Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.17494

Fingerprinting of sediment transport processes in heavily anthropized macrotidal littoral area: an innovative geochemical approach

CLÉMENT FRIGOLA, ROANNE DESGRANGES, GWENDOLINE GRÉGOIRE, ANNE MURAT, EMMANUEL POIZOT, VALENTIN LEGOFF AND YANN MÉAR

CNAM intechmer

Presenting Author: clementfrigola@hotmail.fr

The coastal zone is subject to a fragile equilibrium maintained by the interactions between hydrodynamic, biological, and anthropic agents. The study area « Anse du Cul de Loup » (East Cotentin, Normandy, France), a 4 km2 intertidal cove, displays (1) strong tidal currents with (2) swell currents (strong to low longshore current), (3) varied sedimentary sources (marine production, oyster farming, river inputs), and (4) heavy anthropization (artificialized coast, a 1 km-long seawall, oyster farming).

This site is of specific interest to the scientific community who aims to maintain both a good environmental balance (Natura 2000 site classified as a natural zone of ecological, faunal, and floral value, ZNIEFF) and aquaculture activities (oyster farming).

During the sampling campaign (2022), 109 subsurface sediment samples were collected according to a regular grid. Grain Size Trend Analysis (GSTA) method based on granulometric data was carried out to determine the sediment dynamics. Geochemical analyses of major, minor and trace element composition by X-ray fluorescence spectrometry were first carried out on the bulk sediment. An elemental analysis of bulk sediment will be strongly influenced by the particle size distribution of the sample and will therefore be representative of the energy of the depositional environment and provide access to the direction of transport from source to sink. Elemental analysis of bulk sediment also highlighted two main anthropogenic impacts: silting-up in the area sheltered from the swell by the seawall and increasing calcium carbonate in relation with oyster farming. In order to abstract from granulometric variability and to access the geographical variability of the sources, an innovative geochemical approach has been implemented.

Analyses were carried out on 16 granulometric fractions. The use of geochemical proxies obtained by elemental analysis of particle size fractions, allowing to map the transport of heterogeneous sediment components (mud, siliciclastic sands and carbonates). This will enable to trace for the first time in situ the dynamic behaviour of each sediment component.