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LITTOSCOPE: A SATELLITE-BASED SOLUTION TO SUPPORT COASTAL RESILIENCE

Abstract

Among the several effects of climate change, the rise of oceans level and occurrence of extreme meteorological events will inevitably result in coastal flooding episodes, temporarily or permanently affecting the coastal areas.

Rising to the challenge of mapping coastal flooding hazards and assessing their socioeconomic risks from satellite, the Littoscope solution, supported by the Centre National d'Etudes Spatiales (CNES) in the framework of the Space for Climate Observatory (SCO), promotes the use of satellite data for information and decision-making related to the impact of rising oceans in coastal areas.

Littoscope is based on three pillars: a) mapping the coastal flood hazards using high-resolution optical satellite images and satellite altimetry data to estimate future flooded areas, b) assessing coastal flood risks based on local exposures and c) proposing an IT tool dedicated to local decision-makers.

The mapping of several scenarios of coastal flood hazards relies on Pleaides satellite images, from which is derived a high-resolution (0.5m) Digital Elevation Model (DEM). It takes into account the sea level trends estimated from satellite altimeter missions since 1993 and decadal intensity of storm and tide surge from the global model MOG2D. The potential flooding water heights are estimated through a bathtub approach comparing oceanic and terrestrial heights. A high-resolution hydrodynamic model was also applied to evaluate the capability of satellite-derived DEM to be used in flood hazard and climate modeling study, or in early warning tools to prevent coastal flooding risks.

The resulting risks of coastal flooding are estimated by crossing the hazard intensity with social, economic, natural and cultural exposures coming from a multi-sourcing (national, regional and local GIS datasets combined with land use information derived from the HR optical satellite image).

Two demonstration areas were studied in France: the peninsula of Gâvres (4.5 km) in Brittany and a broader area (102.4 km) around the ponds near Palavas-les-Flots on the Mediterranean coast. The web platform has been co-designed with the concerned territories to provide them with a comprehensive and easy-to-use tool.

This communication will present the Littoscope solution and show how satellite data can be used in combination with other data to propose an easily replicable awareness tool for coastal areas at risk of sea level rise.