd WG4	Discussion on preparing the guideline of WG4
	Dec 2006	Publication of the guideline

Annex 10-1

A draft outline of guideline for monitoring of eutrophication in coastal area using satellite data

Table of Contents (1/2)

Table of Contents (2/2)

I Purpose and Background of the project

- NPEC was designated as CEARAC and has been working on development of evaluation method for marine and coastal environment using remote sensing technique (Toyama Bay Project).

- Sharing the result and lessens learned in this project may be useful for NOWPAP Members.

- However refinement and localization is necessary for each region.

II. Eutrophication and satellite remote sensing

1. Introduction

- Eutrophication and their indicators
- Advantage of satellite remote sensing
- Disadvantage of satellite remote sensing
- Usefulness of satellite remote sensing for eutrophication monitoring

II. Eutrophication and satellite remote sensing

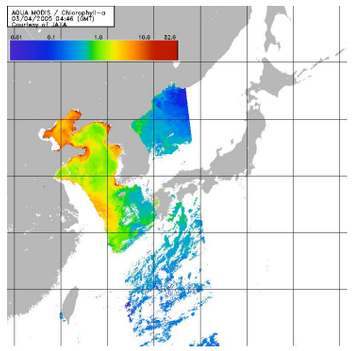
2. Satellite Data

- 1) Monitoring variable

Chlrophyll -a concentration (Chl-a)

Total amount of phytoplankton

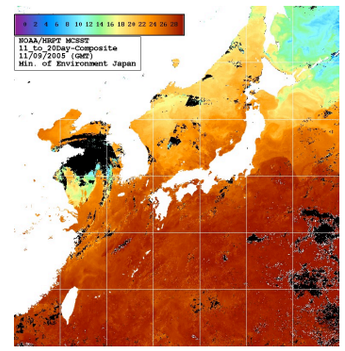
Good indicator of eutrophication



Sea Surface Temperature (SST)

Understand the seasonal change of climate

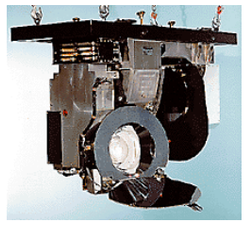
Help understnad the process of eutrophication



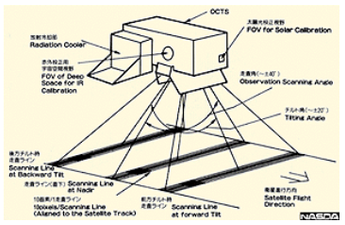
- 2) Sensors

Chl-a

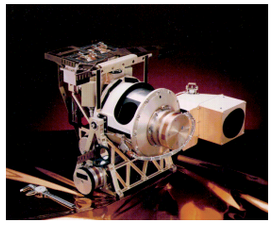
NIMBUS/CZCS



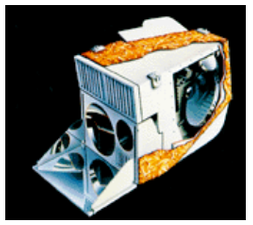
ADEOS/OCTS



Orbview2/SeaWiFS



TERRA-AQUA /MODIS

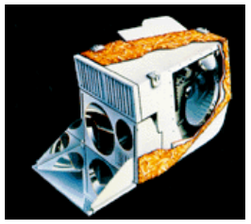


ADEOS-II/GLI

SST

NOAA/AVHRR

TERRA-AQUA /MODIS

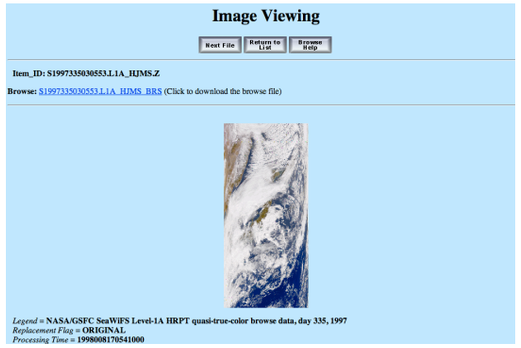


Historical background
Time series of data
Compatibility issues

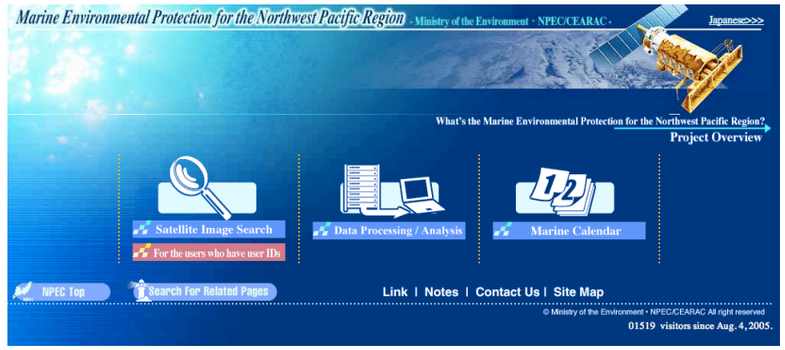
II. Eutrophication and satellite remote sensing

2. Satellite Data

- 3) Obtaining data
  - Where and how to obtain remote sensing data
    - Desription of data set
    - User registartion

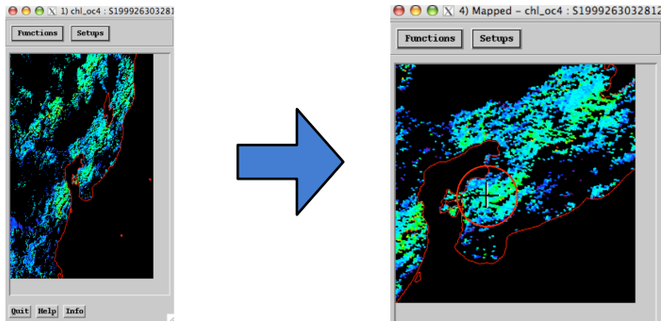


NASA DAAC



The Marine Envrionmental Watch

- 4) Data processing method
  - Setting up of data processing system
    - Hardware and software environment
    - Data processing software
  - Extraction of physical variable
    - Atmospheric correction
    - Geometric correction



II. Eutrophication and satellite remote sensing

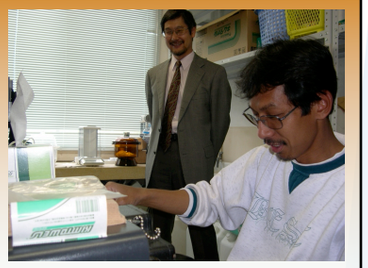
3. In Situ Data

- 1) Monitoring item and measuring method
  - Monitoring items and purpose
    - Chl-a concentration
    - Suspended Solid (SS) and Colored Dissolved Organic Matter (CDOM)
    - Water-Leaving Radiance
    - COD and Nutrient
    - Sea Surface Temperature (SST) and Salinity
    - Transparency
    - Other items
  - Measurement method and notandum

Water sampling for COD and Chl-a concentration

Measurement of reflectance by PRR to estimate Water-Leaving Radiance

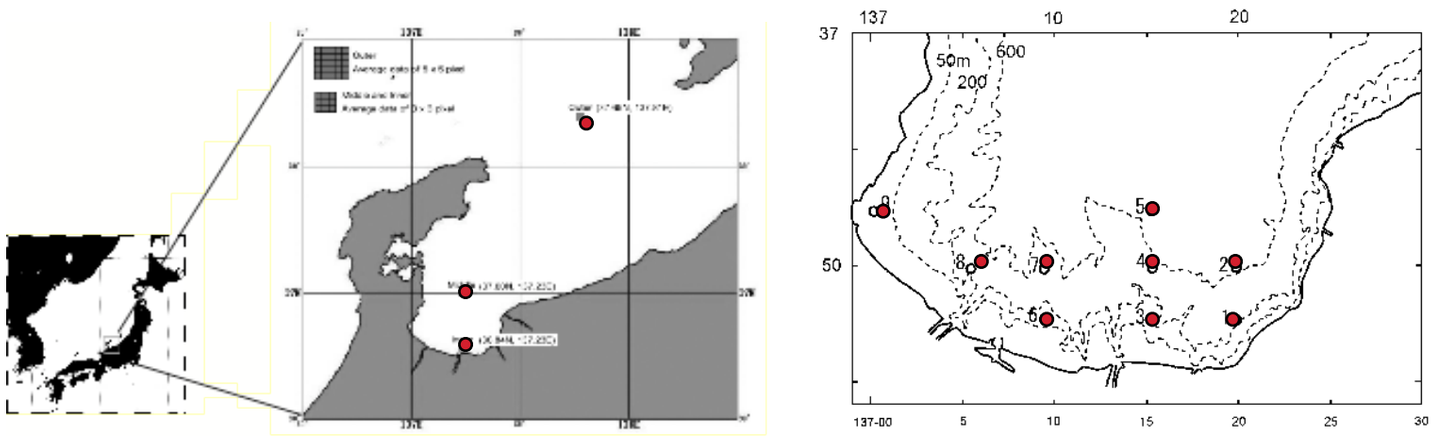
In situ Chl-a analysis in Lab



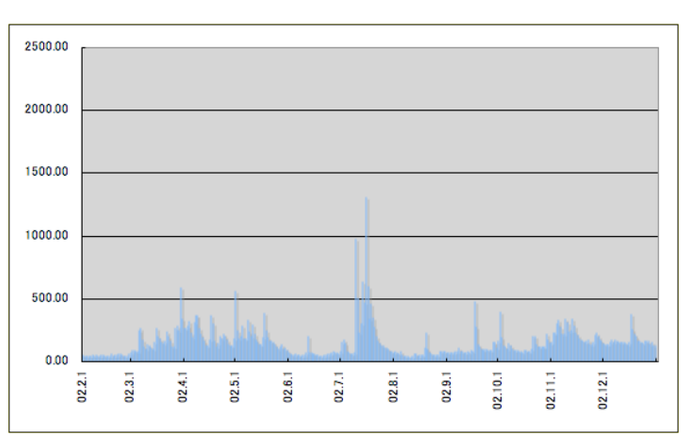
II. Eutrophication and satellite remote sensing

3. In Situ Data

- 2) Determining Sampling Point
  - Locating sampling points
  - Obtaining wide range of in situ data
  - Importance of setting up fixed sampling points and exceptional case
  - Consideration of surroundings such as river discharge



Locating sampling points



River discharge

II. Eutrophication and satellite remote sensing

3. In Situ Data

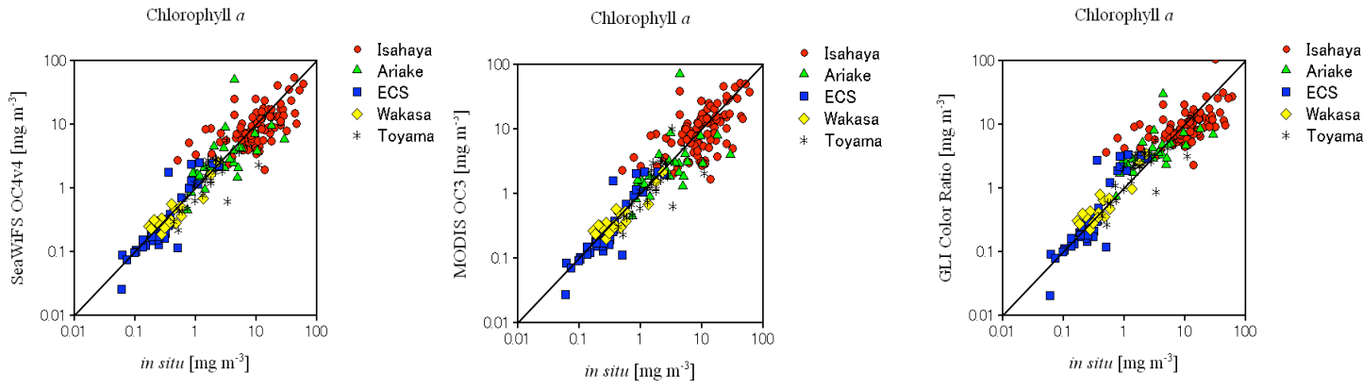
- 3) Monitoring frequency and timing
  - Conditions determining monitoring frequency and time and exceptional case
    - Better condition for match up
    - Recommended frequency of monitoring.

