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Estimation of residence times of an estuarine bay (Baie des Veys, Normandy, France) using a hydrodynamic model. Consequences on the ecosystem.

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The « baie des Veys » is an open estuary and intertidal ecosystem (37 km²) influenced by four rivers. This bay is well known for its oyster farming (10500 tons produced per year). At the bay scale, spatial differences in the structure of phytoplanktonic and microphytobenthic communities were observed as well as biological performances of cultivated oysters. It was assumed that a trophic heterogeneity exists in the bay without further evidence on the mechanisms controlling it. The purpose of this study was to evaluate to what extend residence times of water bodies can explain spatial differences already noticed.

A three dimensional (3D) numerical hydrodynamic model coupled to a transport model has been built. To optimize computation times, an horizontal rectangular grid with irregular meshes allowing a more detailed approach on studied area has been developed. The model has been validated using *in situ* measurements of currents, water depth and salinity. Currents and water depth have been measured with an ADCP current profiler. Salinity data came from 6 CTD probes located in the oyster farming area. Several simulations using different panel of forcing functions (*e.g.* tide level, river flows, wind forces and direction) were run to provide estimation of residence times.

At that time, the results indicated a rather good concordance between the model simulations and the observations leading to a validation of the model. Estimation of residence times are still in progress and results will be discussed accordingly.

The next step is to link a biological sub-model to the existing hydrodynamic model with the general aim of evaluating the interactions between oyster farming and the ecosystem.