However even in this period it remained negative as well as the instrumental records. The bias can be explained by the weak sensitivity of the chronologies to winter precipitation (i.e. accumulation). The tree-ring based mass balance reconstruction was compared with one based on meteorological data (since 1905s). Both reconstructions have good interannual agreement ($r = 0.53$; $p<0.05$) particularly for the period between 1975 and 2005. According to the reconstruction two distinct periods of positive mass balance occurred in 1830s and 1860s. They agree well with early historical data and the tree-ring of moraines of Kashkatash glacier in Central Caucasus.

Poster

Sea ice, biological production and nutrient cycling reconstructed at an unprecedented time resolution in the Adélie Basin, East Antarctica, for the last 2,000 years

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Antarctic sea ice impacts on the ocean-atmosphere heat and gas fluxes, the formation of deep and intermediate waters, the nutrient distribution and primary productivity, the so-called 'biological carbon pump', one of the most active in the global ocean. In this study, we explore the link between sea ice dynamic, biological production and nutrient cycling during the late Holocene (the last 2,000 yrs) in the AdÉlie Basin, East Antarctica, from the well-dated sediments of the Ocean Drilling Program (ODP) Site U1357. This archive, composed from ~32 meters of seasonal to annual laminated diatomaceous sequences, allows reconstructions at an unprecedented time resolution (5-10 yrs). Our study combines records of diatom census counts and diatom-specific biomarkers (a ratio (D/T) of di- and tri-unsaturated Highly Branched Isoprenoid lipids (HBI)) as indicators of sea ice and biological production changes, XRF data as markers for terrigenous inputs and bulk nitrogen isotopes (d15N) and d15N on chlorins as proxies for reconstructing nitrogen cycle.
The diatom and HBI records reveal five distinct periods. From 0 to 350 yrs AD, decreasing occurrences of sea ice-related diatom species (e.g. Fragilariopsis curta + F. cylindrus) together with low D/T values and increasing open ocean diatom species (large centrics, Chaetoceros Resting Spores (CRS)) document a progressive decline of sea ice presence during the year (> 9 months per year) with spring melting occurring earlier in the year and autumn sea ice formation appearing later. In contrast, between 350 and 750 yrs AD, high production of open ocean diatom species and low low D/T values and sea ice related species indicate a short duration of sea ice cover (< ~8 months per year). From 750 to 1400 yrs AD, a prolonged seasonal sea ice (> ~10 months per year) is illustrated by a pronounced increase of sea ice-associated diatom species and high D/T values. Between ~1400 and 1850 yrs AD, seasonal sea ice strongly declines (<~7 months per year) as a result of early spring melting (increasing CRS production) and late autumn waxing (high occurrences of Thalassiosira antarctica). Longer growing seasons promoted a substantial development of phytoplankton communities (especially large centric diatoms) that conducted to lower D/T values.
Consistent with diatom and HBI reconstructions, XRF data show higher Fe/Al and Zr/Al ratios values during inferred warmer periods and lower ratio values during inferred cooler and icier periods, thus supporting a strong impact of the sea ice seasonal cycle on glacial runoffs.
The link between sea ice conditions, biological production and nutrient cycling is still being explored and we will discuss its relationship by combining all the cited records cited above with the $d^{15}N$ records that we are currently generated.
Based on our results, we find that sea ice dynamic and associated diatom production in the AdÉlie Basin revealed an opposite climatic trend than that identified in the Northern Hemisphere for the last 2000 years. The 'Little Ice Age' (1400-1850 yrs AD) or the 'Dark Ages' (400-750 yrs AD) corresponded to warmer climate conditions in the AdÉlie Basin, while the 'Roman Warm Period' (0-350 yrs AD) or the 'Medieval Warm Period' (900-1200 yrs AD) were associated to colder conditions. We therefore emphasize that Northern and Southern Hemisphere climate evolved in anti-phase seesaw pattern during the late Holocene.