- 4) Requisites for monitoring and analysis
  - Vessel with higher speed
  - GPS and navigation system
  - Measurement tools for monitoring items

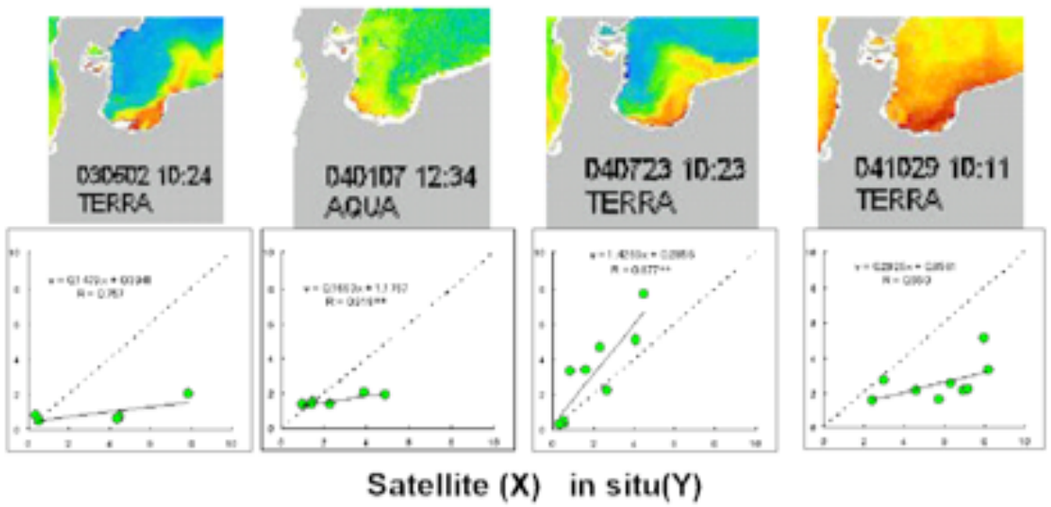
II. Eutrophication and satellite remote sensing

4. Overall evaluation

- 1) Accuracy evaluation
  - Evaluation of in-water algorithm with analysis of profiling reflectance.



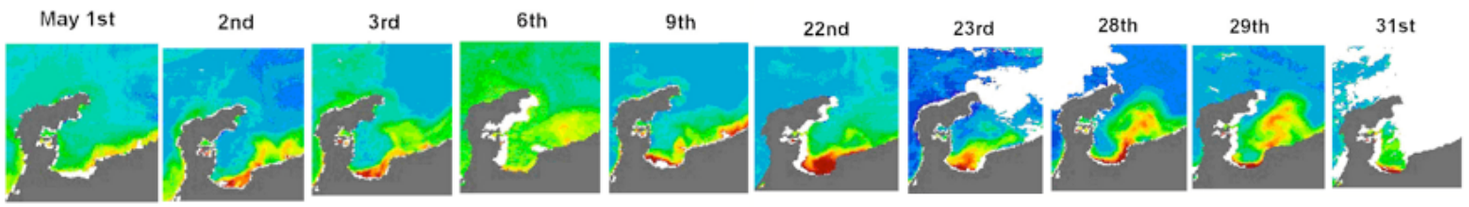
- Analysis of correlation between in situ and satellite Chl-a concentration



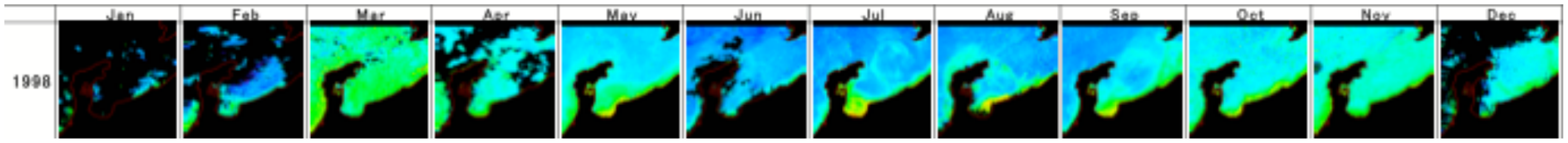
II. Eutrophication and satellite remote sensing

4. Overall evaluation

- 2) Integration with the existing monitoring system
  - Understanding spatio-temporal variation of eutrophication by ocean color satellite



Daily transition pattern



Seasonal change

  - Evaluation of eutrophication
    - Obtaining sea truth data for analysis with COD and nutrient
  - Comparison with existing data
    - Comparison with past data such as water quality and so on.

Appendix 1

A case study in Toyama Bay
(Toaya Bay Project)

Toyama Bay project
1. Objective and Background

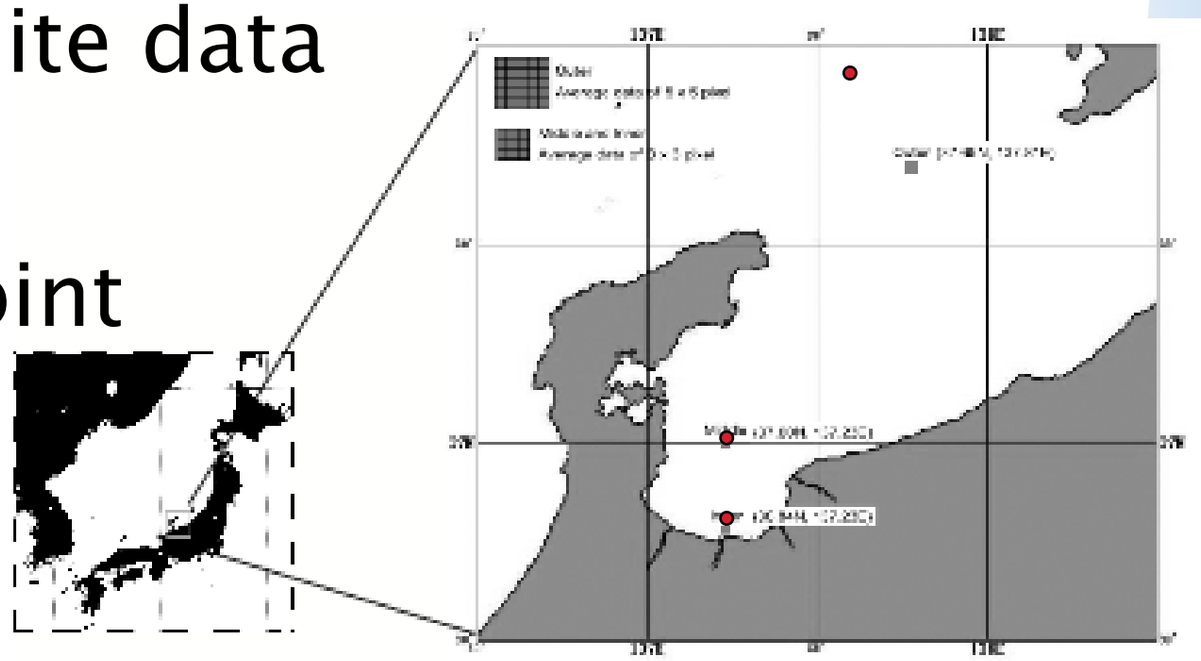
- A draft guideline of eutrophication in coastal area using satellite data is under development by NPEC.

- In the processing of making this guideline, a case study was conducted to evaluate the effectiveness of remote sensing techniques as a monitoring tool for marine and coastal environment.

- The followings are the results and findings to the present.

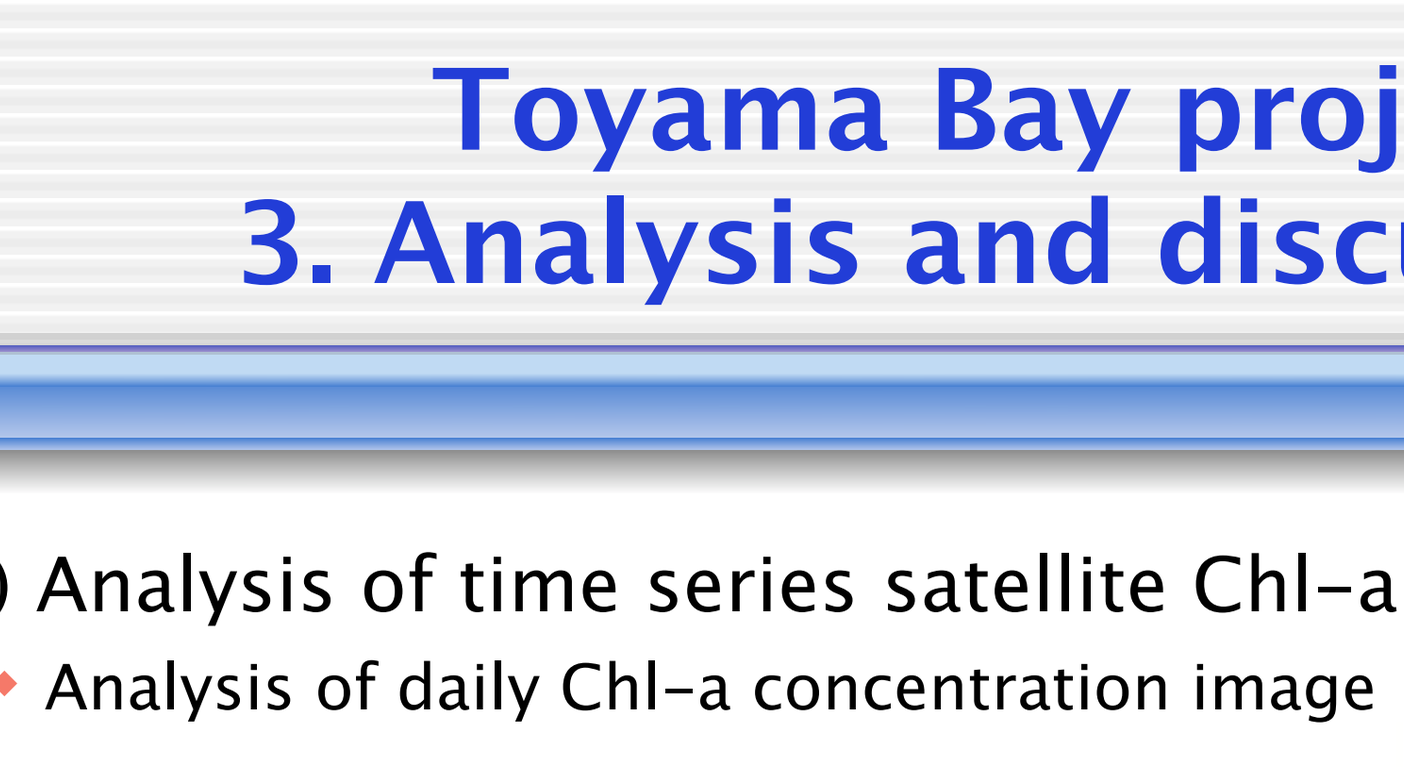
Toyama Bay project
2. Obtaining ocean color satellite data

- Monitoring in situ survey of Toyama Bay
  - Observed variable with vessel
    - pH, Temperature, salinity, water color, transparency, reflectance
  - Analyzed variable in lab
    - Dissolved Oxygen, Chl-a, Suspended solidm, CDOM, COD, Phosphate, Nitrogen and Silicate.
- Obtaining ocean color satellite data
  - Location of study area
  - Determining sampling point



Toyama Bay project
3. Analysis and discussion

- 1) Analysis of time series satellite Chl-a concentration
  - Analysis of daily Chl-a concentration image



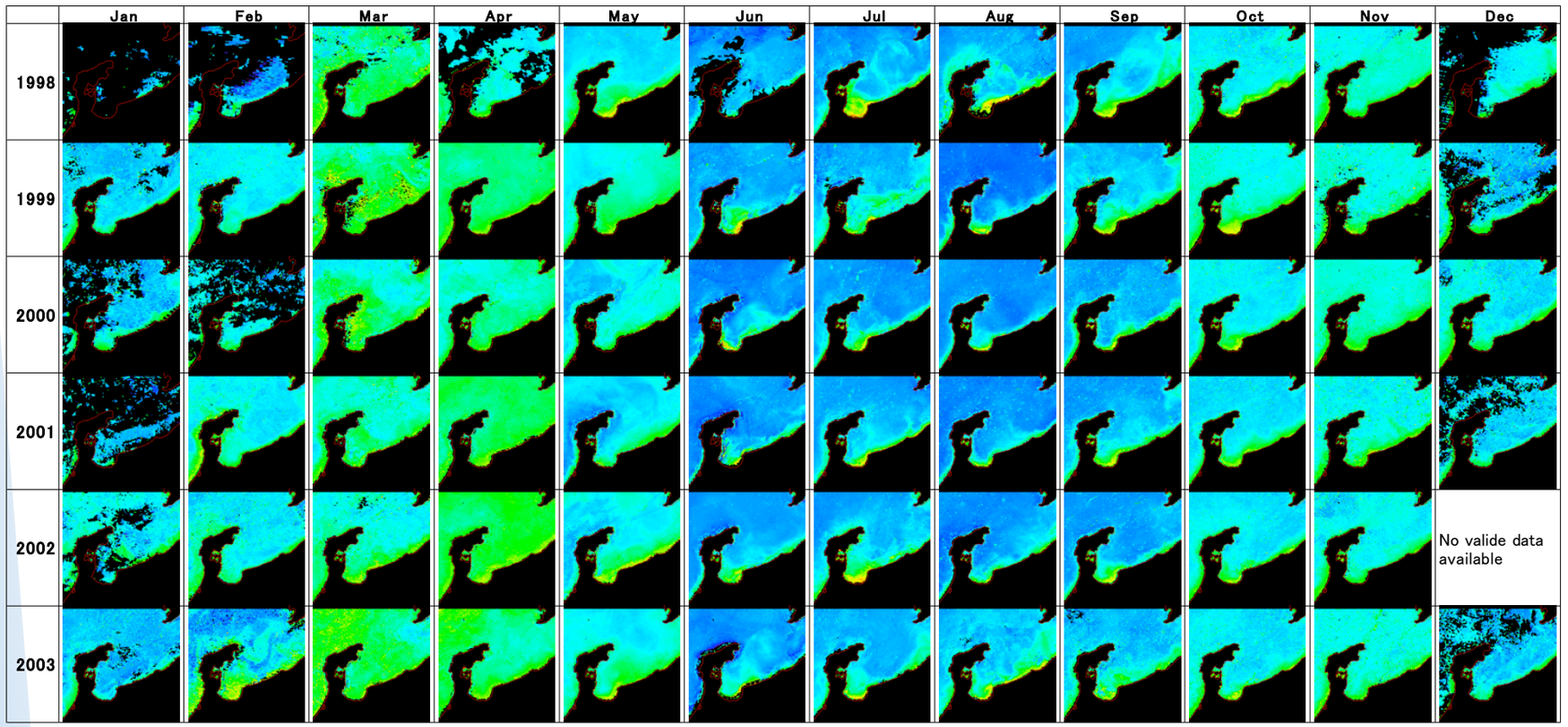
Chl-a concentrations pattern of May 2003 observed by MODIS in Toyama Bay

Anti-clockwise flowage pattern was detected

Few rain fall and river flow was observed in this period, it was suggested that high Chl-a concentration pattern moved with anti-clockwise flowage pattern

Toyama Bay project
3. Analysis and discussion

- 1) Analysis of time series satellite Chl-a concentration
  - Analysis of monthly Chl-a concentration image



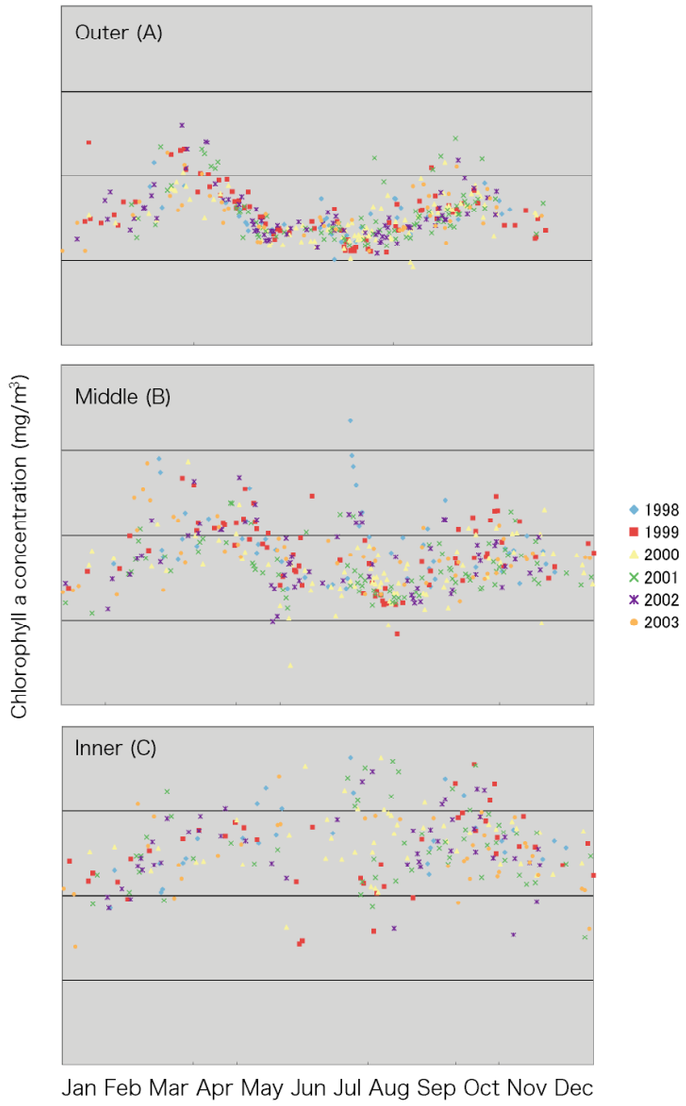
Two peaks of Chl-a concentration one in early spring and the other in fall every year

Chl-a concentration of inner are of the Bay become higher every summer

Monthly average SeaWiFS Chl-a image of Toyama Bay

Toyama Bay project
3. Analysis and discussion

- 1) Analysis of time series satellite Chl-a concentration
  - Seasonal variablity of Chl-a concentration in each sampling point



Chl-a concentration of each sampling point

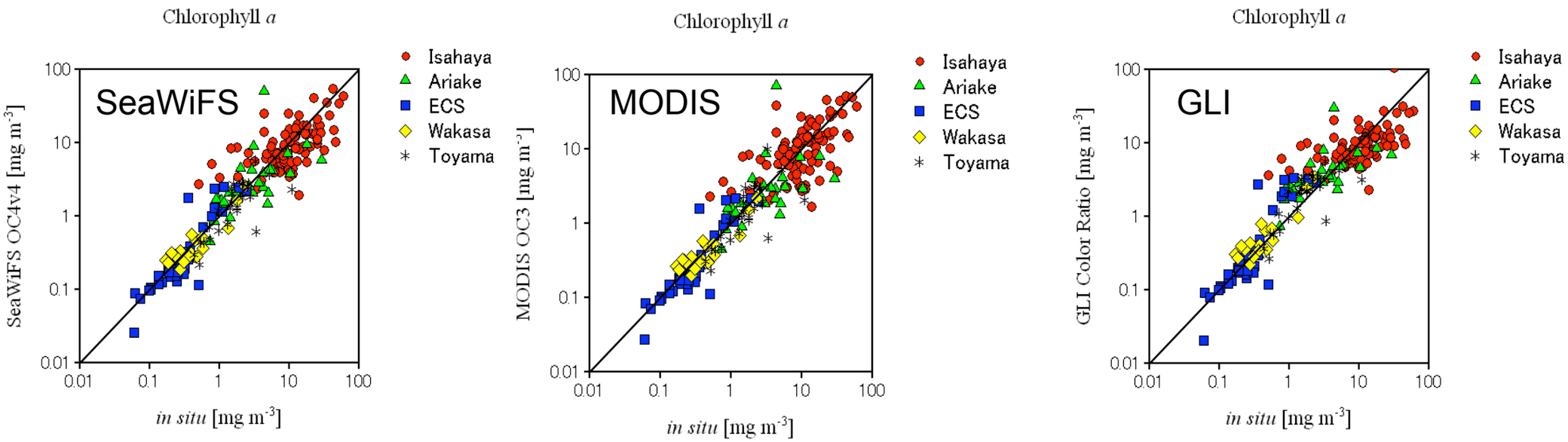
Outer area
Two apparent peaks of Chl-a concentration in spring and fall every year

Middle area
Not as clear as outer area, two peaks of Chl-a concentration exists.
Influence of river discharge is smaller than inner area.

