costeLAB, the Italian thematic platform for coastal and marine downstream applications of institutional and research users in the context of Copernicus data exploitation

Deodato Tapete¹, Laura Candela¹, Alessandro Coletta¹, Maria Girolamo Daraio¹, Rocchina Guarini¹, Ettore Lopinto¹, Monica Palandri², Daniele Pellegrino², Angelo Amodio³, Claudia Giardino⁴, and Mariano Bresciani⁴

¹Italian Space Agency (ASI), Rome, Italy (deodato.tapete@asi.it)
²e-GEOS S.p.A.
³Planetek Italia
⁴National Research Council (CNR) of Italy, Institute for Electromagnetic Sensing of the Environment (IREA)

Coastal and marine environmental management is of vital importance in Italy. Currently there is a growing interest in facilitating user uptake of satellite technologies and Copernicus ecosystem resources, also at non-technical local and regional governmental authorities, and a thematic working table dedicated to “Coastal” issues has been set up in the context of the Italian Copernicus User Forum (Geraldini et al., 2021).

The Italian Space Agency (ASI) has promoted the development of the thematic platform costeLAB as a tool dedicated to monitoring, management and study of coastal areas (sea and land). costeLAB hosts cutting edge tools for satellite image processing and geospatial integration with in-situ data, so as to allow an efficient access to archive data and facilitate direct engagement of users interested in deriving information according to their requirements. costeLAB is built in the framework of Progetto Premiale “Rischi Naturali Indotti dalle Attività Umana - COSTE”, n. 2017-I-E.0, funded by the Italian Ministry of University and Research (MUR), coordinated by ASI and developed by e-GEOS and Planetek Italia, with the National Research Council of Italy (CNR), Meteorological Environmental Earth Observation (MEEO) and Geophysical Applications Processing (G.A.P.) s.r.l. as subcontractors.

Operating in systematic and on-demand modes, costeLAB provides users with validated algorithms and advanced data management resources to analyse multi-mission and multi-sensor data – particularly Copernicus Sentinels and ASI's COSMO-SkyMed Synthetic Aperture Radar data – and to generate products based on user-selected input parameters, without the need for large data volume transfers. costeLAB aligns with the concept of the European Space Agency’s Thematic Exploitation Platforms, and represents a mean to exploit the Italian Sentinel Collaborative Ground Segment equipped with Sentinel-1/2/3 data archives and programmable computing resources. The platform aims to support downstream applications from a wider user community including the Civil Protection, environmental protection agencies and regulators, coastal scientists,
academics, practitioners, and the general public.

costeLAB offers a portfolio of about 30 products among which: coastline, defence works, coastal habitat maps, flooding, hydrocarbon beaching, chlorophyll, wave and wind fields. These products can be generated as “state”, “change”, “damage”, “hazard” or “exposition” maps according to the operational scenarios “baseline knowledge”, “ordinary monitoring”, “extraordinary monitoring” and “post-event”.

We show some of the platform products and how they address specific user needs towards downstream applications, in support to national policies and directives. Examples include products of “Marine Ecosystem” (i.e. “sea level” and “day sea surface temperature cycle”). Thanks to ad hoc Copernicus Marine Environment Monitoring Service (CMEMS) data integration function implemented in costeLAB, these products are generated from pre-processed input data made available in near real time through CMEMS.

costeLAB is also equipped with the “Virtual Laboratory” module, purposely designed as a collaborative environment allowing users (in particular, researchers and analysts) to access “Software as a Service” resources to test proprietary or shared processors, exploit costeLAB computing resources, generate and integrate products, publish results. An example of collaborative research including experiments with ASI’s PRISMA hyperspectral data is presented.