

Otherwise, the planktonic/benthic ratio exceeding 85 % throughout the whole studied series suggests an upper to middle bathyal palaeoenvironment.

Salgueiro, Emília (B2 – Oral presentation)

Temperature and Productivity Gradients within the Western Iberian Upwelling System in Response to Glacial and Heinrich-event Climate Forcing

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The western Iberian margin is characterized by seasonal coastal upwelling associated with cold waters and high primary productivity, which leaves an imprint in the sediments beneath these areas. Fourteen sediment cores (SU92-03, MD95-2039, MD95-2040, MD95-2041, MD95-2042, MD03-2699, PO200/10-28-1, OMEXII-5K, OMEXII-9K, N3KF24, D1195-7P, MD03-2697, MD99-2331, MD99-2339) located along the Iberian coast, between 43°12'N and 35°89'N, were investigated to reconstruct spatial and temporal gradients in temperature and productivity conditions during the Holocene, the last glacial maximum (LGM), and Heinrich events (HE) 1-3. Planktonic foraminifera census counts were used to estimate summer sea surface temperature (SST) and export productivity (Pexp) using the modern analog technique SIMMAX 28 and the extended North Atlantic modern analog data base, currently with 1066 and 1039 modern analogs for SST and Pexp, respectively. During the Holocene all sites exhibit estimated mean SST and Pexp values similar to modern satellite data, including the North to South and East to West temperature increase (from 17 to 21 °C) and productivity decrease (from 110 to 30gC m⁻² yr⁻¹). This demonstrates the accuracy of the transfer function calibration used. During the LGM the estimated SST were relatively warm (~17°C) along the Iberian margin, similar to the present-day conditions and consistent with other reconstructions for the Portuguese margin using planktonic foraminifera, alkenones, and pollen data. The warm SST are equally in agreement with the GLAMAP results. While, the Pexp increased at nearly all sites, particularly within the filament off Porto (MD95-2039, MD95-2040). The increase of productivity could be attributed to strong winds in synchrony with other upwelling regions around the world. During HE 1 - 3, the short-term cooling periods associated with extreme iceberg discharges into the North Atlantic during the last 30 cal kyr BP, temperature increased from North to South (on average 4°C), marking the decreasing influence of melting iceberg along the Iberian margin, with HE 1 being the coldest one. Productivity shows a more complex pattern: productivity in the areas under modern upwelling influence was reduced, but not terminated, and highest/increased Pexp occurred in those areas with lowest modern productivity, most likely linked to frontal upwelling.

Salgueiro, Emília (A1 – Poster Presentation)

MIS 11c and Holocene temperature on the Portuguese Margin as revealed by Mg/Ca and oxygen stable isotopes

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To understand the natural present-day climate variability and to predict the future it is important to find past analogues to our current interglacial period. Since long, the interglacial marine isotope stage (MIS) 11c was considered a good analogue candidate for the Holocene in terms of orbital parameters and greenhouse gas concentrations. Some studies in the North Atlantic revealed rather similar conditions during these two periods, while others showed significant differences. In order to investigate

this problem from the upper water column temperature point of view, we have generated Mg/Ca and $\delta^{18}\text{O}$ records of 3 planktonic foraminifera species (*G. ruber* (white), *G. bulloides*, *G. inflata*), for Portuguese margin site MD03-2699 (39°N; 10.7°W). Mg/Ca and $\delta^{18}\text{O}$ derived temperatures were estimated using the insights gained from the high resolution top-cores study in the study region. During MIS 11c, temperatures were slightly warmer than during the Holocene with values around 19°C based on Mg/Ca *G. ruber* (white). The warmer Mg/Ca temperatures of *G. ruber* (white) and *G. inflata* during early MIS 11c (426–412 ka) were most likely related to an intensification of the wintertime, warm subtropical Portugal Coastal Countercurrent (PCCC) indicating enhanced northward heat flux from the North Atlantic's subtropical gyre. Considering the same proxies, during the early Holocene (4 ka-Present) the same PCCC intensification seems to have occurred. Additionally, the $\delta^{18}\text{O}$ curves of *G. bulloides* and *G. inflata* show similar values during most of the early Holocene period, indicating that both species calcified in similar source waters, but probably in different season. Apparently during the summer there was an intensification of upwelling and *G. bulloides* calcified at temperatures lower 1.2 °C (0.5 ‰) than during late Holocene.

Sánchez-Quinónez, Carlos A. (D4 – Poster presentation)

Integrated stratigraphy across the Cenomanian/Turonian boundary at the El Chorro section, Southern Spain

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A climatic, geological and biological global event resulted in sedimentation of black shales at the Cenomanian/Turonian boundary, coinciding with the Oceanic Anoxic Event 2 (OAE2) or Bonarelli Event. We present an interdisciplinary research of the C/T transition at the Spanish El Chorro section (Betic Cordillera), and show the results of studies on planktic and benthic foraminifera, calcareous nannoplankton, radiolaria, stable isotopes and environmental magnetic properties. The OAE2 event at El Chorro consists of a 2 m thick interval of siliceous black shales interbedded with radiolarian-rich levels, and is almost devoid of carbonates and calcareous microfossils. Marls, marly limestones, limestones with chert nodules occur below and above the OAE2 interval. Environmental magnetic properties indicate low concentrations of magnetic minerals likely in response to reductive dissolution under anoxic conditions. The increase in magnetic susceptibility through the OAE2 event indicates a sharp decrease in carbonate production

The planktic foraminiferal biozones *Rotalipora cushmani*, *Whiteinella archaeocretacea* and *Helvetoglobotruncana helvetica* and the calcareous nannoplankton biozones NC11, NC12 and NC13 have been recognized. Diversity of the radiolarian assemblages gradually decreases from the upper Cenomanian towards the middle part of the OAE2 interval, where it reaches the lowest values, and recovers above the OAE2.

Oxygenation of the sea-bottom waters decreased towards the late Cenomanian, as inferred from benthic foraminifera: a decrease in the percentage of infaunal taxa and in species size is observed 40 cm below the OAE2. Assemblages from the upper part of the section contain abundant and tiny epifaunal, trochospiral species and representatives of *Tappanina*, *Pleurostomella* and small buliminids. These data indicate low oxygen conditions at the top of the section, 370 cm above the top of the OAE2 black shales.

Saraswati, Petrul Kumar (A4 – Oral presentation)