Inner area
Chl-a concentration become higher in summer and fall.
This may be caused by nutrient input from river, and possible eutrophication by human activity is suspected.

Toyama Bay project
3. Analysis and discussion

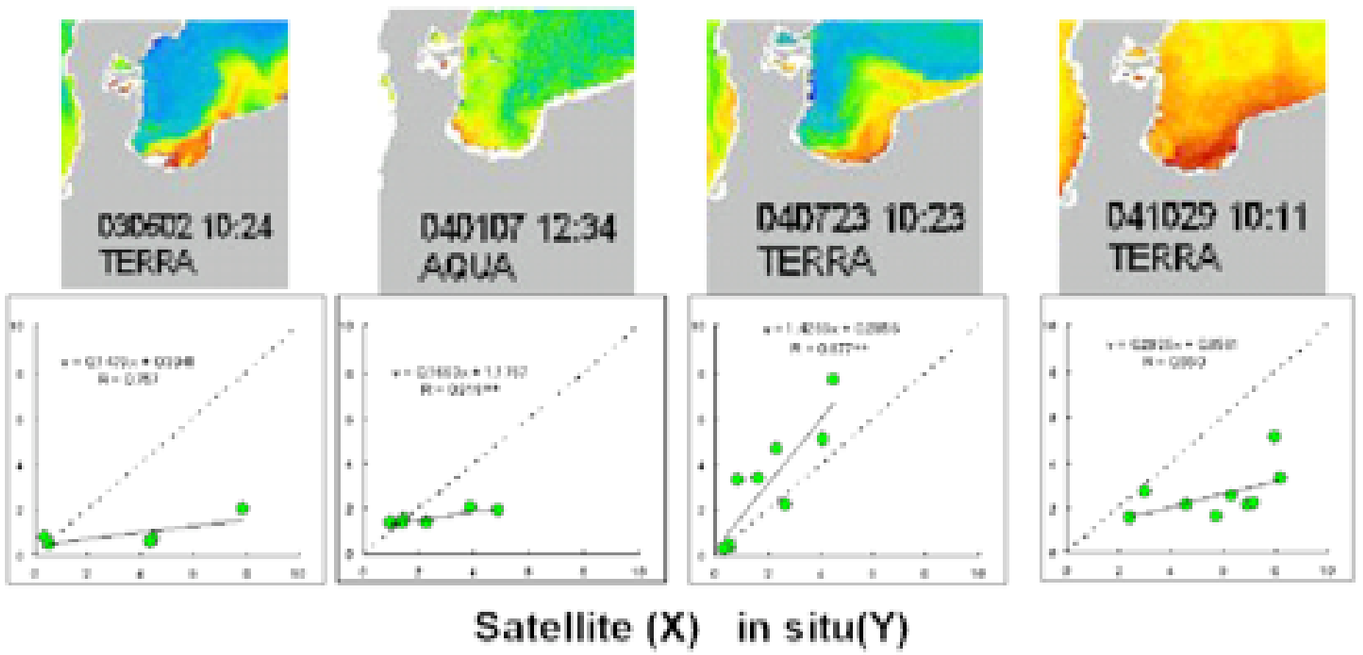
- 2) Validation of satellite Chl-a concentration
  - Validation of in-water algorithms
    - Strong relationship in ratio 1:1 between in situ and one derived form in-water algorithms was found.



Relationship between in situ Chl-a and one derived from three exiting in-water algorithm of SeaWiFS, MODIS and GLI

Toyama Bay project
3. Analysis and discussion

- 2) Validation of satellite Chl-a concentration
  - Correlation of Chl-a concentration between in situ and MODIS



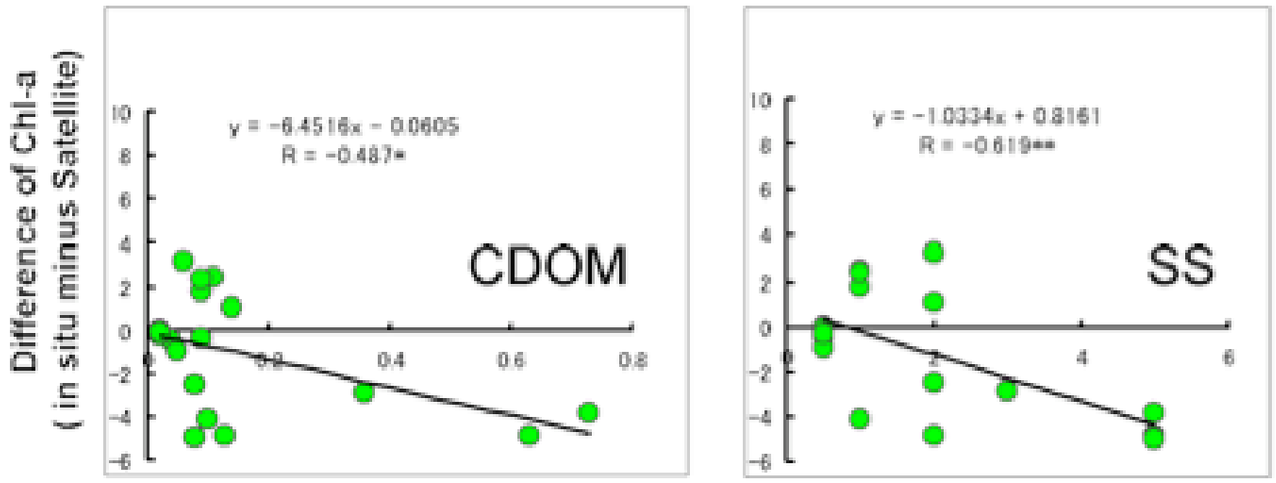
Relationship between satellite and in situ Chl-a

Liner regression was found in all cases.

MODIS Chl-a tended to be overestimated, except one case

Toyama Bay project
3. Analysis and discussion

- 2) Validation of satellite Chl-a concentration
  - Analysis of MODIS Chl-a concentration with SS and CDOM

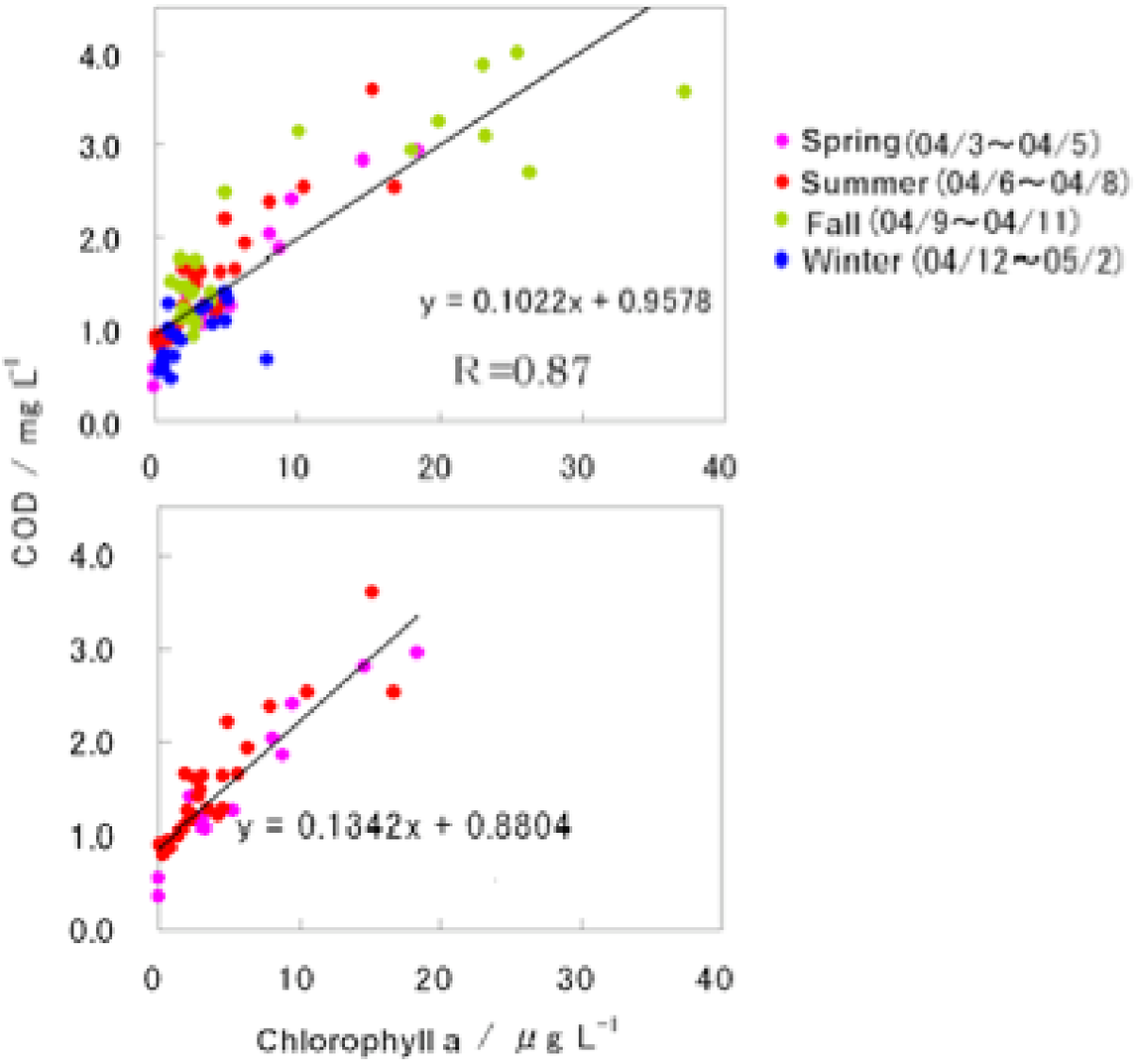


MODIS Chl-a concentration tends to be overestimated when the concentration of SS and CDOM

Analysis of MODIS Chl-a concetration with SS and CDOM

Toyama Bay project
3. Analysis and discussion

- 3) Correlation between in situ Chl-a concentration and COD



Strong positive correlation (R = 0.87, N =86) was found between in situ Chl-a and COD

Less variability was found in spring and summer, when seasonal stabilization of upper water layer is promoted.

