3D FACIES ARCHITECTURE AND DYNAMICS OF A BEACH BARRIER-LAGOON COMPLEX (RÍA DE VIGO, GALICIA, SPAIN) (POSTER)

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Tidal-fluvial estuarine processes and interactions have been studied by monitoring tidal stages, current velocities, river discharges, water slopes, grain size, and transport rates during several tide cycles in the beach barrier-lagoon complex located in A Ramallosa. The sedimentary complex is located in Baiona Bay, at the southeast corner of the Ria de Vigo. The beach barrier (Playa Ladeira) is a north-south, 800 m long and 88-120 m wide feature, located to the west of the complex. Behind the beach barrier a 0.88 km^2 intertidal flat is developed. Three rivers enter the complex toward the north and east, the Miñor, Groba and Guillade-Belesar. All of them merge and connect to the open sea by a narrow inlet located to the south. An ebb tidal delta is developed at the mouth. Tidal range is mesotidal (2-5 m). During high tides the complex evolves to a shallow lagoon, flooding about 90% of the complex in average tides. Tidal deposits consist of sub to intertidal sand flats and mid-channel ramps, mixed intertidal mud-sand flats and intertidal to supratidal marshes.

The Minor River has a single, 22 m wide, meandering channel at the upstream reach. Further downstream, about 3 km from the coast, it develops into an estuary entering the Ramallosa Complex from the north. The estuarine reach shows a fairly straight, 54 m wide channel with several alternate bars evolving downstream to a multi-channel braided system where mid-channel bars and tidal ramps dominate. The Groba River is a moderately sinuous channel about 9 m wide at the upstream reach. It enters the complex on the southern margin showing a discrete anastomosing pattern. Individual channels are about 35 m wide. The Minor and the Groba rivers merge close to the narrow outlet located at the north end of the beach (Ladeira). Current velocities and current directions have been recorded in 0.02 to 0.10 m flow cells across the entire river and estuarine sections with a 4 beam acoustic Doppler profiler. River discharges and tidal flow have been established at several points along the rivers and tidal inlet at different tidal stages to establish tide influence along the rivers. Tide curves have been recorded at 3 locations over 90 hours at 5' intervals with pressure transducers. Fluvial discharges and stage fluctuations were obtained over several years to construct a rating curve. Measured fluvial discharges obtained at the Miñor and Groba Rivers were 0.57 m^3s^{-1} and 0.14 m^3s^{-1}, very low values in relation to average figures obtained for the Miñor (2.7 m^3s^{-1} during 97-98 and 6.7 m^3s^{-1} during 2000/2001; Pérez-Arlucea *et al*., 2005).

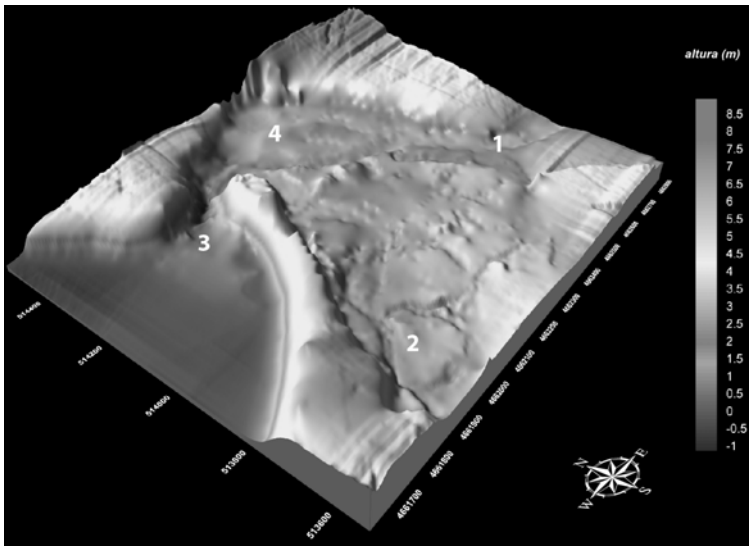

Figure 1 - Digital elevation model for the Ramallosa beach barrier-lagoon complex. 1 Miñor River entry; 2 Groba River and inner marshes; 3. Ebb-tidal delta and 4. Tidal ramps in the Miñor estuary area.

Transport conditions have been calculated for both flood and ebb currents in estuarine channels and intertidal areas. Transport rates have been directly measured with Helley Smith

sediment traps. Fluvial currents showed extremely low stages and flow regime over the current year, so the present conditions show the minimum possible fluvial influence in the intertidal areas.

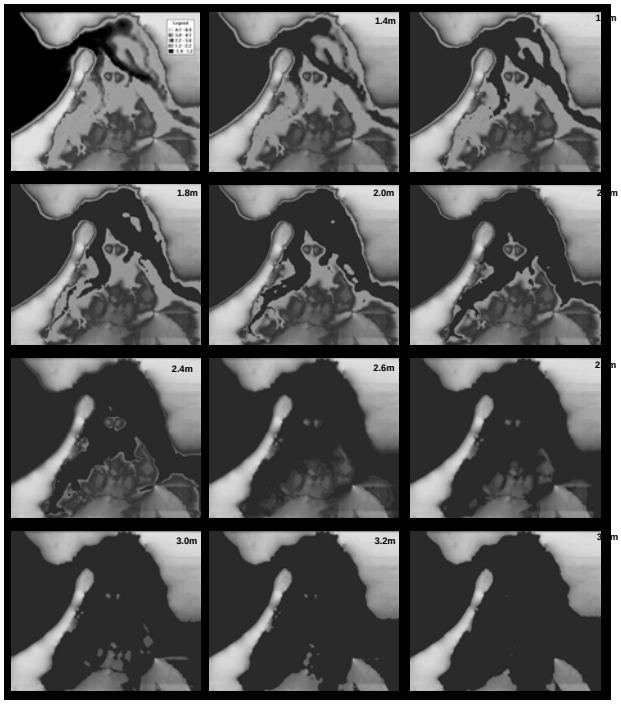

Figure 2 - Tide flood model (0.20 m intervals).

Even under these conditions grains can be transported in and out of the complex by fluvial and tidal currents. Tidal currents flood and ebb through a 50 m wide inlet into the inner intertidal area, causing a funnel effect. Flood tidal currents show maximum velocities of 0.95 $m.s^{-1}$ and ebb currents of 0.89 $m.s^{-1}$. Calculated flow competence indicates movements of sedimentary particles up to 8 mm, which accumulate on an ebb tidal delta. Flood currents allow 10 mm particles to move and accumulate in tidal ramps in the intertidal areas. Sediment transport values obtained with Helley-Smith sediment traps gives values from 0.01 to 0.4 kg $m^{-1}s^{-1}$,

Finally, a model for tide distributions has been generated from a DEM obtained with a Nikon DTM-330 Total Station (Fig. 2). About 90% of the complex interior is located in the intertidal area. Facies distributions show sand dominated environments toward the west and north (estuaries, sand flats and tidal ramps) and inner vegetated marshes toward the east (muddy sand and fine sands). From the digital topographic model and sediment distribution maps a threshold for mud deposition have been established for the sedimentary complex at about 2.0-2.5 m of elevation.

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