

Regions Of Freshwater Influence in the Bay of Biscay and the English Channel during the last two decades

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Abstract

In areas on the shelf adjacent to estuaries, coastal seas can receive large amounts of freshwater from rivers, which can make a dominant contribution to buoyancy input. In addition, these Regions Of Freshwater Influence (ROFIs) undergo significant inputs of nutrients, particles and pollutants. Those regions and their ecosystems are therefore exposed and sensitive to changes associated with evolutions of anthropogenic and climatic pressures. In the Bay of Biscay and the English Channel, major ROFIs are generated by the inputs from the Seine, the Loire and the Gironde rivers.

Based on realistic numerical long-term simulations, using the coastal ocean model CROCO with 1km spatial resolution, the last two decades have been simulated allowing us to characterize these three ROFIs dynamic and to study their annual and interannual variabilities. The evolution of ROFIs 3D structures is investigated with regard to dynamical forcing (e.g. runoffs, winds, tides). Over the studied period, ROFIs present significant variability on different timescales from semi-diurnal to interannual as well as an important spatial variability (including horizontal extension and vertical structure). Analyses show that the variations observed are mainly due to runoff dynamics and are then reinforced or attenuated by winds. Finally, tidal dynamics play a more secondary role. The results obtained do not reveal any ten-year trends, but rather a succession of specific years that may lead to extreme dynamics in the ROFI. Those first results are designed to pave the way for an assessment of ROFIs evolution and impact on the coastal ecosystem over the 21st century, in the context of climate change.