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Paleoproductivity variations off Morocco during Interglacial periods

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Paleoclimate reconstruction of surface and bottom-water properties (alkenone derived sea surface temperature estimations, δ18O and δ13C from planktonic and benthic foraminifera) for the last 500 ka in the NW African region has been obtained from a sediment record [core MD08-3178, 31°17.09'N, 11°29.20'W, 2184 m water depth]. In addition, paleoproductivity (opal and organic carbon content) and geochemical (XRF) measurements were conducted covering three interglacial periods [Holocene, MIS 5 and MIS 11].

The general trend of the alkenone-derived SST record resembles the oxygen isotopic signal, showing a correlation at these latitudes between SST variations in the glacial-interglacial time scales and Northern Hemisphere ice sheets evolution.

Increased nutrient supply from the continent to the ocean realm, due to stronger winds, during glacial periods and colder phases of interglacials is supported by Ti/Ca variation in the sediment record. This trend is also supported by the variation of n-alkane concentration measured in the same core (see poster by Rostek et. al.).

Reconstruction of productivity shows climate variability, supporting higher nutrient supply during glacial periods and in particular during Terminations 4 and 2. The various productivity proxies showed a similar pattern of negative correlation with sea surface temperature record (higher productivity coeval with lower SST).

The highest nutrient supply, deduced from periods of higher productivity, is also in phase with the benthic δ13C pattern. We therefore suggest that during cold periods, besides increased upwelling due to stronger winds, an increase in the proportion of southern sourced nutrient-rich waters is likely to play a considerable role on productivity at these latitudes, as an important source of nutrients.

Taking into account the ocean-atmospheric system affecting the studied region, we propose that both have a major role and contribute in phase for increased productivity during cold periods: (1) intensification of winds favouring an energized upwelling and terrigenous nutrient input and (2) an additional nutrient supply from southern sourced waters.