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Modelling of the Iroise Sea: sensititivity of the Ushant tidal mixing front and lagrangian cross-frontal exchange.

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The Iroise Sea is a shelf region located at the southern-western of the English Channel, on the coastal shelf. In summer, from May to September, a strong tidal mixing front, called the Ushant front, develops and shelters an intense biological activity. Many studies focus on shelf regions subjected to strong tides forcing (Georges Bank, Celtic Sea, ...), nevertheless few works have focused on the Ushant front for the last 20 years. Although the circulation appears largely dominated by strong high frequency tidal forcing, it presents a large variety of spatio-temporal scale and a quite developed meso-scale activity, suggesting the influence of other processes and giving raise to a highly complex dynamic. In order to understand the physical processes that govern the circulation in the Iroise sea, we built a regional realistic high-resolution numerical model with generalized sigma coordinates (ROMS_AGRIF). We then carried out several sensitivity experiments in order to understand the contributions of atmospheric, open ocean and tidal forcing on the dynamics of the Ushant front, focusing on its mean position, its variability and its vertical structure. In particular, we investigate, in term of tidal stress, the physical mechanism driving the tidal low frequency circulation in the region. We then characterize the mass and tracers exchange across the front using a lagrangian technique based on the dissemination of particles along the frontal mean position.