

Lateglacial and Holocene environmental reconstruction of the Santo André lagoon (SW Portugal): geochemical proxies to coastal sedimentary facies

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The Santo André lagoon corresponds to a Lateglacial/Holocene basin infilled by sand, mud and (minor) carbonate sediments of fluvial, lagoonal and marine origin. Sedimentological, paleontological and geochronological (¹⁴C) analysis of core samples recognized four main stages of environmental evolution: (I. 14000-10000BP) terrestrial sedimentation, contemporaneous with lower sea level and distal shoreline; (II. 10000-5000BP) open marine, high energy embayment, associated with a proximal coastline; (III. 5000-1620BP) barrier-lagoonal environment, with lagoonal facies oscillating between marine and fresh-water character; and a (IV. 1620BP-Present) terminal episode of fluvial sedimentation with occasional brackish flooding. Downcore geochemical variations on Al, Ca and Sr primarily reflect the lithological heterogeneity, whereas several elemental/isotopic contents/ratios correlate with variable sediment sources and relative contributions of marine/terrestrial inputs to the lagoonal basin. Samples corresponding to stages II and III marine-dominated sedimentary facies are characterized by higher S (>0.5 wt%), Cl (>500 ppm), Br (>10 ppm), I (>6 ppm), TI (>0.2 ppm), Mg/Al (>0.1), Cu/Pb (>1) and Zn/Pb (>2.5) values, but lower Th/Al (<1.2*10⁻⁴), K/Al (<0.35*10⁻⁴) and ⁸⁷Sr/⁸⁶Sr (0.711157 - 0.716536 vs 0.724493 - 0.740434) ratios, when compared to terrestrial sediments of stages I and IV; moreover, asynchronous geochemical oscillations within stages II and III also translate into the paleoecological record, reflecting different elementary response times to shortlived episodes of fresh/brackish-water influence. The results clearly demonstrate the significance of geochemistry as an environmental sensitive proxy; we suggest further, that this same approach may also be used to identify in the geological record and characterize past catastrophic events (eg. tsunamis) affecting coastal areas.