Toyama Bay project
4. Overall evaluation of remote sensing as monitoring tool

- 1) Detecting spatio-temporal variation of eutrophication by ocean color satellite
  - Liner regression was found between in situ and satellite.
  - TIme series analysis presented seasonal variation and variation pattern well.
- 2) Evaluation of eutrophication from in situ investigation
  - Strong positive correlation (R =0.87, N = 86) was found between in situ Chl-a concentration and COD and it suggested possibility of monitoring organic pollution by satellite remote sensing.
- 3) Others
  - Monitoring by satellite is more economical than conventional method.
  - Analyzing satellite Chl-a concentration data with other environmental parameters is useful for marine and costal environment monitoring.

2.2 Training of young researchers, students and officers of local governments

- Background
  - National Report of China and Russia and Integrate Report pointed out the needs of remote sensing training.
  - Capacity building of NOWPAP Members are one of the mission of CEARAC.

2.2 Training of young researchers, students and officers of local governments

- Breakdown of work plan
  - WG4 to
    - review the draft proposal for remote sensing training program of CEARAC.
    - Review the implementation plan of the training
    - Cooperate with CEARAC to find trainers of the training

2.2 Work plan and schedule for training of young researchers, students and officer of local governments

- Breakdown of Work plan and schedule

Work plan	Schedule	
- Consideration of training program - MOU with WG4 members - Management of training	Sep 2005 FPM 3rd	Reporting the draft proposal of the training program
	Mar 2006 4th FPM	Finalizing the training program
	Summer 2006 3rd WG4	Reviewing the implementation plan of the training
	Dec 2006	Finalizing the implementation plan and coordination of related agencies
	2007	Implementation of training

Annex 10-2

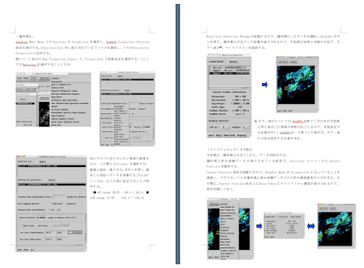
Draft proposal for remote sensing training of young researchers, students and officers of local government

Description of the Training Course(1/2)

- **Duration of training course**
  - 1 week (5 business days)
- **Contents of the training**
  - Lecture and hands on

- **By the end of the course, participants will be able to**
  - Understand how remotely sensed data can be used in marine and coastal environment monitoring
  - Be aware of advantage and disadvantage of remote sensing
  - Use remote sensing data in a geographic information system environment

Description of the Training Course(2/2)



- What CEARAC will provide
  - Trainers
  - Materials and training venue
- Participation Fee and Requirement
  - No registration fee for the course
  - Travel, hotel accommodation and other expenses are in charge of each participant
- Obligation of the participants
  - Participants are obligate to submit a completion report to CEARAC at the end of the course.

Items to be considered

- Venue of the training course
- Possibility of joint organizing of the training with other remote sensing workshops and conference
- How and where to announce the training course to potential participants

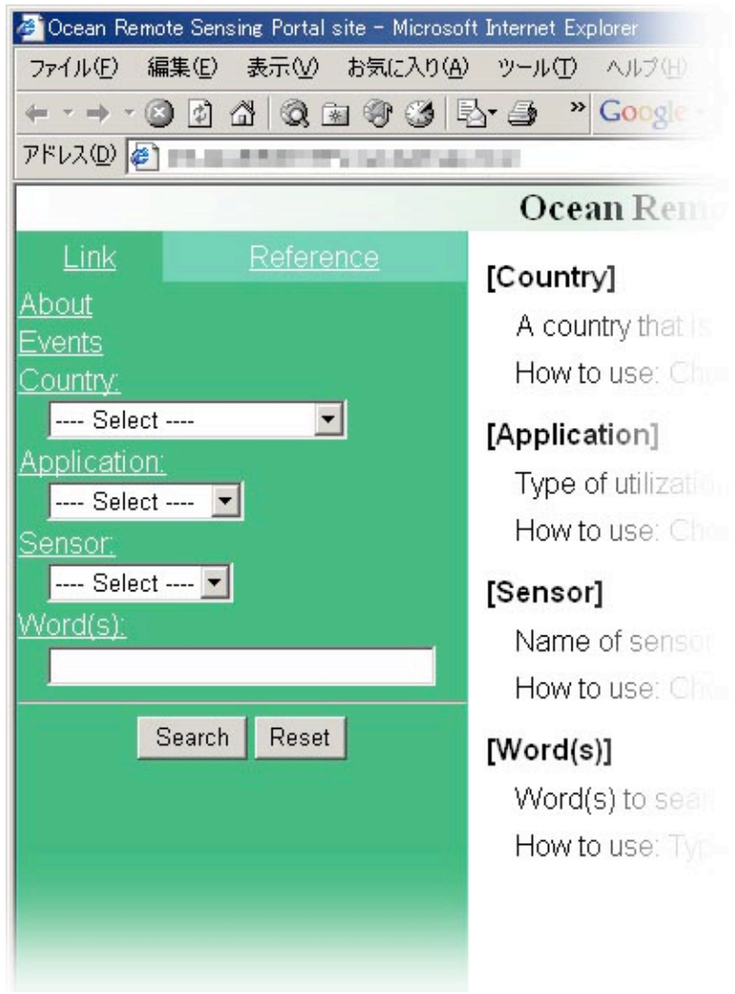
2.3 Further development of ocean RS portal site, website on oil spill monitoring and the Marine Environment Watch

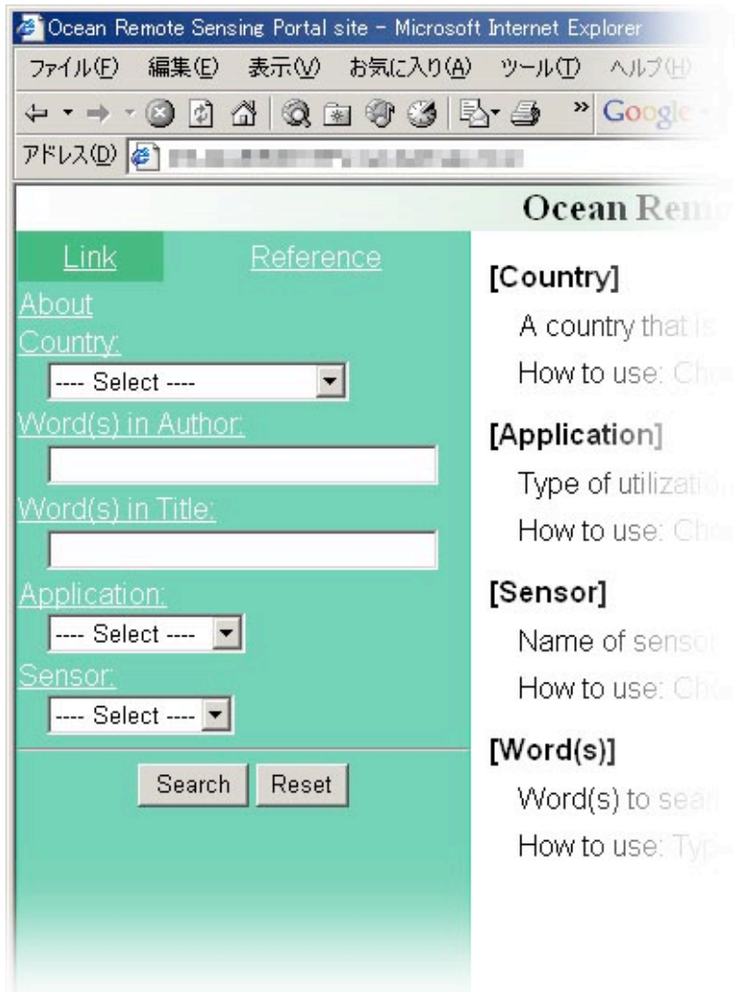
- Background
  - Establishment of publication database
    - Existing RS portal site is still in development phase
    - Keep tracking of new publications is essential to understand the latest trends and findings
  - Establishment of digital library
    - Consistent time series of information and data is essential for environmental monitoring
    - The Marine Watch Project of NPEC can be considered as a base for the digital library.

2.3 Work plan and schedule for development of ocean RS portal site, website on oil spill monitoring and Marine Environment Watch

Work plan	Schedule	
- Collection and categorization of publications - Designing of structure of publication database - Implementation to the existing RS portal site - Test operation - Feasibility study of establishing digital library - Establishment of digital library	Aug 2005	Reporting draft structure of literature search function
	Sep 2005 3rd FPM	
	Mar 2006 4th FPM	Starting of test operation of literature search function
	Summer 2006 WG4 3rd	Discussion on draft implementation plan of digital library
	2007	Implementation of digital library

2.3 User interface of publication search function





Screenshots of publication search function under consideration

2.4 Joint activities with IOC/WESTPAC ocean color project

UNESCO

IOC/WESTPAC

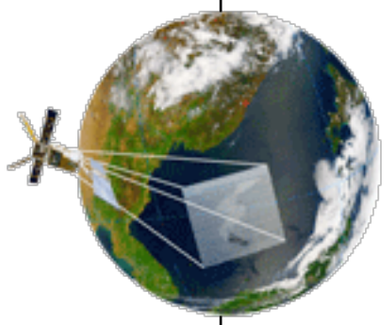
Scientific

Research

CEARAC WG4

Intergovernmental

Utilization



- IOC/WESTPAC and NOWPAP WG4 both work on remote sensing even each perspective and responsibility is different.
- Joint hosting of workshop for ocean remote sensing is possible and meaningful.

2.5 Search of other possible usage of the satellite remote sensing to environmental monitoring in the NOWPAP Region

WG4 has been focused on the issues of

- Eutrophication
- Oil Spill

National Report indicated other issues in the region such as

- Coastal erosion
- Discharge of murky waters
- Land use and land cover

- **NPEC consider possibility of monitoring other phenomena by remote sensing, which might be useful to decide the future activities of WG4.**

3. Budget

Activity	Source of budget	Budget US$
2.1 Refinement of guideline being prepared by NPEC for local governments of each country	CEARAC	15,000
2.2 Training of young researchers, students, and officers of local government	CEARAC	15,000
2.3 Further development of portal site, web site on oil spill monitoring by remote sensing and environment watch system, including publication database and digital library	NPEC	T.B.D.
2.4 Joint activities with IOC/WESTPAC ocean color project	NPEC	T.B.D.
2.5 Search of other possible usage of the satellite remote sensing to environmental monitoring in the NOWPAP region	NPEC	T.B.D.
TOTAL		30,000+ α

T.B.D.: To be determined.

