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**Northwest Pacific Action Plan**
**Special Monitoring and Coastal Environmental Assessment**
**Regional Activity Centre**

**The Fourth NOWPAP Working Group 3 and 4 Joint Meeting**
**Toyama, Japan, 10-12 September 2008**

# Development of educational materials for utilization of remote sensing data for marine environment conservation

# 1 Background

The National Reports on Ocean Remote Sensing in the NOWPAP Region and the Integrated Report on Ocean Remote Sensing for the NOWPAP Region were published in 2005 and they provided comprehensive understanding on the status of remote sensing of the Northwest Pacific Region.

Based on suggested activities and recommendation made in these reports, remote sensing information network such as Ocean Remote Sensing Portal Site, Web Site on Oil spill Monitoring were further developed to provide useful information on remote sensing for the NOWPAP Region. In 2007, Eutrophication Monitoring Guidelines by Remote Sensing for the NOWPAP Region were made targeting coastal managers in local governments and professional researchers and aiming to translate satellite remote sensing techniques into information and tools that are useful for monitoring of eutrophication. Furthermore, an intensive training course on remote sensing data analysis in the Northwest Pacific Region was conducted at Nagasaki University as a joint activity with IOC/WESTPAC.

Recognizing these milestones and considering mid- and long-term strategies of CEARAC and goals of WG3/WG4, CEARAC proposed to develop educational materials for utilization of remote sensing data for marine environment conservation for the 2008-2009 biennium at the 12$^{th}$ NOWPAP IGM and 6$^{th}$ CEARAC FPM, and it was approved.

# 2 Objective

Objective of this activity is to develop the educational materials for utilization of remote sensing data for marine environment conservation (educational materials), targeting at students, young researchers and coastal managers in the NOWPAP region, in order to further promote the use of remote sensing as a marine environmental monitoring tool.

# 3 Status of implementation

## 3.1 Concept of the educational materials

In order to achieve the above objective, the concept of the educational materials was set to deepen understanding of the Eutrophication Monitoring Guidelines by Remote Sensing for the NOWPAP Region.

The educational materials will function as a web service, which provides links to existing useful information available in English and the languages of the NOWPAP member states. The existing information on the web should be collected in terms of complementing further understanding of the contents given in the Eutrophication Monitoring Guidelines by Remote Sensing for the NOWPAP Region.

In the future, contents of the educational material will not be limited to eutrophication

monitoring by remote sensing but be extended to other remote sensing applications for marine environment conservation.

### 3.2 Table of contents of the educational materials

In line with the concept of the educational materials, a table of contents of the educational materials was prepared by extracting key words from the Eutrophication Monitoring Guidelines by Remote Sensing for the NOWPAP Region. The following table 1 shows the list of key words extracted.

Table 1. Key words extracted from the Eutrophication Monitoring Guidelines by Remote Sensing for the NOWPAP Region.

| [Section] | [Keyword] |
|---|---|
| Introduction | Eutrophication |
| | Aquatic ecosystem |
| | Harmful algal bloom |
| | Red tide |
| | OSPAR |
| | NEEA |
| | MAP |
| | HELCOM |
| | Satellite remote sensing |
| Satellite data | Monitoring parameters |
| | Sensors |
| | Obtaining data |
| | Data processing method |
| In situ data | Monitoring parameters and measurement methods |
| | Determination of sampling points |
| | Monitoring frequency and timing |
| | Requisites for monitoring and analysis |
| Monitoring and assessment of eutrophication | Accuracy evaluation |
| | Integration with the existing monitoring system |
| Challenges and prospects | Algorithm development |
| | High resolution data and information system |
| | New sensor |

### 3.3 Collection and organization of existing information

Existing information were collected from lecture materials at the First NEAR-GOOS – NOWPAP Joint Training Course on Remote Sensing Data Analysis and other sources shown in table 2. The collected information was then organized to match up with the table of contents of the educational materials (Annex 1).

