



Hydrodynamic characterization of a microtidal estuary during summer in the NW Mediterranean Sea

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The Ebro Delta (NW Mediterranean Sea) is characterized by the presence of two semi-enclosed bays: Alfacs and Fangar. Both bays receive direct freshwater input from drain channels of rice fields. Southern Bay, Alfacs, is about 14km long by 4km wide with an average depth of about 3.1 m (maximum of 6.5 m in the middle). The mouth is about 2.5 km wide. The non-tidal flow in the area has been studied in the past, showing a persistent structure during most of the year: a salty layer in the bottom and freshwater layer on top due to freshwater input. The bay is micro-tidal, with a mixed tidal regime.

An extensive field campaign was designed in order to characterize the hydrodynamic and T/S patterns during summer. First CTD transects were conducted during June 2012 and July 2013. Moreover, the positions of lagrangian drifters were tracked recording trajectories at sub-surface waters. Finally, two moored stations (within the Bay and Mouth) allowed to obtain hydrodynamic and T/S conditions during two-month period in summer 2013. Atmospheric data were obtained from three fixed land stations.

Data analysis showed density differences from surface to bottom in the middle of the bay around 3-5 kg/m³ and almost constant over all the period. The density profiles seems to be controlled mainly from freshwater contributions (differences of 1.5 in salinity), although heat fluxes in summer contributes positively to the column stabilization (maximum vertical temperature differences of 5-6°C). Observed well-mixed conditions were related with energetic wind events (northerly winds). The variability on water circulation is dominated by seiches (3h and 1h), with a clear barotropic mode and maximum intensities of 50 cm-s⁻¹. These variability is modulated by diurnal winds (sea breeze regimes). On the other hand, low frequency motion is controlled by baroclinic estuarine circulation.