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Upwelling conditions at the Ria de Aveiro (NW Portugal)

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Ria de Aveiro is a shallow estuarine system with a very complex geometry, characterized by narrow channels and large areas of mud flats and salt marshes. The morphology of Ria de Aveiro can be described as an arborescent system of channels with a single connection to the sea. Each channel is independent of the other arms and each one can be considered as a small estuary. Upwelling conditions were analyzed at a control point placed near the ria mouth from October 2003 to September 2004. The effects of upwelling events were not observed at the Ria de Aveiro mouth, even in summer, when atmospheric conditions showed strong upwelling favorable conditions at the adjacent shelf. Temperature-salinity measurements allowed the differentiation of two types of estuarine water at the mouth of Ria de Aveiro. The first one was observed from November to April with temperature and salinity values lower than the Eastern North Atlantic Water and the Iberian Poleward Current, and the second one from May to October with temperature and salinity values higher than the previous referred water masses. Therefore, water masses associated with upwelling events were not observed at the estuarine system mouth during all the period under study. The shallowness of the estuary mouth could limit the ocean water entrance avoiding the consequences of upwelling events inside the estuary.