



Sedimentary process and recent morphological evolution in the Arcachon lagoon, France: a long and short term approaches

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The Arcachon lagoon is a mesotidal embayment in the south Atlantic coast of France. Its total surface is about 174 km², where 65% is formed of tidal flats. Previous studies have shown a relative stable morphology over a period of 126 years, and a very long infilling trend, with a total accretion rarely exceeding + 0.5m in some areas. This is consistent with the fact that fine sediment input from rivers is very low. However at the tidal short term, erosion of mudflats can reach several centimeters, especially under energetic windy conditions. Additionally, recent high-frequency monitoring showed that tidal flats experience erosion and accretion of several dm at the seasonal scale, following the annual cycle of seagrass *Zostera noltei*, which develops on the intertidal areas. These patterns support the most recent observations made by end-users of the lagoon, which point out relative infilling of the channels and increase of turbidity in the water. The whole set the observations suggest that a mobile stock of surficial sediment is available in the lagoon, which contributes to the accretion of the flats, but is also transported towards the channels, when erosive conditions prevail. The aim of this presentation is to show the patterns and conditions of mobility of this stock of sediment. In this work, a set of unpublished data of physical forcing, sediment dynamics and bathymetry of the lagoon, are analyzed over a period of 148 years (1864-2012), which an intermediate scale between the long-term and short-term scales, with bathymetric and LIDAR surveys. In addition, we performed a short-term analysis based on the monitoring of altimetric and granulometric variations in the northern area of the lagoon. We show that accretion and erosion rates are significant at the annual scale with clear trends of exchanges between the center of the lagoon and the internal banks. There is a spatial and temporal difference in the long-term sedimentary balance between each period analyzed. For the period 1993-2001 the lagoon shows a tendency to erosion, coinciding with the results obtained by L'Yavanc (1995) and Allard et al. (2009), that is to say: accretion in the channels and erosion in the intertidal zone. For periods after 2001, the lagoon has an overall pattern of accretion, coincident with the indirect observations of local residents. However, there are areas where erosion dominates, especially in the inner lagoon environment. At the level of the season, the lagoon shows a spatial variation, in which the long-term dynamics are repeated, that is to say, a cyclic variation of erosion and accretion.