

Apresenta-se o estudo dos ostracodos recolhidos em 90 amostras de sedimento (30cm³ cada), provenientes de 5 perfis dos estuários dos rios Minho (2 perfis – CP, PR) e Lima (3 perfis – NSR, DAR, BPR). A amostragem, feita em Abril (45 amostras) e Outubro (45 amostras) de 2011 abrange o raso de maré, baixo e alto sapal. Cada amostra, conservada em álcool, foi tratada laboratorialmente segundo os processos clássicos de lavagem, coloração, triagem (100%); considerou-se 1 indivíduo=1 carapaça ou 1 valva. Foram medidos os parâmetros de temperatura, salinidade, pH e oxigénio dissolvido das águas do estuário e intersticiais do sedimento.

No rio Minho o número de espécies encontradas vivas no sapal é maior, onze no total, sendo as mais abundantes: *Leptocythere porcellanea* (Brady, 1869), *Leptocythere* sp. A, *Loxococoncha elliptica* Brady, 1868, *Cytherois* cf. *stephanidesi* Klie, 1938 e *Cytherois fischeri* (Sars, 1866). No rio Lima foram encontradas 7 espécies, sendo a mais abundante *Leptocythere ciliata* Hartmann, 1957. Nos dois rios o número de espécies e de indivíduos é maior no outono, quando os valores de salinidade estão, em geral, mais altos. Esta característica é mais notória no rio Minho.

O alto sapal, nos dois estuários, quase não tem ostracodos. Apenas no Minho (CP) foi encontrada *Tuberoloxococoncha* sp. I. O baixo sapal, no Minho, é essencialmente colonizado (ordem decrescente) por *L. porcellanea* e *L. elliptica* e *C. cf. stephanidesi* só no outono; no Lima é dominado por *L. ciliata* e *L. porcellanea*, associadas raramente a *L. elliptica*. No raso de maré, no Minho, dominam *Leptocythere* sp. A, *C. fischeri* (outono) e *L. elliptica*; no Lima *L. porcellanea*, *L. ciliata* e *L. elliptica*.

Palavras chave: ostracodos, sapais, dinâmica sazonal, salinidade, assoreamento.

Keywords: ostracods, tidal marshes, seasonal dynamics, salinity, siltation.

Application of Factor Analysis for the characterization of major and trace elements in surface sediments of the Minho estuary

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Surface sediments were collected from 49 sites along the Minho estuary (between Tui and Caminha) and analyzed for grain size, organic carbon and total nitrogen contents, major and trace element

concentrations. Factor Analysis was used to reduce 22 selected variables into 4 factors accounting for 85.9% of the total variance explained, suggesting distinct elemental sources or sediment components affecting their spatial distributions. While factors 1 (detrital component; elements strongly associated with fine (Na, Mg, Ti, Li, Cr, Cu, Fe, Al, Zn, Ca, As) and coarse-grained sediments (Si, K, Rb, mean grain-size) and 3 (Mn oxo-hydroxide sediment component; Mn) are interpreted as reflecting predominance of natural contributions, factors 2 (urban & industrial contamination; sediment components (fine fraction, Pb, Hg, C_{org}, N_{tot}) and 4 (component associated with contamination by nautical activities; Sn) seems to indicate anthropogenic contributions. Spatial distribution of dominant factor scores shows the dominance of factors 2 and 4 between Tui and Vila Nova de Cerveira, while samples dominated by factors 3 and 1 are found between Lanhas and Seixas and in the Caminha areas, respectively. Despite the dominance of factor score 1 in the Caminha area, the distribution pattern reveals samples dominated by other factor scores that can be explained by dredging activities in this river sector that restore ancient sedimentary characteristics or expose contaminated sediments. Through the identification of sample locations dominated by factors associated with contamination it will be possible to select them as priority areas where new environmental (e.g. toxicity tests, organic Sn compounds) studies should be implemented in the future.

Palavras chave: Estuário do Minho, sedimentos superficiais, metais pesados, análise factorial.

Keywords: Minho estuary, surface sediments, heavy metals, factor analysis.

