Annex IX

Development of the web site on remote sensing of oil spill monitoring

(Reviewed by the Second Meeting of NOWPAP WG4)

Development of the web site on remote sensing of oil spill monitoring

1 Background

The ability to remotely detect and monitor oil spills at sea is becoming increasingly important due to the threat that such pollution poses to marine wildlife and the ecosystem. We are all aware of the problems associated with oil spills in the marine environment. The oil spill resulted in large scale damage to the local ecosystem, causing the death of thousands of sea birds, fish and marine animals, as well as oiling many beaches.
Oil spills occur at a much reduced scale frequently, but still cause significant damage to the local wildlife and ecosystems, the effects of oil spills upon the marine and coastal ecosystems has been well documented. As the demand for oil based products increases, shipping routes will consequently become much busier, the likelihood of slicks occurring is increasing. If applied correctly, remote sensing can act as an important monitoring tool. It can provide early detection of slicks, provide size estimates, and help predict the movement of the slick and possibly the nature of the oil. Using satellite platforms to monitor oil slicks is more cost effective than applying airborne monitoring techniques and therefore would be beneficial for routine spill monitoring. This information will be invaluable in aiding clean up operations, and consequently help save wildlife and the balance of the local ecosystem, provide damage assessment and help to identify the polluters.
From the onset of the emergency, it is evident that the re-visit capability is crucial for repeat monitoring, and the inherent all-weather, light-independent imaging capability guaranteed image acquisition. Near-real time data processing and delivery are also important.

Based on the consideration in 1st NOWPAP WG4 meeting (December 2003) and the Memorandum of Understanding between CEARAC and POI FEB RAS, the web site development on oil spill monitoring by remote sensing was adopted as a major activity of NOWPAP WG4 in 2003-2004. The progress of its activity will be reported in 2nd NOWPAP WG4 meeting (October 2004).

2 Objective

The aims of this site are:

- to review the processes which determine evolution oil in the sea and include spreading, evaporation, dispersion, emulsification, dissolution, oxidation, sedimentation and biodegradation;
- to give a short description of physical background of various remote sensing techniques used for oil spill detection in visible, infrared and microwave ranges;
- to assess the ways in which oil slicks can be monitored by various satellite remote sensing techniques in particular by consideration of oil monitoring in the European seas.
- to present the results of recent and ongoing research on remote oil spill detection as well as to give links to model used for simulation of oil spill processes in the marine environment;
- to provide database of the satellite SAR images covering the NOWPAP area.

3 Contents

3.1 Information to be provided

The following information associated with oil spill detection and monitoring by remote sensing is summarized in the CEARAC web site in English.

- Behavior oil in the sea
- Physical background and the features of remote sensing in different spectral bands
- Active and passive remote sensing techniques in visible, infrared and microwave ranges
- Statistics of oil spills revealed in Baltic, North and Mediterranean Seas by satellite SAR and examples of oil spill detection by SAR in the NOWPAP Seas area.
- Algorithms of oil spill detection on SAR images
- Links to model used for simulation of oil spill processes in the marine environment
- POI database of satellite SAR images covering the NOWPAP area involving map, metadata, ERS-1 and ERS-2 SAR images and interface.
- Comprehensive data on satellites and their parameters and sensors and their characteristics as well as geometry of sensing for SAR satellites and definition of spectral bands.
- Links covering the following directions: oil pollution of the Northwestern Pacific, Ecosystems, Environmental Regulations.

3.2 Methods to Use

The web site will have emphasis on effectively providing information on the present situation of oil spill detection and monitoring by remote sensing as well as on ancillary problems. Efficiency of remote sensing is demonstrated by numerous examples of ERS-1 and ERS-2 SAR images acquired over the NOWPAP region. It is supposed to put in the web site new information and new SAR images taken by ERS-1, ERS-2 and Envisat. (Processing and analysis of the available and new SAR images will allow to get statistic characteristics of oil spill of the area under monitoring and help to develop a strategy to diminish its influence on coastal and open sea ecosystems).

The information including the smoothed SAR images will be freely opened to any users. Precision SAR images can be downloaded and analyzed only by POI scientists participating in the projects of the European Space Agency (ESA) or after getting permission by the ESA.

Free Search

Links are searched by free keyword. The search results will be shown categorized by use examples, research and development, delivery and distribution, literature, and others.

3.3 Operating Environment

As one of the activities of NOWPAP WG4, literature database on different aspects of oil spill important for it remote detection is under development at the POI. Hardware resources needed for the web site (a server and two hard disks) taking into account the increase of database and other advancements were bought by the POI in accordance

with the MoU. Original software for ERS SAR database was developed at the POI as well as the algorithms for SAR image analysis and discrimination of the polluted area.

4. Schedule

The activity of POI on web site development in accordance with the content presented in the MoU finished in March 2004. The content of the web site was checked and its functions were tested by the CEARAC. Some comments and suggestions were recently obtained from MERRAC and CEARAC members. These suggestions were considered and as a result some modifications were done. The next steps associated with normal operation of the web site and its advancement should be discussed during the 2nd NOWPAP WG4 meeting. Comments from NOWPAP WG4 members during test operation will be reflected by the time of 3rd CEARAC FPM to be held in summer 2005.

Financial issues in the 2004-2005

Financial support by CEARAC is required:

- to rent an individual Internet channel to provide fast access to the website;
- to maintain the website, carry out relating work, etc.;
- to order, process and analyze the archive and new ERS-1/2 SAR and Envisat ASAR images and get statistical estimates of oil spill in the NOWPAP area.