NOWPAP EVOLUTION

new directions for the NOWPAP RACs

UNEP/NOWPAP IS. 1/3

NOWPAP Regional Activity Centers (RACs):

current situation

UNEP/NOWPAP IS. 1/3

The present activities of NOWPAP RACs

(as decided by the 3rd and 4th NOWPAP IGM)

RAC	Present activities
CEARAC Toyama	**Monitoring and Assessment:** **- Harmful Algal Blooms (HAB)** **- Remote Sensing (RS) Applications**
DINRAC Beijing	**Data and Information Management**
MERRAC Daejeon	**Oil Spill Preparedness and Response**
POMRAC Vladivostok	**Monitoring:** **- Atmospheric Deposition (AD) of Contaminants** **- River and Direct Inputs (RDI) of Contaminants**

The following suggestions were prepared based on consultations with RAC directors

UNEP/NOWPAP IS. 1/3

CEARAC

2004-2005:

- WG3 on Harmful Algal Blooms (HAB)
- WG4 on Remote Sensing (RS) of the Marine Environment
- National Reports on HAB and RS
- Integrated Reports on HAB and RS

2006-2007:

- Working Groups on HAB and RS (continued)
- Land Based Sources of Pollution (with POMRAC)
- Marine Litter (with MERRAC) - might be linked with general waste management practices on land and with 3R (reduce, reuse, recycle) initiative

CEARAC contributions towards implementation of global chemicals conventions (Basel, POPs, PIC) are not envisioned at this stage (though suggested previously)

DINRAC

2004-2005:

- DINRAC website and databases of experts and institutions
- NOWPAP policy on data and information sharing
- National reports on data and information management
- Guidelines for NOWPAP meta-database establishment
- Study on GIS-type products and applications in NOWPAP region

2006-2007:

- NOWPAP Clearing-House - storage and easy retrieval of data resulting from all NOWPAP activities (oil spills, HAB, atmospheric and river inputs of contaminants, biodiversity data, legal issues, etc.)
- A “switchboard” to provide links to resources available in NOWPAP member countries

DINRAC contributions towards implementation of global biodiversity conventions (CBD, CITES, CMS, Ramsar, etc.) and work on marine invasive species are not envisioned at this stage (though suggested previously)

MERRAC

2004-2005:

- Oil Spill Preparedness and Response
- NOWPAP Regional Oil Spill Contingency Plan (RCP) and MOU
- Specific projects on oil spill modeling; sensitivity mapping; dispersant application; shore clean-up
- Training exercises

2006-2007:

- Oil and Chemical Emergency Preparedness and Response (within a framework of NOWPAP RCP, including specific projects and training exercises)
- Marine-Based Pollution (MARPOL and OPRC, with IMO)
- Marine Litter (with CEARAC)

At a later stage:

- Ballast Waters and Alien Invasive Species (with GloBallast II)
- IMO conventions
- Liability and Compensation

POMRAC

2004-2005:

- WG1 on Atmospheric Deposition (AD) of Contaminants
- WG2 on River and Direct Inputs (RDI) of Contaminants
- National Reports on AD and RDI

2006-2007:

- Regional Overviews on AD and RDI
- State of Marine Environment Report (with other RACs)
- Land Based Sources of Pollution (with CEARAC)
- Integrated Coastal and River Basin Management

POMRAC contributions towards cooperation with global atmospheric conventions (Montreal; Kyoto Protocol) are not envisioned at this stage (though suggested previously)

NOWPAP Intersessional Workshop agreed tentatively with the suggested directions of work of NOWPAP RACs for 2006-2007

(pending further approval by the 10th IGM)

UNEP

Regional Seas

Sustainable Management of Marine Litter in the NOWPAP region

HOT NEWS!

NOWPAP (Northwest Pacific Action Plan)

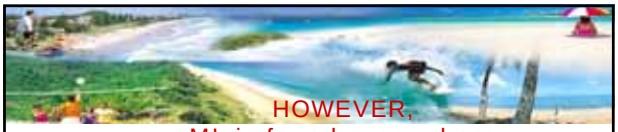
- decided in 2004 to develop joint initiatives to prevent and reduce marine litter in the marine environment and its harmful and costly effects
- marine litter activity is presently in the middle of preparation aiming at its initiation in 2006

Definition of Marine Litter (Debris)

Any persistent, manufactured or processed solid material disposed of or abandoned in the marine environment

Global Distribution of Marine Litter

Marine litter may be found near the source of input but could also be transported over long distances with ocean currents and winds



HOWEVER,
ML is found everywhere

- lying on beaches and shores
- floating on the water surface

- mixed in the water column and even on the seabed

Threat to wildlife

- entanglement
- accumulation and dispersion of toxic substances
- environmental changes due to invasive species
- disturbance from mechanical beach cleaning

Damages to people, property and livelihood

- fishing boats and gear
- safety risks for people at sea
- damage to cooling water intakes
- contamination of beaches and harbours
- health hazards to people
- injuries to grazing cattle

ML is an environmental, economic, health and aesthetic problem!

including

- possible distribution of toxic substances
- destruction of habitats
- transfer of invasive species

ocean currents can also carry wastes to remote corners of the world

The main sea-based sources of Marine Litter

- merchant shipping, ferries and cruise liners
- fishing vessels
- military fleets and research vessels
- pleasure craft
- offshore oil and gas platforms
- aquaculture installations

The main land-based sources of Marine Litter

- municipal landfills (waster dumps) located on the coast
- riverine transport of waste from landfills or other sources along rivers and other inland waterways
- discharge of untreated municipal sewage, including storm water and occasional overflows
- industrial facilities: solid waste from landfills and untreated waste water
- tourism (recreational visitors to the coast; beach-goers)

Conventions and Agreements on ML

- UN Convention on the Law of the Sea
- Agenda 21 and Johannesburg Plan of Implementation
- London Convention 1972 and the 1996 Protocol
- MARPOL Convention 73/78 Annex V
- Basel Convention
- GPA for the Protection of the Marine Environment from Land-based Activities
- Convention on Migratory Species
- CBD, with the Jakarta Mandate
- FAO Code of Conduct for Responsible Fisheries

Major reasons that Marine Litter problem appears to increase worldwide

1. deficiencies in the implementation and enforcement of existing international and regional environmental related agreements, as well as national regulations and standards
2. littering practice from the shipping sector
3. lack of land-based infrastructure to receive litter
4. lack of awareness among main stakeholders and the general public

NOWPAP efforts to reduce or prevent marine litter will benefit all those using the Northwest Pacific and its beaches

Thank you!

NOWPAP/CEARAC Activities and Budget for 2006-2007 (draft)

NOWPAP/CEARAC

Outline of CEARAC Activities for 2006-2007

- **Organization of CEARAC 4th & 5th FPM and 3rd joint WG3/WG4 Meeting**
- **Publication of CEARAC Newsletter**
- **Intersessional work; HAB, RS**
- **Cooperation and Coordination**

Draft CEARAC Budget for 2006-2007(1/2)

In US$

Activity	Date & Venue	Budget
Organization of CEARAC 4th FPM	Mar. 2006, Toyama	23,000
Publication of CEARAC Newsletter	Summer 2006	2,000
Organization of 3rd joint Meeting of WG3/WG4	Summer 2006	30,000
Intersessional Work	Throughout 2006	3,000
Organization of CEARAC 5th FPM	Sep. 2007, Toyama	23,000
Publication of CEARAC Newsletter	Summer 2007	2,000

Draft CEARAC Budget for 2006-2007 (2/2)

In US$

Activity	Date & Venue	Budget
Specific Projects (tentative) WG3 (HAB) -Booklet of Case Studies of Mitigation of Red Tides WG4 (RS) -Guideline -Training Others	Throughout 2006-2007	56,000
Intersessional Work	Throughout 2007	3,000
Cooperation and Coordination of CEARAC Activities	Throughout 2006-2007	8,000
TOTAL		150,000

Relating Activity

- International Workshop on Marine Environment in the Northwest Pacific Region, Summer 2006, Busan
- International Workshop on Marine Litter in the Northwest Pacific Region
  - 14-15 November 2005, Toyama
  - Autumn 2006, Japan
  - Autumn 2007, Japan

Outline of CEARAC Activities for 2006-2007 (in addition)

- 1st Working Group on Marine Litter
- Intersessional work for ML
  - ML in NOWPAP region
  - ML brochures in NOWPAP
  - Sectoral Guidelines
  - Regional Monitoring Programme
- State of the Marine Report of the NOWPAP Region

CEARAC Budget for 2006-2007 (in addition)

In US$

Activity	Date & Venue	Budget
Organization of 1st Working Group of Marine Litter	Autumn 2006	6,000
ML in the NOWPAP Region	Throughout 2006	12,000
Preparation of brochures of ML in the NOWPAP Region	Summer 2007	10,000
Preparation of sectoral guidelines in the NOWPAP Region	Throughout 2007	10,000
Development of Regional Monitoring Programme	Throughout 2007	10,000
State of the Marine Report in the NOWPAP Region	Throughout 2006	?
Total		48,000+α

NOWPAP CEARAC 3rd Focal Point Meeting
Toyama, Japan 15-16 September 2005

Remote Sensing of oil spills in NOWPAP region

Denis Darkin
On behalf of Dr. Leonid Mitnik

United Nations Environment Programme

POI FEB RAS
RUSSIA

Before we look into NOWPAP region

- Let us see what is happening in other countries suffering from oil pollution problem. And these are EU countries.
- After numerous disasters (e.g. Prestige tanker) European Commission has prepared a proposal for European Parliament:
  - on ship-source pollution and on the introduction of sanctions, including criminal sanctions, for pollution offences http://oceanides.jrc.cec.eu.int/gmes/proposal.pdf
- Significant attention has been drawn to development of operational monitoring

Monitoring in Europe

- European union joins forces
  - Regional projects are merging into international (for example HELCOM – www.helcom.fi or REMPEC – www.rempec.org)
- Big international project are funded by EU
  - DISMAR
  - Oceanides

Monitoring in Europe: DISMAR

- http://www.nersc.no/Projects/dismar/
- Includes 16 partners from 6 countries
- Targeted to development of information system for monitoring oil spills, HAB etc.
- Ongoing research

Monitoring in Europe: Oceanides

- http://oceanides.jrc.cec.eu.int/
- Includes 12 partners from 6 countries
- Impressive historical database on oil spills http://dma.jrc.it/oceanides/oceanides/viewer.htm
- Generate slick distribution maps
- Develop algorithms (interactive, automatic)

POI is involved in collaboration with EU

- 4 Projects with ESA give us free image quota for Enivsat ASAR, ERS -1/2 SAR operational and archive data
- We participate in two projects related to active surface films
  - INTAS project 4987 SIMP (Slicks As Indicators of Marine Processes)
  - DeCOOP, Sixth Framework Programme
- Total precision image number approaches 350. Number of QuickLook images surpassed over 3000.

