



Assessing the Accuracy of Shoreline Evolution Trends Obtained by Using Copernicus Earth Observation Data. Case Study: Mediterranean Coastal Areas

Luca Cenci¹, Valerio Pampanoni², Giovanni Laneve², Carla Santella¹, Valentina Boccia³, and Clément Albinet³

¹Serco Italia SpA, Italy (luca.cenci@serco.com)

²Sapienza University of Rome, Rome, Italy

³European Space Agency, Frascati, Italy

Earth Observation (EO) data characterised by a spatial resolution in the range of 10-30 m (e.g., Sentinel 1 – S1, Sentinel 2 – S2, Landsat series), systematically acquired and freely distributed by national and international space agencies/institutions (e.g., ESA, EU, NASA), are a valuable tool for analysing shoreline evolution trends. These data can be used for supporting coastal erosion hazard and risk management strategies (Cenci et al., 2018). However, the accuracy of such trends is not often quantified because of the difficulties in finding systematic and freely available EO data at Very High Resolution (VHR) concurrently acquired over the same target areas to use as reference.

Within this context, this work was conceived for taking advantage of the Copernicus VHR optical datasets (spatial resolution: 2-4 m) to use as reference data to validate the shoreline evolution trends obtained by exploiting S1 and S2 images. The abovementioned analysis was carried out for a short-term scenario (i.e., 3 years: from 2015 to 2018) in an exemplifying littoral of the Mediterranean Sea characterised by both urbanised and natural coastal areas: i.e., Lido di Ostia (Rome, Italy). Importantly, the shoreline extraction method used in this case study was based on a methodological approach that allowed to map the shoreline positions with sub-pixel precision (Bishop-Taylor et al., 2019; Cenci et al., 2021).

Preliminary results showed that the shoreline evolution trends based on the S2 Visible Near-InfraRed (VNIR) spectral bands (spatial resolution: 10 m) retain an accuracy of 4.5 m (in term of Root Mean Squared Error - RMSE), if compared against the corresponding trends acquired by using Copernicus VHR data with a spatial resolution of 2 m. At the conference, the results of the analysis based on S1 data will be also presented, as well as a thorough interpretation and discussion of the S1 and S2 -based results that take into account the characteristics of the coastal area under assessment (e.g., presence or absence of defence structures) and the relationship between the magnitude of the shoreline advance/retreat trends and the corresponding accuracy. The overall objective of this work is to show the potentialities of the Copernicus EO data for the management of the coastal erosion hazard/risk in the Mediterranean area.

References:

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