The impact of sediment compaction on the calculation of sedimentation rates and sedimentary fluxes based on physical and geotechnical properties from PROMESS1 boreholes PRGL1 (Gulf of Lions, Western Mediterranean)

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The PROMESS1 PRGL1 borehole offered a unique opportunity to collect a continuous sediment succession and in situ geotechnical measurements (300 m water depth, Latitude N42∞41.39, Longitude E003∞50.26, length 300 m).

The mechanical properties of sediment are related to their composition and to the compaction. The geotechnical data from CPTU (in situ Cone Penetration Testing) and laboratory analyses allow quantifying the compaction rate of the sediment related to the burying.

Here, we compare sedimentary fluxes calculated from the physical properties and from the geotechnical properties measured on boreholes PRGL1.

The calculation of sedimentary fluxes from a sedimentary record is classically obtained via the reconstructed age-depth model and the density of the sediments from the following equation:

Φ (g.cm^{-2}.ky^{-1})= Thickness of sediment layer (cm) x Dry density (g.cm^{-3}) / Time (ky)

This calculation corresponds to a normalisation of the sediment accumulation rates by the compaction of the sediment and allows reconstruct a more realistic scenario for the

sediment accumulation calculation by removing the burying history of the sediments.

The calculation of the dry density of the sediment needs a precise measurement of the bulk density and/or the measurement of the water content. The grain density can be measured by pycnometry or hypothesized.

Calculating a compaction ratio from geotechnical data offers and independent alternative to the classical method.