Natural heavy metal concentrations in sediments of the Minho estuary (Portugal): Baseline values for environmental studies

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Forty-nine surface sediment samples from the Minho estuary sector between Tui and Caminha are analyzed for grain-size contents, Al, As, Cr, Cu, Hg, Li, Pb, Sn and Zn concentrations. Selected heavy metals (As, Cu, Cr, Hg, Sn and Zn) distributions were normalized against Al with the main goal of compensating natural grain-size variability. Lead not reveal significant relationship with Al. Assuming the general non-

impacted metal character of the Minho estuary sediments, regional geochemical baselines (RGB) are defined for differentiating between natural and anthropogenic contributions. Based on RGB defined for each heavy metal, the degree of enrichment is estimated through the determination of enrichment factors. Despite relatively low total heavy metal concentrations, defined RGB identifies a set of samples characterized by presenting As, Cu, Cr, Hg and Zn enrichments relatively to Al. Mercury is the element showing the highest level of enrichment relative to the baseline values.

Palavras chave: Estuário do Minho, sedimentos superficiais, metais pesados, valores de *baseline* geoquímica, factores de enriquecimento.

Keywords: Minho estuary, surface sediments, heavy metals, regional geochemical baselines, enrichment factors.

Effects of ultraviolet radiation, CO₂ and temperature increase on winter phytoplankton assemblages in a temperate coastal lagoon (Ria Formosa, Portugal)

Efeitos do aumento da radiação ultravioleta, CO₂ e temperatura na comunidade fitoplanctónica de inverno numa laguna costeira (Ria Formosa, Portugal)

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Increases in ultraviolet radiation, carbon dioxide and water temperature affect phytoplankton growth and mortality in an array of different ways. In situ responses of natural phytoplankton communities to climate change, as well as its effects on phytoplankton biomass seasonal cycles, are still largely unknown. Although temperature and UVR have been increasing in temperate latitudes during winter months, this season is still particularly neglected in climate change studies, since it is considered a non-active season in respect to phytoplankton growth and production. In addition, coastal lagoons are highly productive ecosystems and they rank as very vulnerable to climate change. The goal of this study is, therefore, to evaluate the effects of increased UVR, CO₂ and temperature on the metabolism of winter phytoplankton assemblages in a temperate coastal lagoon, the Ria Formosa (southern Portugal).

During Winter 2012, two sets of microcosm experiments were used to evaluate the combined effects of: (A) UVR and CO₂, using low (ambient) and high (values expected for 2100) CO₂ treatments, exposed to ambient UV levels and without UV

radiation, and (B) CO₂ and temperature, with low and high CO₂ treatments exposed to in situ and increased temperature (+3°C). Phytoplankton composition, abundance and biomass, as well as primary production, photosynthetic response and nutrient consumption, were evaluated during the experiments.

Overall, phytoplankton growth, photosynthetic capacity and primary production exhibited significant declines under increased temperature, reflecting how well adapted winter phytoplankton communities are to winter conditions. On the contrary, phytoplankton growth, particularly diatoms, was stimulated by CO₂ additions. Ultraviolet radiation had a deleterious effect only on cyanobacteria growth, but not on the other phytoplankton groups.

Palavras chave: fitoplâncton, alterações climáticas, Ria Formosa, metabolismo, fotossíntese.

Keywords: phytoplankton, climate change, Ria Formosa, metabolism, photosynthesis.

Mid-late Holocene climatic changes in the Southwestern Iberian shelf

Alterações climáticas no Holocénico na plataforma do SW da Ibéria

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Vegetation (pollen analysis) and Sea Surface Temperature (SST) reconstructions from a south western Iberian shelf core (POPEI VC2B) show orbital and suborbital climate variability for the last 6000 years. The short-term vegetation changes, reflecting millennial scale climatic variability, are clearly identified over the last 6000 years. The first zone, 3310 - 738 cal. yr BC, is marked by the presence of semi-desert plants reflecting dry conditions. The next zone, 738 cal yr BC - 421 cal. yr AD, shows a decline of semi-desert plants and an increase of heathland and *Pine* associated with the establishment of an incipient *deciduous Quercus* forest reflecting temperate and humid conditions that can be associated with the Roman Warm Period (RWP). The Dark Ages Cold Period (DACP) (c. 421 - 1200 cal. yr AD) is marked by a decrease of trees and increase of *cistus* and *chenopodiaceae* suggesting a relative cooling and dryness. In contrast, the Medieval Climate Anomaly (MCA) (c. 1200 - 1449 cal. yr AD) is characterized by the recovery of the temperate forest suggesting warm conditions. During the Little Ice Age (LIA), 1449 - 1795 cal. yr AD, the temperate trees were replaced by semi-