Table 2. Information sources referred to collect existing educational materials.

| Organization | Websites providing educational materials (URL) |
|---|---|
| IOC | Ocean Teacher (http://www.oceanteacher.org/) |
| IOCCG | IOCCG (http://www.ioccg.org/) |
| NASA | Ocean Color Web (http://oceancolor.gsfc.nasa.gov/) |
| NOAA | NOAA Coastal Remote Sensing (CRS) Program (http://www.csc.noaa.gov/crs/) |
| ESA | ESA Earthnet (http://earth.esa.int/) |
| NPEC | Marine Environmental Watch System (http://www.nowpap3.go.jp/jsw/eng/) |
| CEARAC | Website on oil spill monitoring (http://cearac.poi.dvo.ru/en/) |

### 3.4 Development of pilot version of educational materials

Upon collection of existing educational materials, pilot version of the web-based educational materials was temporarily constructed on the following website. Fig. 1 shows the top page image of the pilot version.

**<Web site address of the pilot version of educational materials>**

http://www.cearac-project.org/wg4/em/index.php

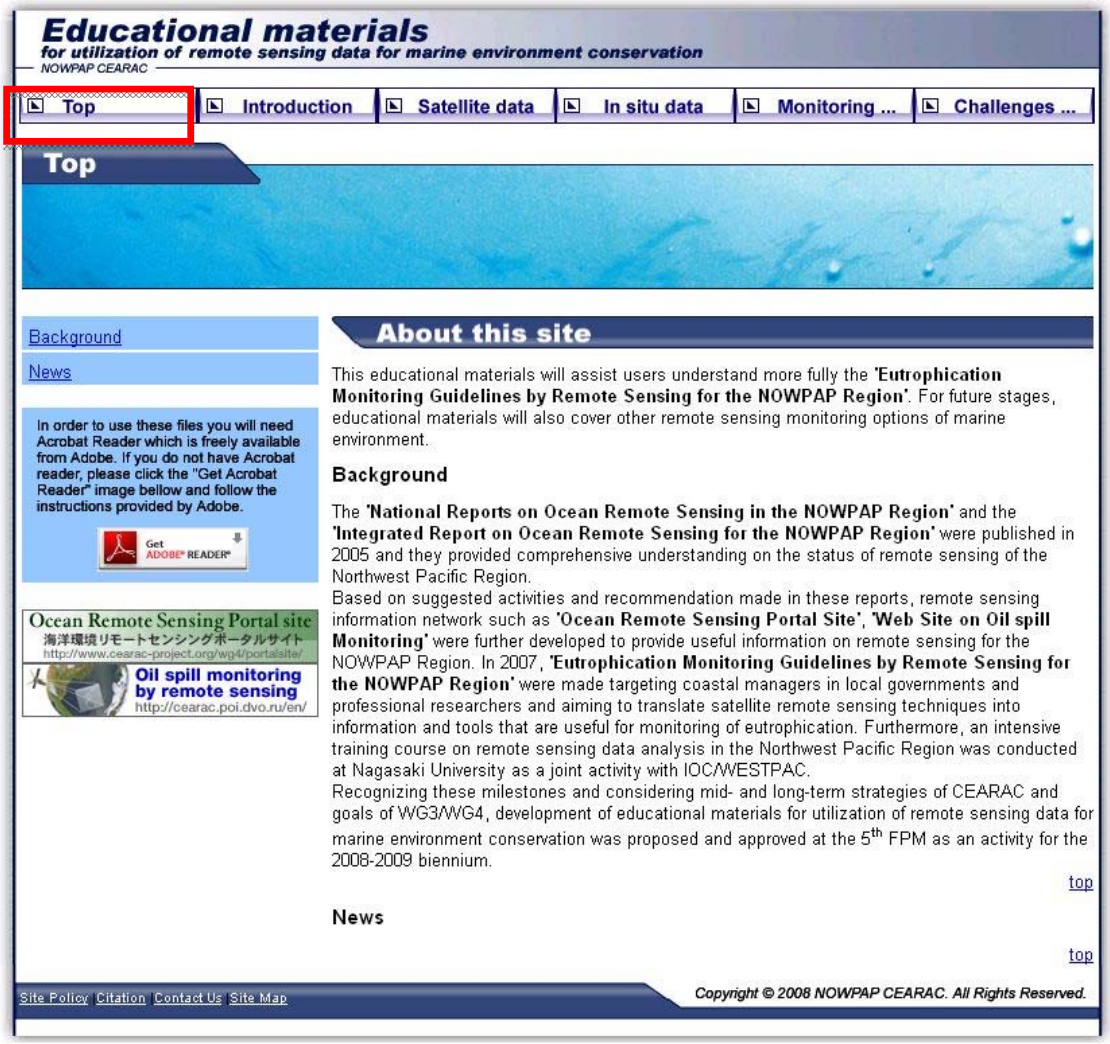


Fig. 1. Top page of the educational materials

## 4. Future work

In order to enrich information provided through the educational materials, more information available in the languages of the NOWPAP member states will be collected and organized. The following tasks are expected to be coordinated in NOWPAP WG4. CEARAC will conclude MoU with national experts recommended by WG4 experts or WG4 experts themselves to implement these tasks.

**<Tasks to be coordinated by NOWPAP WG4>**

- Collection of exiting educational materials available in the language of each NOWPAP member state, which matches up with key words shown in table 1.
- Organization of the collected materials following the format attached as Annex 1 and translating titles of collected materials into English by authorization of the authors.


