From a regional wave hindcast database to characterization of coastal sediment cells: the case study of Guadeloupe island

Jessie Louisor[1], Déborah Idier[1], Manuel Moisan[2], Rodrigo Pedreros[1]

[1] *BRGM, 3 Av Claude Guillemin, BP 36009, 45060 Orléans Cedex 2 – France.*
[2] *BRGM, Parc d'activités de Colin - La Lézarde, 97170 Petit-Bourg – Guadeloupe.*

We here present a study on characterization of sediment cells on Guadeloupe island coasts. This type of delimitation is relevant for coastline managers, because coastal measures taken inside a cell may affect other sectors of the same cell but are assumed to not affect the other cells.

In order to obtain the dominant coastal drift direction along the Guadeloupe coasts, the method consists in characterizing the sea states close to the coast, with: i) a statistical analysis of the offshore wave (on Hs, Tp, and Dp) and wind features provided by the regional sea state model IOWAGA-CRB from 1990 to 2016 (by Ifremer/Lops) and CFSR/CFSv2 (by the NCEP) for winds selected on the same period. We identified several clusters of offshore representative conditions, by applying statistical clustering methods namely k-means++, and DBSCAN. ii) The use of the third generation wave model WAVEWATCH III© forced by all the clustered offshore conditions in order to obtain the sea states along the Guadeloupe coasts (100m × 100m resolution).

The results, combined to field expertise, contribute to identify the dominant direction of the sediment transfers and the homogeneous cells associated. It should be noted that a satellite based product providing the mean wave conditions (Hs, Wavelength or Tp, Dm or Dp) at a spatial resolution of about 1 to 10 km, together with an estimation of the error, would have been an interesting complementary dataset. Indeed, in our studies, the availability of wave spectrum, appears crucial in some cases (e.g. shoreline evolution in embayed beaches, flood induced by overtopping, wave conditions offshore leeward coasts, as for instance the west coast of most of the Caribbean islands). In addition, the availability of satellite based wave tracks are crucial for us to validate wave models when applied to predict waves induced by cyclones.