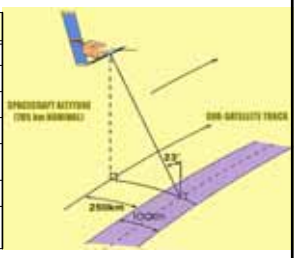
Sensors that we get data from

Primary source of data: ESA ERS-1/2 and Envisat

- Operate under all conditions, irrespective of the cloud cover and sun illumination
- Oil slicks dampen the small-scale roughness of the ocean surface

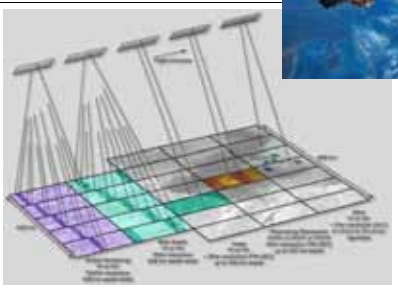
Characteristics of ESA spaceborne SAR sensors

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



European Remote Sensing Satellites:
ERS-1 **was launched on 17 July 1991,**
ERS-2 **- on 21 April 1995 and**
Envisat **- on 1 March 2002.**

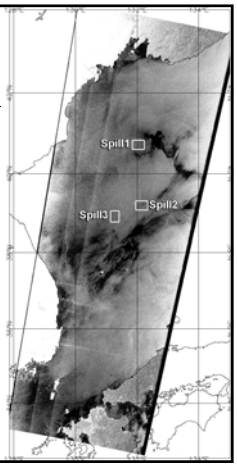
Enivsat ASAR



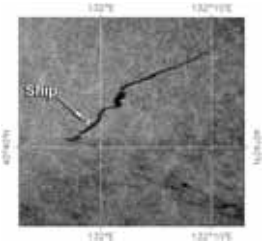
Has very attractive monitoring capability: Wide Swath Mode, with swath width = 405 KM

Envisat WS mode

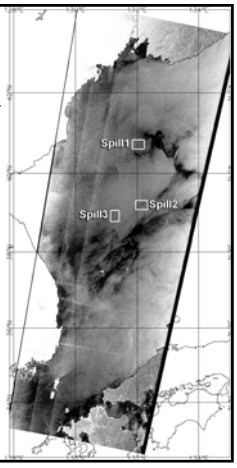
- 11 April 2004 01:21 UTC
- NOWPAP region with coastal zones of 3 countries included
- 3 spills are identified
- Area of the pollution can be calculated
- Given the film thickness 0.2 μm, we can compute the volume of discharge



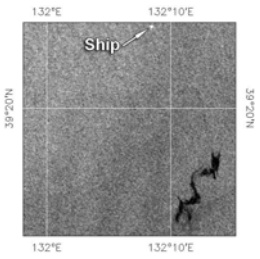
Oil spill analysis



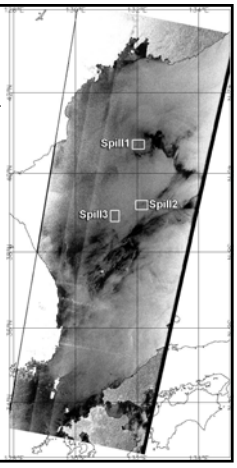
The area is 14.5 km², discharge is 2.9 m³



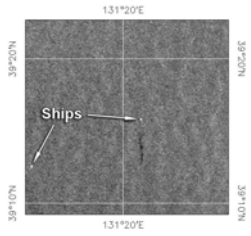
Oil spill analysis

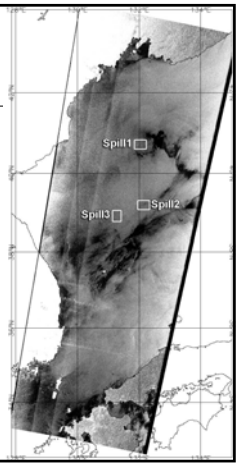


The area is 15 km², discharge is 3 m³



Oil spill analysis



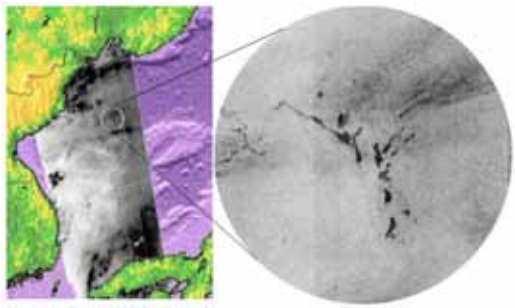


The area is 3.5 km², discharge is 0.7 m³

Sensor characteristic considerations for Monitoring

- **Spatial Coverage**
- 100 x 100 km for ERS 2
- 300 x 300 km for Radarsat
- 405 x 405 km for Envisat
- **Temporal Coverage**
- ERS-2 every 10-15 days on average (not good) or if one gets lucky then 10-14 hours/ 3-4 days (Asc./Desc. pass)
- Radarsat and Envisat 2-3 days (good)

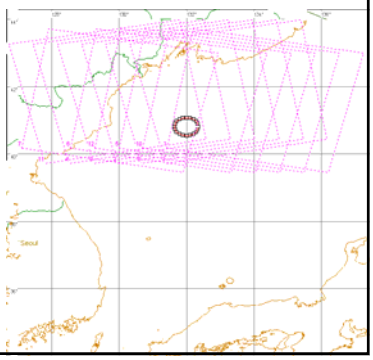
Envisat Wide Swath on April 7, 2003



- The oil spill is 110 km² and the circular area of selection is with radius of 40 km

IF we wanted to monitor that circle shaped area from previous slide

Approximately similar circular area with radius about 40 km could be fully covered on August 2004 by 12 ASAR Wide Swath frames and additionally partly covered by 4 frames



POI: What is in place

- Data archive
- Capable research team
- Experienced operators
- Experimental algorithms for extraction of oil slicks
- Internet-intranet GIS
- CEARAC Oil Pollution website
  http://cearac.poi.dvo.ru/

POI: Plans

- Dissemination of results
- Education
- Capacity building

Means

CEARAC WEBSITE

PORSEC 2006 Training ship cruise

CEARAC WEB SITE statistics
http://cearac.poi.dvo.ru/stat/index.html

- In Oct 2004 – Sept 2005 over 4000 visits
- Lots of referrals from search systems (e.g. Google, Yahoo)
- **Underlines the need for education portal**
- **Emphasizes high quality of education material present**

CEARAC WEB SITE statistics
http://cearac.poi.dvo.ru/stat/index.html

Most viewed pages

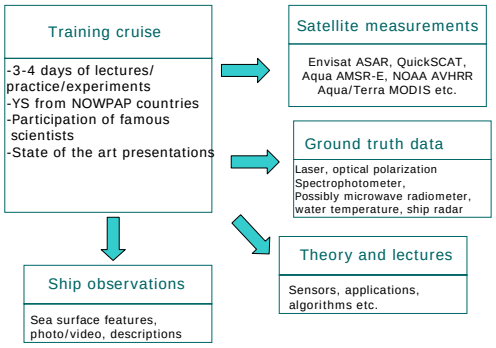
- **Remote sensing techniques of oil pollution detection** http://cearac.poi.dvo.ru/en/background/techniques/
- **Image database** http://cearac.poi.dvo.ru/en/db/

People need more education in Remote Sensing and more analyzed and annotated images to look at.

PORSEC 2006 Training ship cruise

- Can happen in Busan during and after PORSEC 2006.
- Will be on board of Russian research vessel "Academician Lavrent'ev"
- The capacity is 28/30 scientists (young scientists and lecturing professors)
- Preliminary discussed with
  - Academician Victor Akulichev, POI Director
  - Vyacheslav Lobanov, POI Deputy-Director
  - Kristina Katsaros, President of PORSEC.

Training cruise activities



Training cruise details

- All participants (apart from Russians) will arrive in Busan before PORSEC and will leave Busan after sea expedition.
- Young scientists and students (from China, Japan, Korea and Russia) and their teachers will participate in PORSEC to present papers/posters.
- Participants of the cruise can live on the ship during PORSEC 2006.
- Continuous measurements of water temperature as well as several hydrological stations can be performed together with Korean scientists.
- POI plans to order Envisat ASAR images covering the cruise area.

Training cruise possible timetable

- 4 November - cruise start in Vladivostok.
- 6 November - arrival in Busan.
- 7-10 November - Busan, participation in PORSEC 2006.
- 10 November leave Busan to start the measurements in the Korean? waters (We need permission. It will be more
- difficult to arrange the measurements in the Japanese or Russian waters).
- 11-13 (or 11-14) November - lectures, measurements, explanations, seminars and discussions.
- 14 or 15 November - Busan.
- 16 or 17 November - Vladivostok.

Training cruise current issues

- The main roadblock is money. Ship operation costs 6500-7000 $/day. Hopefully POI can provide 10000-12000$.
- Need to cooperate with other NOWPAP partners;
- Need support from NOWPAP (not financial, but countenance)
- Maybe docking fare for the ship in Busan can be arranged by Korean side!?
- Would be great to acquire hydrological data;
- Need to get permissions from ESA to disseminate SAR data between participants;
- Need to get permission from JAXA to disseminate Aqua AMSR-E data between participants;
- Any suggestions/ideas are welcome

Conclusion

- Increase in collaboration between NOWPAP countries is needed;
- More work should be done on the CEARAC oil pollution web site;
- Additional annotated images should be prepared for the web site. More financing is needed to arrange the work;
- Financial and other support from NOWPAP partners is very needed for the PORSEC 2006 training cruise to happen;

Possible collaboration of WG3 & WG4

- Toyama Bay project:
  - Based on the existing measurement efforts related to in situ and satellite chlorophyll concentration and SST monitoring in the Bay
  - would be beneficial to add multisensor capabilities.
  - SAR data from EU and future Japanese satellites can be used to support the monitoring in cloudy days.

