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Orientation: Ocean Observation and Global Change

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PhD project: Characterization of the main Iberian Peninsula and French Atlantic turbid plumes using MODIS satellite data

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Summary: A river plume can be defined as a water mass with different properties than surrounding ocean water, in terms of salinity, temperature, composition and color, due to the influence of a river discharge. This is because river inputs provide fresh water, nutrients, sediments, organic and inorganic material and/or contaminants, among others, into the ocean, modifying the physical, chemical and biological conditions of the coastal areas under influence. Therefore, plumes play a key role in the affected areas, and hence, the importance to characterize and improve the knowledge on plume dynamics.

Turbid plumes formed by the main Iberian Rivers were analyzed and compared, in order to determine similarities and differences among them. Plumes dynamic was evaluated through synoptic patterns obtained by means of MODIS satellite imagery, due to the high spatial and temporal resolution provided. Composite images were constructed averaging those days characterizing each driving force in order to obtain the mean plume state under each forcing. Then, the study was expanded to analyze the most important plumes formed in the Atlantic coast of France (Loire and Gironde plumes), which are subjected to similar conditions to those plumes formed in the Atlantic coast of Iberian Peninsula. The influence of the most important teleconnection indices on these plumes was also evaluated, as well as the impact of these plumes on the thermohaline properties of seawater.

In general terms, river discharge showed to be the main forcing affecting the plumes under analysis, with wind acting as the secondary forcing and tide as the third one, although with marked differences among the plumes, promoted by the regional morphodynamics of each area. In addition, French Rivers provoke important differences in the thermohaline properties of seawater inside and outside the turbid plume. In fact, the ocean area warms while the coastal area occupied by the plumes cools during winter months.