Fig. 2. Completion image of the educational materials.

## 5. Expected outcome

The developed educational materials will contribute to wider use of remote sensing data among students, young researchers and coastal managers in the NOWPAP member states. In addition, the educational materials will be adequately updated through feedback from users and experts, given at the second NOWPAP training course on remote sensing data analysis and other possible opportunities.

## 6. Schedule

Schedule of this activity and main body are as follows.

| Time | | Actions | Main body |
|---|---|---|---|
| 2008 | Q1 | • Preparation of workplan for development of educational materials | CEARAC / consultant |
| | Q1 | • Review of prepared workplan by WG4 experts | WG4 experts |
| | Mar (6th CEARAC FPM) | • Approval of workplan and budget for development of educational materials | CEARAC / CEARAC FPs |
| | Q3 | • Conclusion of MoU with national experts | CEARAC / National experts |
| | Q3 | • Development of the educational materials | National experts |
| | Q3 (4th WG3/WG4 Meetings) | • Review of interim progress on the development of educational materials | WG3/WG4 experts |
| | Q4 | • Development of the educational materials (continue) | National experts |
| 2009 | Q1 | • Development of website contents | CEARAC consultant |

## 7. Budget

| Contract | Timing | Output | To be completed | Couterpart | Budget (US$) |
|---|---|---|---|---|---|
| MoU for the development of educational materials | 2008 Q3 | Educationa materials | 2008 end of Q4 | Expert in China | 2,000 |
| | | | | Consultant in Japan | 2,000 |
| | | | | Expert in Korea | 2,000 |
| | | | | Expert in Russia | 2,000 |
| MoU for the development of website contents for the educationa materials | 2009 Q1 | Website contents for the educational materials | 2009 Q1 | Consultant | 2,000 |
| Total | | | | | 10,000 |

# Annex List of collected information for the educatinal materials 1

| Number | Name | URL | Organization | Country | Language | Category | Sensor | Application | Keywords | Note |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DM 204 Environmental Imagery & Satellite Data Management | http://www.oceanteacher.org/oceanteacher/index.php?module=resourcekit&nodeid=gen11Srv32Nme37_1409&action=content | IOC IODE | Others | English | Education | | | introduction/satellite remote sensing,satellite data/monitoring parameters+sensors | OceanTeacher, Digital Library |
| 2 | Lecture 1 - Calibration of Ocean-Colour Sensors | http://www.ioccg.org/training/india/DrNeumann_ahd_cal.pdf | IOCCG | Others | English | Education | | | satellite data/sensors | Training Course in Ocean Colour: Techniques and Applications (India, Feb. 2001) |
| 3 | Lecture 2 - Information Content of Ocean Colour Data | http://www.ioccg.org/training/india/DrNeumann_ahd_info.pdf | IOCCG | Others | English | Education | | | satellite data/monitoring parameters | Training Course in Ocean Colour: Techniques and Applications (India, Feb. 2001) |
| 4 | Lecture 3 - Principal Component Conversion | http://www.ioccg.org/training/india/DrNeumann_ahd_pci.pdf | IOCCG | Others | English | Education | | | satellite data/monitoring parameters | Training Course in Ocean Colour: Techniques and Applications (India, Feb. 2001) |
| 5 | Lecture 4 - Validation of Ocean Colour Sensors | http://www.ioccg.org/training/india/DrNeumann_ahd_val.pdf | IOCCG | Others | English | Education | | | in situ data/monitoring parameters and measurement methods | Training Course in Ocean Colour: Techniques and Applications (India, Feb. 2001) |
| 6 | Lecture 1 - Primary Production and Related Processes | http://www.ioccg.org/training/turkey/DrWatts_lect1.pdf | IOCCG | Others | English | Education | | | monitoring and assessment of eutrophication/Integration with the existing monitoring system | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 7 | Lectures 2 & 3 - Modelling Primary Production on a Local and Global Scale | http://www.ioccg.org/training/turkey/DrWatts_lect2.pdf | IOCCG | Others | English | Education | | | monitoring and assessment of eutrophication/Integration with the existing monitoring system | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 8 | Software Demonstration - Primary Production Software Demonstration | http://www.ioccg.org/training/turkey/DrWatts_SoftwareDemo.pdf | IOCCG | Others | English | Education | | | monitoring and assessment of eutrophication/Integration with the existing monitoring system | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 9 | Lecture - Satellite Orbits / Basic Radiometric Quantities and Definitions | http://www.ioccg.org/training/turkey/DrLynch_lectures2.pdf | IOCCG | Others | English | Education | | | satellite data/monitoring parameters | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 10 | Lecture 1 - Radiative Transfer in Oceans | http://www.ioccg.org/training/turkey/DrKopelovich_Topic6.pdf | IOCCG | Others | English | Education | | | satellite data/monitoring parameters | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 11 | Lecture 2 - Oceanic Optical Properties and Models | http://www.ioccg.org/training/turkey/DrKopelovich_Topic7.pdf | IOCCG | Others | English | Education | | | satellite data/monitoring parameters | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 12 | Lecture 3 - Bio-optical Algorithms | http://www.ioccg.org/training/turkey/DrKopelovich_Topic8.pdf | IOCCG | Others | English | Education | | | satellite data/monitoring parameters | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 13 | Lecture 1 - On SeaWiFS Processing using SeaDAS | http://www.ioccg.org/training/turkey/DrFearns_session3.pdf | IOCCG | Others | English | Education | SeaWiFS | | satellite data/data processing method | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 14 | Lecture 2 - On SeaWiFS Processing using SeaDAS | http://www.ioccg.org/training/turkey/DrFearns_session4.pdf | IOCCG | Others | English | Education | SeaWiFS | | satellite data/data processing method | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 15 | Lecture 3 - On SeaWiFS Processing using SeaDAS | http://www.ioccg.org/training/turkey/DrFearns_session6.pdf | IOCCG | Others | English | Education | SeaWiFS | | satellite data/data processing method | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 16 | Lecture 1 - Primary production, availability/uptake of nutrients and photo-adaptation of phytoplankton in three interconnected regional seas: Black Sea, Sea of Marmara and Eastern Mediterranean | http://www.ioccg.org/training/turkey/DrYilmaz_lecture1.pdf | IOCCG | Others | English | Education | SeaWiFS | | monitoring and assessment of eutrophication/Integration with the existing monitoring system | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 17 | Lecture 2 - Notes on Nutrients | http://www.ioccg.org/training/turkey/DrYilmaz_lecture2.pdf | IOCCG | Others | English | Education | | | in situ data/monitoring parameters and measurement methods | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 18 | Lecture - Optical measurements, phytoplankton pigments, absorption characteristics, cal/val of ocean colour sensors | http://www.ioccg.org/training/turkey/DrClementson_lect.pdf | IOCCG | Others | English | Education | | | in situ data/monitoring parameters and measurement methods | Remote Sensing of Ocean Colour Course (Turkey, Sep. 2000) |
| 19 | Living Ocean Teacher's Guide | http://oceancolor.gsfc.nasa.gov/SeaWiFS/LIVING_OCEAN/ | NASA GSFC | US | English | Education | SeaWiFS | | introduction/satellite remote sensing | SeaWiFS Project, Teachers Resources |
| 20 | Monitoring the Earth from Space with SeaWiFS | http://oceancolor.gsfc.nasa.gov/SeaWiFS/TEACHERS/sanctuary_1.html | NASA GSFC | US | English | Education | SeaWiFS | | introduction/satellite remote sensing | SeaWiFS Project, Teachers Resources |
| 21 | NEW 2000 Teacher Workshop | http://oceancolor.gsfc.nasa.gov/SeaWiFS/TEACHERS/INTRO/ | NASA GSFC | US | English | Education | SeaWiFS | | introduction/satellite remote sensing | SeaWiFS Project, Teachers Resources |
| 22 | Faux Shuttle Views From SeaWiFS Data | http://oceancolor.gsfc.nasa.gov/staff/norman/seawifs_image_cookbook/faux_shuttle/ | NASA GSFC | US | English | Education | SeaWiFS | | satellite data/data processing method | SeaWiFS Project, Teachers Resources |
| 23 | General information | http://www.csc.noaa.gov/crs/gen_info.html | NOAA CSC | US | English | Education | | | introduction/satellite remote sensing | Coastal Remote Sensing Program |
| 24 | Present and Future Chinese Satellite Missions for Ocean Remote Sensing | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY1-15Oct2007/D1_L1_Pandelu_lectur_20071015_V1.pdf | ESA | Europe | English | Education | COCTS,CZI | | satellite data/monitoring parameters+sensors,challenges and prospects/new sensor | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |

| Number | Name | URL | Organization | Country | Language | Category | Sensor | Application | Keywords | Note |
|---|---|---|---|---|---|---|---|---|---|---|
| 25 | Present and Future ESA Satellite Missions for Ocean Remote Sensing | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY1-15Oct2007/D1_L2_ESA-EOmissions10-07.pdf | ESA | Europe | English | Education | ATSR,AATSR,MERIS | | satellite data/paramters+sensor,challenges and prospects/new sensor | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 26 | Dragon Projects in Ocean Research: Ocean Colour Studies | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY1-15Oct2007/D1_L4_ocean_colour_studies_doerffer20070921_eng.pdf | ESA | Europe | English | Education | MERIS | | challenges and prospects/algorithm development | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 27 | System and Data Products of ERS and ENVISAT, Access to ERS and ENVISAT data | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY1-15Oct2007/D1_L5_Regner_System_and_data_products_1.pdf | ESA | Europe | English | Education | MERIS,ASAR,AATSR | | satellite data/sensors+obtaining data | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 28 | Lecture 1 - Introduction into Ocean Colour remote sensing using MERIS | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY2-16Oct2007/D2_L1_ocean_color_lecture_I_doerffer20070921_eng.pdf | ESA | Europe | English | Education | MERIS | | satellite data/monitoring parameters+sensors,challenges and prospects/new sensor | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 29 | Lecture 2 - Atmospheric correction and Coastal Water Algorithms | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY2-16Oct2007/D2_L2_ocean_color_lecture_II_doerffer20070921_eng.pdf | ESA | Europe | English | Education | MERIS | | satellite data/monitoring parameters+sensors,challenges and prospects/new sensor | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 30 | Practical 1: MERIS data and BEAM Toolbox principles | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY2-16Oct2007/D2_P1_MERIS_Products_1.pdf | ESA | Europe | English | Education | MERIS | | satellite data/obtaining data | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 31 | Lecture 3 - The use of MERIS, MODIS and SeaWiFS data for ocean color applications in coastal areas | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY2-16Oct2007/D2_L3_PanDelu_lecture_20071016_V1.pdf | ESA | Europe | English | Education | MERIS,MODIS,SeaWiFS | | Introduction/neea+ospar+eutrophication+satellite remote sensing,satellite data/monitoring parameters,in situ data/monitoring parameters and measurement methods,challenges and prospects/algorithm development | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 32 | Practical 2: Practical exercises with MERIS data using the BEAM and MAPP software 1 | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY2-16Oct2007/D2_P2_BEAM_training_4.pdf | ESA | Europe | English | Education | MERIS | | satellite data/data processing method | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 33 | Practical 2: Practical exercises with MERIS data using the BEAM and MAPP software 2 | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY2-16Oct2007/D2_P2_Pan-Delu_MAPP_practice_V1.pdf | ESA | Europe | English | Education | MERIS,MODIS,SeaWiFS,COCTS | | satellite data/data processing method | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 34 | Lecture 1 - Measuring SST from Space | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY4-18Oct2007/D4_L1_DLJ1_OTC07_lecturers.pdf | ESA | Europe | English | Education | ATSR,AATSR | | satellite data/monitoring parameters,monitoring and assessment of eutrophication/integration with the existing monitoring system | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 35 | Lecture 2 - SST Observations of Large-Scale Ocean Processes | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY4-18Oct2007/D4_L2_CD_lecture.pdf | ESA | Europe | English | Education | | | satellite data/monitoring parameters,monitoring and assessment of eutrophication/integration with the existing monitoring system | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 36 | Practical Session-The AATSR Global Analyser | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY4-18Oct2007/DLJ-LAGA_Exercise_notes.doc | ESA | Europe | English | Education | AATSR | | satellite data/data processing method | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 37 | Practical Session: Bilko-an Introduction to SST Image Analysis | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY4-18Oct2007/D4_P1_CD_lecture1.pdf | ESA | Europe | English | Education | AATSR | | satellite data/data processing method | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 38 | Lecture 1 - Observations, Models and Environmental Prediction | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY6-20Oct2007/D6_L1_DLJ_OTC07_lecture.pdf | ESA | Europe | English | Education | | | monitoring and assessment of eutrophication/integration with the existing monitoring system | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |

| Number | Name | URL | Organization | Country | Language | Category | Sensor | Application | Keywords | Note |
|---|---|---|---|---|---|---|---|---|---|---|
| 39 | Lecture 2 - GODAE: TheGlobal Ocean Data Assimilation Experiment | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY6-20Oct2007/D6_L2_letraon_lecture5.pdf | ESA | Europe | English | Education | | | monitoring and assessment of eutrophication/integration with the existing monitoring system | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 40 | Lecture 3 - MERSEA and Dragoness: Operational Monitoring and Forecasting Systems of the Ocean Physics, Biogeochemistry, and Ecosystems | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY6-20Oct2007/D6_L3_JJ_Dragon_MERSEA_opocean.pdf | ESA | Europe | English | Education | | | monitoring and assessment of eutrophication/integration with the existing monitoring system | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 41 | Lecture 4 - Using the Next Generation of Sea Surface Temperature data Products for Climate monitoring, NWP and Ocean Forecasting | http://earth.esa.int/dragon/ocean_training/Lecture_Material/DAY6-20Oct2007/D6_L4_CD-SST-applications-v1.0.pdf | ESA | Europe | English | Education | | | monitoring and assessment of eutrophication/integration with the existing monitoring system | ESA-MOST Dragon Programme, 2nd Advanced Training Course in Ocean Remote Sensing (Hangzhou, Oct. 2007) |
| 42 | Satellite data downloading procedures | http://www.nowpap3.go.jp/jsw/eng/software/pdf/imagedlmethod.pdf | NPEC | Japan | English | Education | | | satellite data/obtaining data | Marine Environmental Protection of Northwest Pacific Region, Data Processing/Analysis |
| 43 | Acquiring the physical values from ASCII data format | http://www.nowpap3.go.jp/jsw/eng/software/pdf/fromasciidata.pdf | NPEC | Japan | English | Education | | | satellite data/data processing method | Marine Environmental Protection of Northwest Pacific Region, Data Processing/Analysis |
| 44 | Creating correlation charts using on-site and satellite data | http://www.nowpap3.go.jp/jsw/eng/software/pdf/creatingcorrelationcharts.pdf | NPEC | Japan | English | Education | | | monitoring and assessment of eutrophication/accuracy evaluation | Marine Environmental Protection of Northwest Pacific Region, Data Processing/Analysis |
| 45 | Seasonal variations in satellite data and charting changes over time | http://www.nowpap3.go.jp/jsw/eng/software/pdf/seasonalvariationsinsatellite.pdf | NPEC | Japan | English | Education | | | monitoring and assessment of eutrophication/integration with the existing monitoring system | Marine Environmental Protection of Northwest Pacific Region, Data Processing/Analysis |
| 46 | Image display procedures using SeaDAS | http://www.nowpap3.go.jp/jsw/eng/software/pdf/seadasimageresearch.pdf | NPEC | Japan | English | Education | | | satellite data/data processing method | Marine Environmental Protection of Northwest Pacific Region, Data Processing/Analysis |
| 47 | Image display procedures using GRASS | http://www.nowpap3.go.jp/jsw/eng/software/pdf/grassimageresearch.pdf | NPEC | Japan | English | Education | | | satellite data/data processing method | Marine Environmental Protection of Northwest Pacific Region, Data Processing/Analysis |
| 48 | Introduction - Remote Sensing for the Northeast Asian Seas | http://www.cearac-project.org/wg4/1stRST/DrKawamura_Introduction.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | introduction/satellite remote sensing,satellite data/monitoring parameters+sensors | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 49 | Atmospheric Correction and Bio-optical Algorithm for Ocean Color Remote Sensing 1 | http://www.cearac-project.org/wg4/1stRST/DrAsanuma_Atmospheric.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/monitoring parameters | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 50 | Atmospheric Correction and Bio-optical Algorithm for Ocean Color Remote Sensing 2 | http://www.cearac-project.org/wg4/1stRST/DrAsanuma_Bio-optical.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/monitoring parameters | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 51 | Introduction of Satellite Data Distribution System | http://www.cearac-project.org/wg4/1stRST/DataSystem.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/obtaining data | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 52 | Operational Oceanographic Data Exchange and NEAR-GOOS Regional Real Time Data Base | http://www.cearac-project.org/wg4/1stRST/MrYoshida_Operational.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | in situ data/parameters and measurement method | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 53 | Introduction of RDMDB (NEAR-GOOS) & Data Management at JODC | http://www.cearac-project.org/wg4/1stRST/MrMukainaka_Introduction.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | in situ data/parameters and measurement method | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 54 | Introduction to software for satellite data analysis - with an emphasis on SeaWiFS Data Analysis System | http://www.cearac-project.org/wg4/1stRST/MrTerauchi_Introduction.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/data processing method | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 55 | The Optic Properties and Regional Ocean Color Algorithms for the Case-II Waters in China Seas | http://www.cearac-project.org/wg4/1stRST/DrTang_Optic.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/monitoring parameters, in situ data/parameters and mesurement method,challenges and prospects/algorithm development | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 56 | Validation of Ocean Color Remote Sensing Data in Korea | http://www.cearac-project.org/wg4/1stRST/DrKim_Validation.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/monitoring parameters,in situ data/parameters and mesurement method,challenges and prospects/algorithm development | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 57 | Satellite-based Red-Tide Detection/Monitoring | http://www.cearac-project.org/wg4/1stRST/DrKawamura_Satellite.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | monitoring and assessment of eutrophication/integration with the existing monitoring system | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |

| Number | Name | URL | Organization | Country | Language | Category | Sensor | Application | Keywords | Note |
|---|---|---|---|---|---|---|---|---|---|---|
| 58 | Case Studies of Red Tide | http://www.cearac-project.org/wg4/1stRST/RedTide.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | monitoring and assessment of eutrophication/integration with the existing monitoring system | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 59 | Measurements of Ocean Optical Properties for Sea Truth | http://www.cearac-project.org/wg4/1stRST/Measurements.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | in istu data/parameters and mesurement method | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 60 | Introduction to NGSST and SST Application for Monitoring of Ocean Environment | http://www.cearac-project.org/wg4/1stRST/Dr_Park.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/monitoring parameters,monitoring and assessment of eutrophication/integration with the existing monitoring system | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 61 | Hands-on Practice on WIM/WAM - Basic exercise on WIM/WAM | http://www.cearac-project.org/wg4/1stRST/Exercises_WIM_WAM.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/data processing method | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 62 | Hands-on Practice on WIM/WAM - Familiarizing with satellite data distribution system | http://www.cearac-project.org/wg4/1stRST/Exercises_Merging_L2_Chl_and_SST.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/obtaining data | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 63 | Hands-on Practice on WIM/WAM - Visualizing and projecting satellite data images 1 | http://www.cearac-project.org/wg4/1stRST/Exercises_Chl_movie_South_China_Sea.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/data processing method | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 64 | Hands-on Practice on WIM/WAM - Visualizing and projecting satellite data images 2 | http://www.cearac-project.org/wg4/1stRST/Exercises_Altimetry.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/data processing method | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 65 | Hands-on Practice on WIM/WAM - Command line programs for time series analysis 1 | http://www.cearac-project.org/wg4/1stRST/Exercises_WAM_EOF.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/data processing method | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 66 | Hands-on Practice on WIM/WAM - Command line programs for time series analysis 2 | http://www.cearac-project.org/wg4/1stRST/Exercises_WAM_EOF_Appendix_South_China_Sea.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | satellite data/data processing method | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 67 | Hands-on Practice on WIM/WAM - Match up analysis with sea truth measurement data | http://www.cearac-project.org/wg4/1stRST/Exercises_detecting_habs.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | monitoring and assessment of eutrophication/accuracy evaluation | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 68 | Hands-on Practice on WIM/WAM - Time series analysis of NGSST data | http://www.cearac-project.org/wg4/1stRST/Exercises_Merging_SST.pdf | CEARAC, NEAR-GOOS | Others | English | Education | | | monitoring and assessment of eutrophication/integration with the existing monitoring system | 1st NEAR-GOOS - NOWPAP Joint Training Course on Remote Sensing Data Analysis (Nagasaki, Sep. 2007) |
| 69 | Remote Sensing Tutorial | http://rst.gsfc.nasa.gov/ | NASA GSFC | US | English | Education | | | introduction/satellite remote sensing | |
| 70 | Ocean Color Science Focus | http://disc.sci.gsfc.nasa.gov/oceancolor/ | NASA GSFC | US | English | Education | CZCS,SeaWiFS | | introduction/satellite remote sensing | |
| 71 | Earth Observatory | http://earthobservatory.nasa.gov/ | NASA | US | English | Education | | | introduction/satellite remote sensing | |