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DYNALIT: A RESEARCH AND OBSERVATION SERVICE MONITORING COASTAL MORPHODYNAMICS IN METROPOLITAN AND OVERSEAS FRANCE

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Abstract

DYNALIT is a research-based observatory on coastal morphodynamics. Created in 2014 from existing and new monitoring programs, recognised 'Service National d'Observation' by CNRS-INSU and member of Research Infrastructure ILICO, the observatory integrates over 30 sites in metropolitan and overseas France.

Keywords: Coastal monitoring, morphodynamics, topography, remote sensing, long-term coastal evolutions

1. Introduction

Coastal zones are among the most dynamic environments on Earth. Coastal zones are also home of a growing population and provide many eco-systemic services, while storms, accelerating sea-level rise and anthropogenic pressure put this environment at threat. Coastal observations at representative sites and time scales are needed to better understand the physical processes at play and hence to help adapting coastal planning strategies to future changes.

DYNALIT is part of the French Research Infrastructure (RI) ILICO for coastal ocean and nearshore observations (Cocquempot *et al.*, 2019). Data from DYNALIT are available using services provided by the ODATIS ocean and coastal data cluster of the French DATA TERRA RI (Schmidt *et al.*, 2020).

2. From at-a-site data acquisition … to fair data dissemination

Field sites monitored span different coastal systems: beaches, cliffs and estuary mouths, located across five oceanic facades (Figure 2). Variables measured comprise the subaerial topography through repeated surveys (frequency is monthly to annual) using GNSS and remote-sensing techniques such as LiDAR and photogrammetry. Surveys are generally conducted during spring low tides to maximise surface coverage. The sediment load represented by turbidity is measured at the estuary sites.

The continuously updated dataset can be accessed at: http://www.dynalit.fr/. It incorporates historical data as well as continuous monitoring from the 2000s, resulting in over 1000 beach profiles, 500 topographic point clouds and DEMs, orthophotos as well as bathymetric DEMs georeferenced to legal reference systems and distributed under an open licence. The data are readily usable with a variety of GIS and programming software and enable online access and visualisation.

3. Field data of coastal morphological evolution over yearly and decadal timescales

Observations of coastal morphological evolution indicate complex behaviour over a wide range of scales in time and space. Of particular practical and scientific interests are timescales of years and decades (Figure 1). Datasets produced in the framework of DYNALIT typically encompass time series of topographic surveys (one- or two-dimensional in space), possibly with some simultaneous measurements of the forcing (e.g., wind, waves, and currents).

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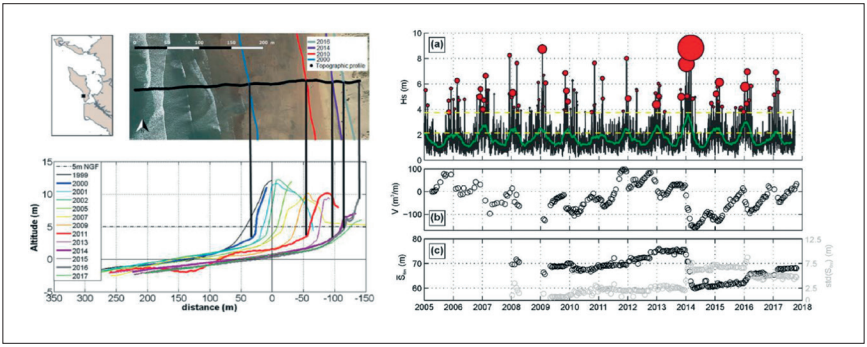

Fig. 1. Time-series using the datasets of Oléron and Truc Vert beaches. Decadal shoreline changes at Saint Trojan beach (Oléron) identified using shoreline mapping (top left) and topographic profiles (bottom left). (Right) (a) 3-hourly Hs (black) and 2-month moving average of Hs (thick green) using wave hindcast data. Red bubbles are storm events (Hs > Hs95%), whereby the size of the bubbles is proportional to storm duration. Beach-dune volume above mean sea level (b), and mean (black) and longshore standard deviation (grey) of the 6-m elevation shoreline (c), determined using topographic quad-mounted GNSS DEM surveys. Adapted from Castelle *et al.*, (2019) and Chaumillon *et al.*, (2019).

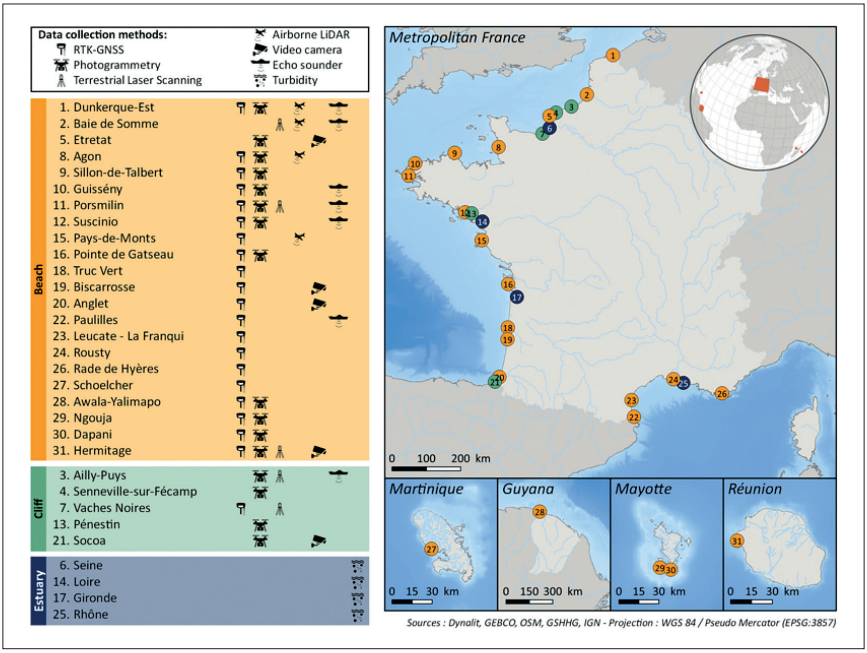

Fig. 2. Field sites monitored and data acquisition methods.

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