Automatic identification by clustering of ocean circulation patterns and current back-sequences driving the transport of Sargassum seaweed beds to the Lesser Antilles

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The massive strandings of Sargassum seaweed observed over the last decade represent a new natural hazard (human health, environmental damage and economic losses) currently affecting Caribbean island nations.

This talk presents the study to improve the prediction of surface current dynamics leading to stranding in the Lesser Antilles using cluster analysis methods combined with an expert metric [2]. The input surface currents were derived from the Mercator model and the Hybrid Coordinate Ocean Model (HYCOM) outputs in which we integrated the windage effect. Previous daily observations of Sargassum strandings off Guadeloupe and Sargassum abundances off the coast based on satellite data were also included.

Four representative circulation patterns were identified in the Mercator and HYCOM data. Analysis of the current back-sequences leading to strandings showed that recurrences of the two current regimes were associated with the stranding peaks observed in March and August.

The performance scores of the predictive model indicated that the HYCOM data seemed more appropriate for assessing the risks associated with coastal Sargassum in the Lesser Antilles. In the test year (i.e. 2021), the accuracy of the decision tree reached 70.1% and 58.2% for HYCOM and Mercator, respectively, with a temporal uncertainty of $\pm$ 3 days before and after the prediction date. The current cluster analysis forecasting system, which requires less computational resources than traditional forecasting models, will improve risk management for the islands in this region [1].

[1] D. Bernard, E. Biabiany, R. Cécé, R. Chery, N. Sekkat. *Clustering analysis of the Sargassum transport process : application to beaching prediction in the lesser antilles.* Ocean Science, **18(4)**, 915–935, 2022. doi :10.5194/os-18-915-2022.

[2] E. Biabiany, D. C. Bernard, V. Page, H. Paugam-Moisy. *Design of an expert distance metric for climate clustering : The case of rainfall in the lesser antilles.* Computers Geosciences, **145**, 104612, 2020. doi :10.1016/j.cageo.2020.104612.

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