ale ocean circulation patterns in the western North tlantic. Eutrophication is in part due to nutrient release the St. Lawrence, which could be regulated, but can e also linked to the upwelling intensity at the head of e Laurentian Channel. Moreover, the characteristics f bottom waters is dependent upon the properties and elative contributions of the North Atlantic and Labrador ea waters that mix, prior to entering into the Laurentian hannel through Cabot Strait.
ecent studies from sedimentary cores collected in he Laurentian Channel tend to demonstrate important hanges in bottom water properties over the last century ccompanied by a warming close to 2°C, which can be ue to enhanced contribution of North Atlantic water elative to Labrador Sea water. Such a change apparently layed a role in the trend towards hypoxia, because lorth Atlantic water are depleted in dissolved oxygen s compared to the Labrador Sea Water and because igher temperatures result in increased organic matter espiration rates and oxygen consumption. In such a context, it appears relevant to evaluate the natural ariability of the ocean circulation that controls the mixing of North Atlantic and Labrador Sea water masses along the eastern Canadian margins and may also influence the water current speed in the Laurentian Channel, which in turn affects remineralisation and upwelling intensity at the head of the Channel. The postglacial records from the Estuary and Gulf of St. Lawrence illustrate a millennial pacing of the upwelling intensity and bottom water temperatures, which suggest that large scale ocean circulation exerts a determinant role on environmental conditions and might buffer or intensified their sensitivity to the anthropogenic stress.

Poster

Chemical Fractionation of Metals in Sediment cores of Intertidal regions along Ulhas Estuary, Mumbai, India

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In order to predict the mobility, bioavailability and potential toxicity of metals it is necessary to distinguish and quantify the different forms of metals in sediments. This can be achieved by Speciation analysis. Previous studies carried out in Ulhas estuary, located in Mumbai, India, have shown presence of sediment pollution. However, no study has focused on sediment metal fractionation of the aquatic system. Therefore, speciation study was carried out along the intertidal regions of the estuary. Three mudflat cores of the estuarine region, i.e. near the estuary mouth (UI), the lower estuary (UV) and the upper estuary (UIV) were sampled and analysed for metals (Fe, Mn, Cu, Pb, Co, Zn and Cr) in the bulk as well as in the different fractions of the sediment. The results indicate that the upstream region (core UIV) of the estuary, representing the combined effect of the lithology, land use patterns and soil conditions, show higher values of metals in the exchangeable (F1), carbonate (F2) and Fe-Mn oxide (F3) fractions as compared to the downstream regions of the estuary. This observation suggests that supply of metals in the estuarine system via the sediment dissolution and soil erosion has been a significant factor which has been increasing in recent times. Also, from the bottom to the surface, the metal concentration is found to increase, except for upper few layers of some of the cores. This may be due to the post diagenetic disturbances taking place in this region like dredging, resuspension, etc. Based on correlation analysis in each of the cores, distinct associations among the different elements and sediment components (sand, silt, clay, organic matter) are not observed. This may be attributed to frequent sediment resuspension caused by dredging activities, which strongly disturbs the spatial distribution of heavy metals in sediments. Eco-toxicological effects of heavy metal contaminations in sediments were determined using Sediment Quality Guidelines (SQGs). The bio-available fractions of Cu, Pb, Zn and Cr in all the cores of the estuary are below Threshold Effect Level (TEL), Probable Effect Level (PEL), Effects Range-low (ERL) and Effects Range-Median (ERM) values indicating low risk of adverse effects on organisms. Further, the Risk Assessment Code (RAC) was used to assess environmental risks and estimate the possible damage to benthic organisms. Fe, Cu, Co, Zn and Cr project low risk; Mn and Pb show low to medium risk. Although metal concentrations in the bio-available fractions are low in the estuary, contaminated sediments at relatively shallow depths in estuary experiencing erosion, may present considerable risk to sediment dwelling biota.

Poster

Identification of Tsunami deposits and their impact on coastal zones: A study case of the Boca do Rio estuary (Algarve, Portugal)

