



costeLAB platform: a prototype collaborative environment for research and applications in support to coastal risk management

Laura Candela¹, Alessandro Coletta¹, **Maria Girolamo Daraio**¹, Ettore Lopinto¹, Deodato Tapete¹, Monica Palandri², Daniele Pellegrino², Massimo Zavagli², Angelo Amodio³, Antonio Vecoli⁴, Simone Mantovani⁴, and Claudia Giardino⁵

¹Italian Space Agency (ASI), Rome, Italy

²e-GEOS S.p.A, Rome, Italy

³Planetek Italia, Bari, Italy

⁴Meteorological and Environmental Earth Observation (MEEO), Ferrara, Italy

⁵National Research Council (CNR) of Italy, Institute for Electromagnetic Sensing of the Environment (IREA), Napoli, Italy

Coastal areas are increasingly becoming more vulnerable due to economic overexploitation and pollution. The Italian Space Agency (ASI) supports the research and development of technologies aimed at the use of multi-mission EO data, in particular of the national COSMO-SkyMed Synthetic Aperture Radar and PRISMA hyperspectral missions, as well as Copernicus Sentinels, through the development of algorithms and processing methodologies in order to generate products and services for coastal risk management.

In this context, 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). This platform was developed in the frame of the "Progetto Premiale Rischi Naturali Indotti dalle Attività Umana - COSTE", n. 2017-I-E.0 (<http://costelab.asi.it/en/homepage-en/>), funded by the Italian Ministry of University and Research (MUR), coordinated by ASI and developed by e-GEOS and Planetek Italia with the participation of National Research Council of Italy (CNR), Meteorological Environmental Earth Observation (MEEO) and Geophysical Applications Processing (G.A.P.) s.r.l. The aim of the project was to define, develop and run in a pre-operational context, an integrated system that exploits Earth Observation data to support the management of coastal areas environmental processes and risks. The platform is addressed to the institutional, scientific and industrial users and allows the study, experimentation and demonstration of new downstream pre-operational services for the monitoring of the coastal area environment and in support to risk management.

The costeLAB platform provides a common entry point for several web-based EO data processing in the field of coastal zone monitoring and emergency management, to generate and visualize products by means of consolidated algorithms that users can utilize for their duty tasks.

The rationale of the platform is to "keep applications close to the data", i.e. allowing users to access huge amount of EO data relieving them of demanding tasks for big data download and processing in local computers. Users are therefore able to generate reliable products by means of validated algorithms with reduced processing times.

Of the thirty consolidated products that users can generate through the platform (Candela et al., 2021), the paper will showcase in particular those of main relevance for coastal risk management:

Coastline change map, Coastal subsidence rate, Landslide activities, Hydrocarbon beaching, Flooding maps, Flood exposure, Erosion exposure, Coastal pollution at national scale, Pollution at coastal scale, under different application scenarios.

Finally, the paper will present experimental scientific products that Researcher Users from CNR generated over selected Mediterranean sites via testing the “collaborative virtual laboratory” namely “Virtual Lab”, i.e. the ad hoc costeLAB facility for researchers and developers to share, test and demonstrate innovative algorithms in order to build new processing chains. These experiments within the platform followed on from dedicated research activities that were carried out on the various components of the marine-coastal environment (land-sea interface) during the costeLAB project. The breadth and novelty of these activities towards an improved understanding of Mediterranean coastal hazards will be presented.