The material sources and processes during the infilling of estuaries in Algarve (South Portugal)

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The area of the Arade Estuary

The actual estuary that occupies the Boina-Arade paleo-valley accommodated the Holocene sedimentary sequence whose thickness does not exceed 35 m in the deepest zones, as registered from geotechnical borehole data. We present here the results of partial analyses of two continuous cores which cross the Holocene sequence until the Pre-Quaternary substratum. In the P5 core (Boina river), the sedimentary column, which spans 20 m accumulated during ca 8500 years. In the light fraction of sandy layers, feldspars (both plagio-clases and orthoclases) and hydro-muscovite, originating in slates or feldspar alteration, are abundant. The heavy minerals with a contribution of 10 to 19% of total weight are very abundant. Pyrite, which is very abundant in the heavy fraction, comes from the reaction between iron and the sulfur released during microbial sulfate reduction processes. The rest of the heavy mineral assemblage is made of pyroxenes and amphiboles (predominantly alkaline), titanite, biotite, rutile all originating from the Monchique Massif and some minerals originating from the slate-grauwacke substratum such as andalusite and epidotes. The sedimentary sequence from Odelouca-Arade river estuary (P2) is similar to the above-described sequence. While the clay mineralogy from both areas does not reveal significant differences, the sandy fraction mineralogy in P2 differs from the one of Boina area as follows: quantitatively smaller heavy mineral fraction, more rounded quartz grains and quantita-tively fewer minerals originating from the nepheline massif.

The area of the Guadiana Estuary

During the last 4 years, a series of boreholes has been carried out with the aim to recognize the structure, mineralogy and geochemistry of the sedimentary sequence of the Guadiana river estuary (Boski *et al.*, 2002). The deepest core, which will be discussed hereafter, reached the slate-grauwacke substratum at a depth of 52 m, corresponding to 13000 years. The studied sequence starts with sandy fluvial deposits in which, besides quartz, lithic grains and hydromicas are predominant. The rest of the sequence, up to the surface, is mainly silty-clay sediment composed of illite, interstratified and kaolinite, with mean contents of 58%, 29% and 12%, respectively. In this sequence, the benthic foraminifera analysis reveal three main steps for the estuary's evolution: confined, open to marine circulation and confined during terminal infilling. Regarding the geochemistry of the organic fraction, the lower section of the sequence (up to ca. 15 m deep) is characterized by a mean organic carbon (OC) content ≈ 1.1% and by the persistent occurrence of phytol, a marine phytoplankton biomarker coming from the incomplete degradation of chlorophyll (Gonzalez-Vila *et al.*, 2003). Pyrite, which is an indicator of reducing conditions, has also been observed in several levels of this section together with sulphur contents above 1% of dry weight.

References

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