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Tsunamis are unforeseeable phenomena and therefore one of the most devastating natural disasters in terms of human and economic losses. Their impact on coastal and nearshore zones is substantial and needs to be accurately evaluated to improve their prevention and management. In the last decades, numerous investigations focused on the identification of paleotsunamis in order to evaluate their frequency in the geological record. However, because storm- and tsunami-deposits are generated by similar depositional mechanisms, their discrimination using classic sedimentological methods is an elusive prospect. A promising approach is to couple classic geological criteria with geophysical and geochemical proxies to search for new benchmarks of tsunami deposits and to integrate them into a multi-disciplinary study. To test our method, we investigate the 1755 Lisbon tsunami

deposit from the Boca do Rio estuary and other Tsunami-induced deposits from Algarve (Portugal). First results show that, Sr and Ca are enriched in the tsunami layer probably linked to the presence of shelled organism. Contrarily, others marine seawater indicators, such as Ba and Br, which are usually more concentrated in brackish than in fresh water, and heavy minerals, which are generally used as high energy event indicators, are depleted in the Tsunami deposit. Very low magnetic susceptibility values for the Tsunami deposit also indicate a dilution of iron oxides, reworked from the estuarine clays, within the huge volumes of quartz and carbonate (i.e. diamagnetic), issued from the abrasion of the littoral sandy dune and the surrounding carbonated cliffs. Diffusive Reflective Spectrophotometry analyses show significant changes in the siliciclastic fraction below and above the tsunami layer. These colour variations are linked to the deposition of finer siliciclastic particles after the tsunami. Our data show that the material brought by the Tsunami is proximal, i.e. littoral, and not marine as usually thought. Our study also suggests that the 1755 Tsunami affected the geomorphology of the estuary, and therefore the sedimentation, inducing mis-interpretations of the geological record regarding local sea level changes and coastal evolution history. These results provide new benchmarks for the identification of tsunami-induced deposit and for the evaluation of their impact on the coastal zone.

Keywords: rock magnetism, tsunami deposit, estuary, natural hazards.

Talk

Erosion of Arctic permafrost coasts and mobilization of dissolved organic carbon (DOC) from ground ice

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Arctic permafrost coasts make up ~34% of the world's coastline (ca. 400,000 km) and are often made of ice-rich unconsolidated sediments. This makes them highly susceptible to coastal erosion, and it is likely that large quantities of carbon are released, because permafrost soils are considered to hold approximately 50% of the global soil organic carbon pool. Current estimates of the carbon released by coastal erosion focus solely on particulate organic carbon (POC). Dissolved organic carbon (DOC) is generally not included in these calculations, because estimations of DOC contents in ground ice, which is overwhelmingly present along Arctic coasts, do not exist. In some cases, ground ice occupies as much as 90% of coastal bluffs with 40 m in height, where the coastline erodes at rates approaching 10 m/yr at its maximum. Here, we report DOC contents from different ground ice types throughout the Arctic. We put them into context of Arctic organic carbon pools and fluxes, and evaluate their contribution to the Arctic carbon budget against the background of increasing permafrost degradation and enhancing coastal erosion in the future. For example, even conservative numbers for the background parameters (coast length, erosion rate, clif height, ground ice content) lead to a first estimation of DOC flux derived from ice wedges of 0.29 Gg/yr. This number is expected to increase significantly if the whole Arctic permafrost coastline was classified, if oth ground ice types were incorporated, and if the DOC concentrations were weighted and upscaled for differe terrain units (e.g. carbon-rich and ice-rich Pleistocene uplands).

Although these numbers might be still small compared to the POC stocks in peat and mineral soils, DOC is chemically labile and may directly enter local food web the near-shore zone. Moreover, due to its lability, DOC quickly mineralized and returned to the atmosphere wh released due to permafrost degradation.

Robust estimations of how much organic carbon is potentially released from permafrost are crucial for predicting the strength and timing of carbon-cycle feedback mechanisms in the Arctic. This approach shal lead to an improved understanding of how important permafrost thaw in general and the erosion of permafr coasts in particular are for the climate development thi century and beyond. This is especially important in the Arctic before the background of expected rising air and sea surface temperatures, prolongation of the open-wa season, increasing storm frequency and accelerating eustatic sea level rise.

Poster

Anthropogenic impact in coastal Baltic Sea over the last 2000 years using biological proxies

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Baltic Sea is one of the most intensely studied coastal marine systems in the world. The environmental proble related human-induced eutrophication and anoxic bott waters are of prime concern. But still there are a numbe of unanswered questions: for instance for how long an to what extent has the human activity affected the Balti Sea. In our project we aim to develop and refine biolog proxy variables in the marine sediment record over a s of last 2000 years. We present data from two stations along the Swedish Baltic coast. Two long cores (~ 5.2m have been sampled and employing XRF scanning, and range of biological proxy variables, such as dinoflagell cysts, testate amoebas (thecamoebians), ciliates (tintinnids), together with bottom-dwelling (benthic) foraminifera. The XRF results show a high proportion of Bromine in organic rich intervals that may be related to marine organic matter. The micropalaeontological analyses indicate a very poor population of benthic foraminifera with very few agglutinated form such as Miliammina fusca, no calcite adult species but relative moderate proportion of unidentified juvenile forms. The preliminary investigation also reveals a large and diverse abundance of tintinnids, which can be related