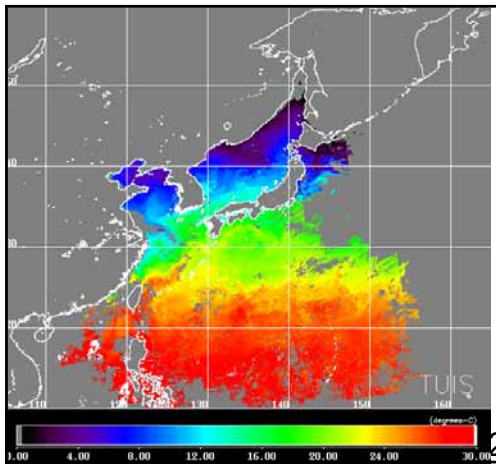
Possible collaboration of WG3 & WG4

- East China Sea monitoring project:
  - Monitoring of East China Sea areas to assess the impact of Three Gorges Dam project.
  - This can include investigations seasonal variability of natural slick and oil spill distribution, in particular of those that are flown from the river.
  - Satellite SAR is a perfect tool due to ability to register
    - slicks associated with the increased biological productivity
    - oil slicks associated with pollution
    - fronts at boundaries of saline/fresh water masses

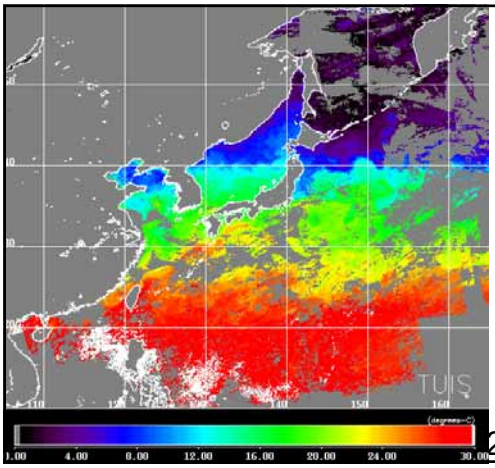
Kuroshio's transport determines a distribution of marine litters in NOWPAP region

Ichio Asanuma

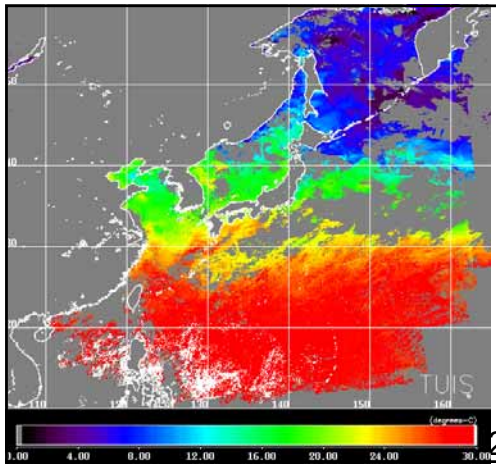
Tokyo University of Information Sciences



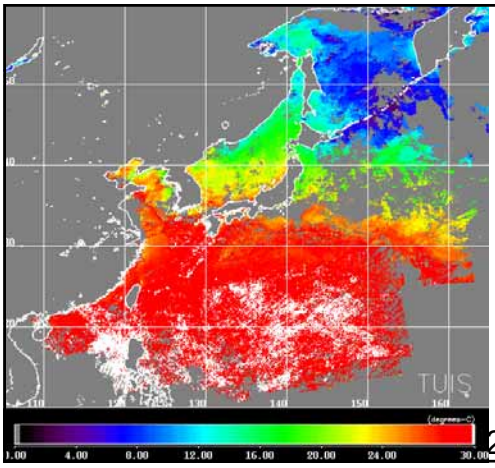
SST 2005.04



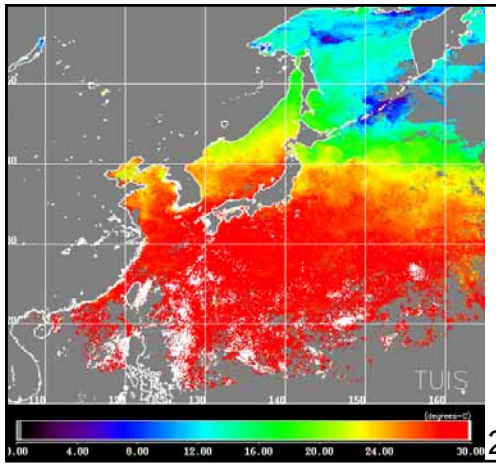
SST 2005.05



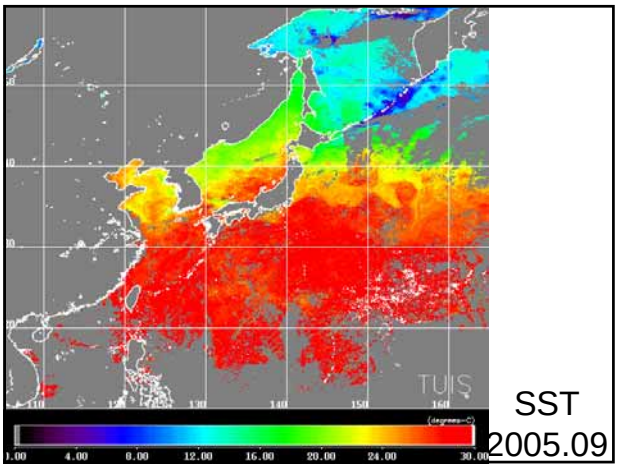
SST 2005.06

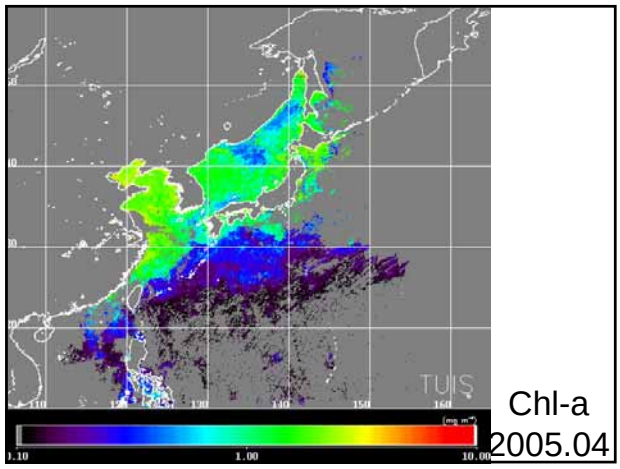


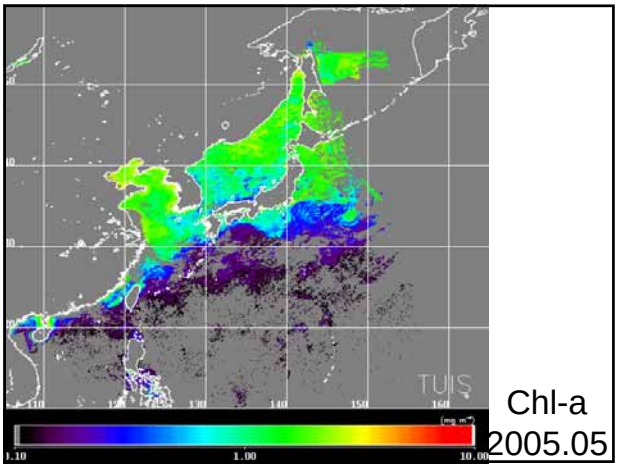
SST 2005.07

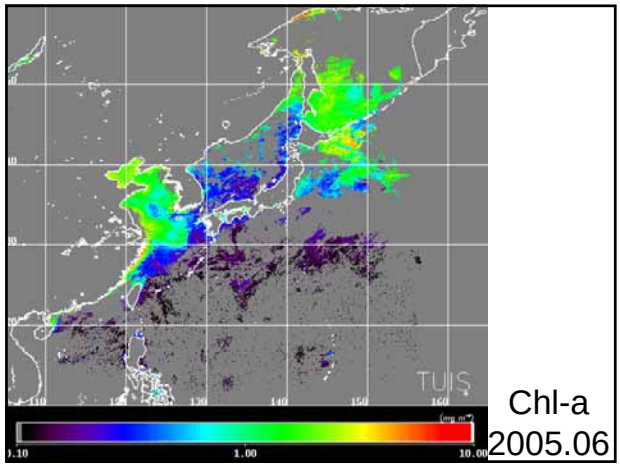


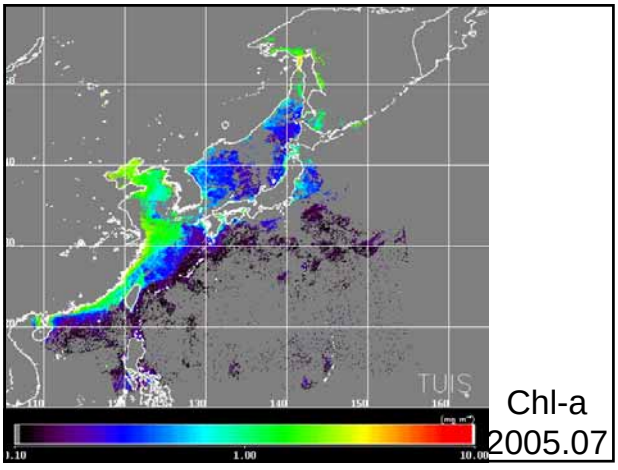
SST 2005.08

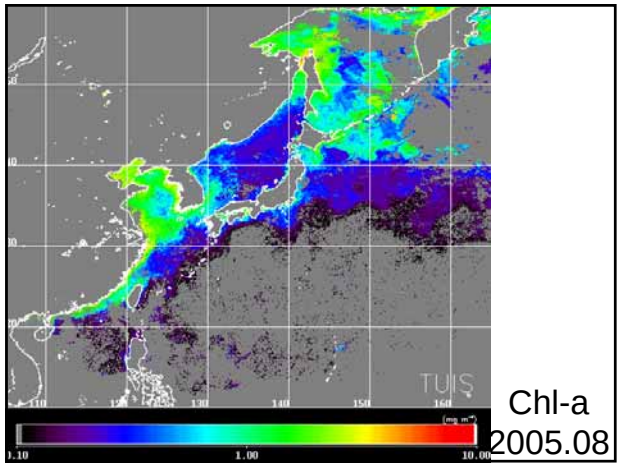

TUIS
SST
2005.09

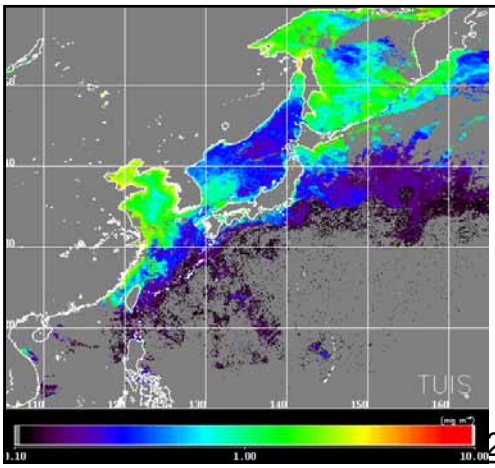

TUIS
Chl-a
2005.04


TUIS
Chl-a
2005.05

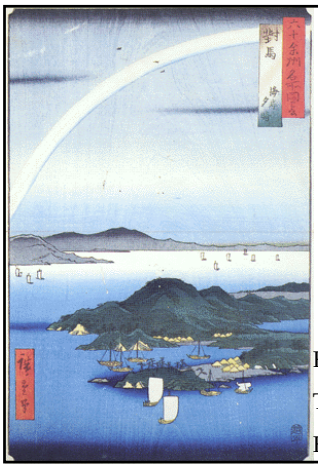

TUIS
Chl-a
2005.06


TUIS
Chl-a
2005.07


TUIS
Chl-a
2005.08



Chl-a
2005.09



Famous Spots at Sixty Regions
Tsushima
By Hiroshige Utagawa

Famous Spots at Sixty Regions
Oki
By Hiroshige Utagawa

Famous Spots at Sixty Regions
Wakasa
By Hiroshige Utagawa