

EARTH OBSERVATION SYMPOSIUM (B1)
International Cooperation in Earth Observation Missions (1)

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EARLY WARNING SYSTEM FOR ENVIRONMENTAL MONITORING OF ROPME REGION

Abstract

The Regional Organization for the Protection of the Marine Environment (ROPME) extends from Oman to Iraq and its member states are faced by particular international cooperation and environmental challenges. Their environments are characterized by major oil reserves, fragile and arid conditions and significant coastal areas. Resource pressures on oil reserves and climate fluctuations pose particular dangers to the stability of the region. The regional implementation of global earth observations in near real time has a great potential for solving a multitude of environmental problems in the areas of disasters, public health, water resources and more.

This study outlines the capabilities and architecture of an early warning system that is based on satellite remote sensing observations and is utilized by ROPME. The Ground Station, established in ROPME/Kuwait, utilizes MODIS Direct Broadcast mode of NASA EOS Terra and Aqua satellites. This is providing unique possibilities to have short daily revisiting periods of observations over the region, which allows the tracing of high dynamic events.

The structure of the system and the algorithms of data processing to provide real-time monitoring are presented as a highly successful example of regional cooperation. The Station capabilities include coordination with member states to perform successful monitoring of accidents and their transboundary impact. Therefore, the station acts as a first phase of an early warning regional system, focusing mainly on the anthropogenic events and significant environmental impacts. High resolution imagery from recent space platforms, airborne data and field measurements are part of the validation of MODIS products. The “in situ” hyperspectral data are used to observe the spectral properties of habitats in the member states to simulate and foresee the performance of the MODIS observations.

The utilization of custom developed thematic algorithms and processing together with generation of standard NASA products are addressing the major regional problems, such as massive algal blooms, marine mortality and maritime accidents (oil spills, fires). Image analysis and geospatial GIS tools are supporting increasingly complex applications. The system was found to be useful in addressing the issues related to the coastal management, rivers discharge, pollution mitigation, vegetation status and monitoring the arid land interfaces. Future steps of the existing regional early warning environmental system include ROPME’s aim at an increasing comprehensive geospatial workflow for a constellation of small satellites.