Poster

Multi-annual variability of the Peruvian Oxygen Minimum Zone across the last millenium

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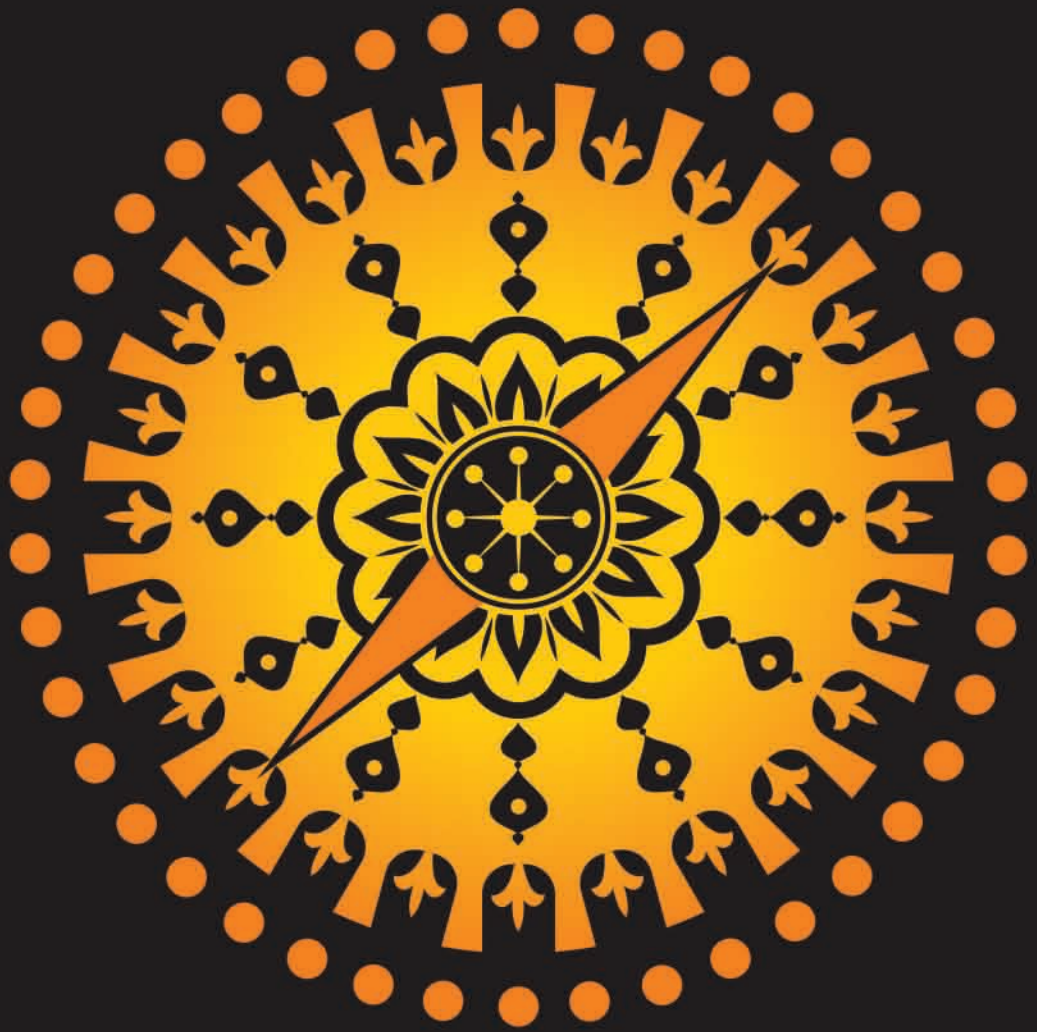
There is evidence that pelagic oxygen minimum zones (OMZ) have expanded and intensified for at least 50 years, probably as a response of global warming. However, it is essential to document the OMZ evolution beyond the historical record to better assess the relative contributions of natural and anthropogenic forcings. Such records from the Peruvian margin have been studied but only a few ones focus on both variability and mean state of nutrient cycle and upwelling intensity in the OMZ.
We here analyzed three trigger cores containing faintly laminated sediments from the Peruvian shelf, along a North-South transect, from 11°S to 15°S within the OMZ. Non-destructive measurements (X-ray radiography and X-ray fluorescence core-scanning) were first realized to better identify individual layers. A combination of ^{210}Pb based estimates of accumulation rates and ^{14}C analysis on calcitic foraminifera or organic matter will provide the age model for the cores. We analyzed diatom assemblages, bulk $\delta^{15}N$, total nitrogen, organic carbon and alkenone contents as well as alkenone-based sea surface

PROGRAM AND ABSTRACTS



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Contents: