

# Influence of internal *versus* diffuse sources on nutrients and trace elements in water: the case study of a eutrophic coastal lagoon

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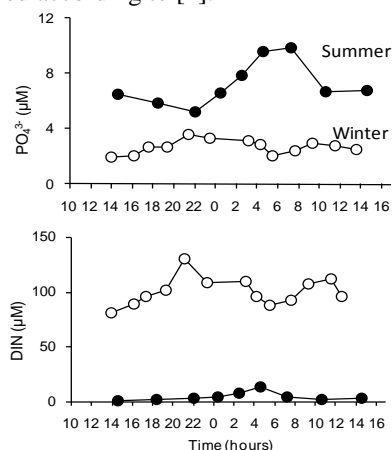
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**Introduction:** Most coastal lagoons in Europe are undergoing a major human impact. Accumulation of organic matter makes such systems vulnerable to eutrophication [1]. Rivers, tributaries, as well as localized and diffuse sources supply nutrients to coastal lagoons. Eutrophication may, however, create conditions for sediment to act as an additional internal source of regenerated nutrients and redox-sensitive elements [2]. This work reports the day-night variation of nutrients and trace-element/Al ratios in water of a eutrophic coastal lagoon (Óbidos, Portugal). Observations under summer and winter conditions allowed to compare the relevance of internal and diffuse sources for biologically active elements and contaminants.

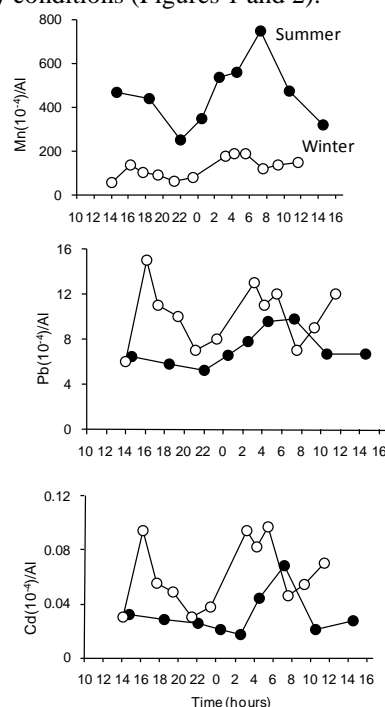
**Methods:** Dissolved nutrients and trace-element/Al ratios in suspended particulate matter (SPM) were obtained in the water column of a confined area of the Óbidos lagoon, over day-night cycles (each 2-4 hours) under summer and winter conditions. Determination of nitrate, nitrite, ammonium, phosphate and silicate was performed as described in [3]. Aluminium and trace elements in SPM were quantified according to [4].



**Fig. 1:** Day-night variation of DIN and phosphate ( $\mu\text{M}$ ); winter and summer conditions.

**Results:** In summer, water column of a confined inner area showed a broad range of dissolved oxygen, from 40% at night to 200% saturation at daylight. This reduction overnight was accomplished by a marked increase of phosphate concentrations and ratios to Al of Mn, Fe, Cd and Pb in SPM. In winter, under freshwater discharges and well oxygenated conditions, DIN showed an accentuated increase, phosphate and Mn/Al ratio varied within narrower intervals, whereas Cd/Al and Pb/Al ratios ranged

within similar intervals to those observed in summer. Metal/Al ratios peaked in ebb periods of lower salinity conditions (Figures 1 and 2).



**Fig. 2:** Day-night variation of trace-element/Al ratios; winter and summer conditions.

**Discussion:** The results point to contrasting patterns among parameters in the two surveyed periods. Dissolved inorganic nitrogen increased in winter, due to low consumption and possible inputs from diffuse sources, while phosphate increased in summer reflecting the regeneration in the sediments. Seasonal variation of the nutrient pool composition has impact on the plankton communities [3]. Manganese in SPM increased markedly by the precipitation of oxides in summer. Other trace elements showed exchanges across the sediment-water interface under periods of low oxygenation in summer, as well as inputs from diffuse sources in the rainy season.

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**References:** [1] Pérez-Ruzafa et al. (2005) *Hydrobiologia* 550, 11-27. [2] Point et al. (2007) *Estuarine Coastal Shelf Sci.* 72, 457-471. [3] Pereira et al. (2012) *Estuarine Coastal Shelf Sci.* 1122, 61-72. [4] Caetano et al. (2007) *Sci. Total Environ.* 380, 84-92.