

Particulate metal distribution in Tagus Estuary (Portugal), during a flood episode

Metais pesados ligados à matéria particulada em suspensão no estuário do Tejo, durante uma cheia

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The Tagus estuary is one of the largest estuaries in Europe and has historically received effluents from agricultural, industrial, and urban sources. The Tagus River is frequently punctuated by flood events upstream in its drainage basin, with predictable consequences in terms of river flow and discharges into the estuary. These flood events have numerous consequences, not only by introducing abnormally high amounts of fresh water into the estuary but also by affecting the estuarine chemistry and hydrology. Particulate metal concentrations were assessed before, after and during a flood episode at Tagus estuary. Particulate metal concentrations showed a decrease during the flood period and very similar values in the months before and after the flood event. One of the main effects driven from the flood, simultaneously with the particulate metal concentration decrease, was the high input of SPM into the estuarine area. This points out, not only, to higher levels of heavy metals in fine-sized particles at low SPM concentration, than those present in coarser particles at high SPM levels. This combination of factors that affect water chemical characteristics, along with a decrease in the estuarine water residence time, make these flood events conceal estuarine contamination and can therefore be interpreted as periods of heavy metal contamination dilution rather than an estuarine cleansing process.

Palavras chave: Estuário do Tejo, metais na forma particulada, eventos de cheia, MPS.

Keywords: Tagus Estuary, particulate metals, flood events, SPM.

Mecanismos de suporte à intervenção relativos a acidentes de derrames de hidrocarbonetos em zonas costeiras e estuarinas (Ria de Aveiro, Portugal)

Support mechanisms for oil spill hazards response in coastal estuarine areas (Ria de Aveiro, Portugal)

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O intenso tráfego marítimo verificado ao redor das zonas portuárias impõe a necessidade de constituir mecanismos de prevenção e actuação perante acidentes com derrame de hidrocarbonetos, cuja eficácia é essencial para minimizar potenciais consequências. Torna-se portanto necessário prever os mecanismos de dispersão existentes em cada local, delimitar zonas de contenção ou sacrifício, preservando áreas de maior vulnerabilidade ambiental e/ou antropogénica, às quais se impõem diferentes graus de prioridade de intervenção.

O presente estudo insere-se no âmbito dos projectos PAC-MAN: *Pollution accidents in coastal areas: a Risk management system* e SPRES: *Oil Spill Prevention and Response at Local Scales*, tendo como principais objectivos a recolha de informação e integração nos planos de prevenção e resposta a acidentes com derrame de hidrocarbonetos na Ria de Aveiro.

A Ria de Aveiro é uma vasta área lagunar, numa zona costeira, portuária e densamente povoada, constituindo o principal recurso natural da região. Este estudo envolve a elaboração de um Sistema de Informação Geográfica de Sensibilidade e Vulnerabilidade Ambiental, com a respectiva geodatabase e cartografia, incorporando todo o recurso hídrico lagunar e entrada da embocadura, os seus habitats, geomorfologia, comunidades locais, infra-estruturas e hidrodinâmica. Estes elementos deverão servir de apoio aos meios de protecção civil, para identificação dos recursos mais expostos a este tipo de acidentes e estimar os impactos económicos susceptíveis de afectar os diferentes sectores de actividade presentes.

O método utilizado é inovador, integrando metodologias específicas para a multiplicidade de ambientes, domínios ecológicos, geomorfológicos e socio-económicos que é possível encontrar na Ria de Aveiro.

Palavras chave: derrame, hidrocarboneto, sensibilidade, vulnerabilidade, estuário.

Keywords: spill, oil, sensitivity, vulnerability, estuary.

North Atlantic Paleo-productivity changes during Marine Isotope Stages (MIS) 10 to 16 – Coccolithophore Sr/Ca Evidence

Variação de paleo-productividade no Atlântico Norte durante os Estádios Marinheiros Isotópicos 10 a 16 com base no rácio Sr/Ca em cocólitos

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The North Atlantic is the primary deep ventilator of the oceans playing a key role in the thermohaline circulation through the Atlantic Meridional Overturning Circulation whose strength can be affected by regional or global climatic changes. During abrupt climate change events, e.g. Heinrich Events, the southward migration of the Polar Front, induced by the discharges of icebergs and melt-water pulses, led to abrupt decreases in sea surface temperatures and salinity thereby affecting primary productivity. Paleoproductivity signals in the North Atlantic are controversial and not straightforward (Villanueva et al., 2001). Coccolithophores are primary producers and the most important calcifying organisms in the ocean, playing a key role not only in the ecosystem but also in the global carbon cycle. The coccolith Sr/Ca ratio is linked to productivity with a higher ratio indicating higher growth rates and thus coccolith productivity.

This study infers paleoproductivity variability based on coccolith Sr/Ca ratios at IODP Site U1313 (41°N, 33°W) between 676 and 355 ka ago. MIS 12 is considered the most extreme glacial of the last 500 ka and experienced Heinrich-type ice-rafting events while MIS 14 was a relative mild glacial. For the MIS 12-10 interval, for which data corrections and interpretation have already been completed, the Sr/ Ca data clearly shows that coccolithophore productivity was substantially higher during glacial than interglacial or interstadial periods. Heinrich events, conversely, greatly diminished paleo-productivity.

Palavras chave: circulação termohalina, coccolitóforos, produtividade, Sr/Ca, evento Heinrich-type.

Keywords: *thermohaline circulation, coccolithophores, productivity, Sr/Ca, Heinrich-type event.*

Proxy calibration: What are coccolithophores of Galician waters and surface sediments telling us?

Calibração de proxy: O que nos dizem os coccolitóforos e coccolitos encontrados nas águas da Galiza e sedimentos superficiais?

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Calibration of nowadays proxies, namely micro and nanofossils, validate their use in paleoenvironmental reconstructions. CALIBERIA project, under which this study has been developed, aims a multi-proxy calibration from the water column into the surface sediments off Galician margin.

Coccolithophores are one of the major groups of marine phytoplankton and among the most important pelagic calcifying organisms. They affect the climate system and global carbon cycle through biological (sink of organic carbon) and alkalinity pumps (sink of inorganic carbon). Coccoliths, little platelets that constitute their calcareous exoskeleton, can be used as tracers for paleoceanographic reconstructions. Coccolithophores are thus a paleoclimatic tracer due to their stable calcite skeleton and wide geographic distribution under direct climatic control.

This work aims to describe and understand the distribution of coccolithophores off Galician margin based on (1) water column samples collected at two stations; one on the continental shelf (75 m depth) and the other on the shelf-break (350 m depth) at aprox. 42°N, (2) sediment trap samples from a subsurface deploy at the inshore station and (3) sediment surface samples collected between 41.5° - 42°N and 9 - 10°W. The integration of these three data sets will, for the first time, to allow us to improve our coccolithophore proxy for this area. Additionally, hydrographic (temperature and salinity from CTD profiler) and biogeochemical data of discrete water column samples, such as oxygen, inorganic nutrients and stable isotopes, will be used to study the ecology of coccolithophores in this coastal upwelling region.

Palavras chave: calibração, paleoceanografia, cocólito, abundâncias, ecologia.

Keywords: *calibration, paleoceanography, coccolithophores, Galician margin.*

A Preliminary Environmental Sensitivity Index (ESI) Map to assist oil spill management in the Aveiro coastal and estuarine region

Mapa Preliminar de Índices de Sensibilidade Ambiental (ESI) para apoio à gestão de derrames petrolíferos na região costeira e estuarina de Aveiro

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