

THE HYPERSPECTRAL FOR ADRIATIC COASTAL MONITORING (HYPAD.COM) PROJECT

R. M. Cavalli¹, L. Alberotanza³, C. Bassani¹, F. Braga^{3*}, L. Fusilli¹, A. Palombo², S. Pascucci², S. Pignatti² and F. Santini¹

¹ Consiglio Nazionale delle Ricerche - Istituto sull'Inquinamento Atmosferico, Roma, Italia

² Consiglio Nazionale delle Ricerche - Istituto di Metodologie per l'Analisi Ambientale, Potenza, Italia

³ Consiglio Nazionale delle Ricerche - Istituto di Scienze Marine, Venezia, Italia - f.braga@ismar.cnr.it

Abstract

The HYPerspectral for ADriatic COastal Monitoring project meets requirements for understanding and monitoring the coastal environments. The understanding of the coastal areas dynamics, their processes and significance for the environment, is becoming even more a milestone for any future conservation and protection of these areas. The demand for coastal zones managements has progressively risen due to the increased direct impacts by human activities, which may cause an irreversible damage to the local natural balance. In particular, the project focuses on improving the knowledge of the Albania and Montenegro coastal area by integrating different high resolution spatial and spectral remote sensing technologies.

Keywords: Coastal Waters, Remote Sensing, Adriatic Sea

Introduction

The HYPAD.COM project takes place at this strategic moment, when the Earth Observation (EO) has become an essential component of the global effort to deal with global challenges.

The purpose of the HYPAD.COM is to promote capacity building in EO, on existing initiatives and sector-specific needs, like GEOSS planned, in order to achieve comprehensive, coordinated and sustained in situ and airborne observations of the coastal area.

The HYPAD.COM activity programme meets the need for timely and quality local scientific information as a basis for decision making, and enhances delivery of benefits to society especially in the following areas, recognized in the GEOSS 10-Year Implementation Plan: "Improving the management and protection of terrestrial, coastal, and marine ecosystems" [1].

In the framework of the HYPAD.COM, the integration of the EO hyperspectral data (airborne and ground-based) has been performed to improve the quality of the information available from EO data as well as to characterize the Albania and Montenegro coastal area and the surrounding lands.

For the purposes of the HYPAD.COM project, the following scientific objectives, for the coastal area, have been identified:

- a) the characterization of the coastal water;
 - b) the detection of the coastal fresh water;
 - c) the spectral characterization of submerged aquatic vegetation [2].
- The aims of the project devoted to characterize the surrounding land are:
- d) the spectral characterization of vegetation/land use and land cover;
 - e) the spectral characterization of the bauxite refinery residues derived from aluminium production [3].

Methodology and results

The CNR (National Research Council) through the mediation of Italian Ministry for the Environment and Territory "Direzione Ambientale Ricerca e Sviluppo" has implemented cooperation with some Italian and foreign research agency for the success of the project. These agencies have shown great interest in and willingness for project activities, collaborating, constructively and proposing suggestions. The Albanian - Montenegrin coastal environments have been selected as study areas in accordance to the local Institutions requests.

On the basis of the scientific objectives and proposes defined in the project, several actions have been taken:

§ Three oceanographic cruises have been realized, in synergy with the Adricosm-star project [4], to spectrally characterize the water constituencies of the coastal waters along the Albanian and Montenegro shorelines. About 90 water column stations were characterized [5];

§ June 2008, airborne hyperspectral MIVIS survey (53 flightiness) has been deployed on part of the Montenegro and Albanian coast and on the Buna/Bojana river;

§ July 2008 spectral signatures of the main submerged vegetation species were collected on Montenegro coastal with the objectives to map the submerged vegetation extension (e.g. *Posidonia oceanica*) and to analyze the impact of a growing urbanization of the coastline. About 40 sites were characterized [3];

§ June-July 2008, field CAL/VAL campaigns were conducted along the

surveyed area to define a spectral library of the main land cover units and on the more significant material in order to be applied in a spectral "data base" and to be integrated with the airborne survey.

Conclusions

The HYPAD.COM activities have been carried out within a close and continuing collaboration of the some Italian and foreign research agency. The results of the project have generated strongly interest to continue the scientific research with the involved Institutions.

In front of that, on the Joint Committee of the July 31, 2008 the Ministry of Environment of the Republic of Albania, Institute of Hydrometeorology of Albania e University of Tirana declared their formal declaration of interest to collaborate in the HYPAD.COM project at the Italian Ministry for the Environment and Territory, as the below minute states:

"Hypad.com (HYPerspectral for ADriatic COastal Monitoring).

Members of the Joint Committee agreed that, since involvement of the Albanian Institutions (MoEFA; Institute of Energy, Water and Environment; Institute of Albanologi Studies) has been important in the definition of the monitoring activities and of the major environmental problems affecting the area, the possibility of involvement (onerous) of the above mentioned Albanian Institutions will be taken into consideration in the proposal of extension of the activities of this project".

References

- 1 - GEOSS, 2005. 10-Year Plan Reference Document. pp.209.
- 2 - Cavalli R.M., Kljaji Z., Macic V., Palombo A., Pascucci S., Pignatti S. and Santini F., 2009. Discrimination of phanerogams communities through spectral analysis: preliminary study of Montenegro coastal areas. Proceedings of ISRSE 33rd International Symposium on Remote Sensing of Environment, Sustaining the millennium development goals, Stresa, Italy.
- 3 - Pascucci S., Belviso C., Cavalli R. M., Laneve G., Misurovic A., Perrino C. and Pignatti S., 2009. Red mud soil contamination near an urban settlement analyzed by airborne hyperspectral remote sensing. IGARSS-09 Cape Town, 2009 IEEE International Geoscience and Remote Sensing Symposium, University of Cape Town, South Africa.
- 4 - Oddo P., Pinardi N. and Zavatarelli M., 2005. A numerical study of the interannual variability of the Adriatic Sea (2000–2002), *Sci. Tot. Environ.*, 353: 39-56.
- 5 - Fargion G S. and Mueller J.L. (eds.), 2000. Ocean Optics Protocols for Satellite Ocean Color Sensor Validation: Revision 2, NASA Goddard Space Flight Center, Greenbelt, MD, USA