

the Gravettian there seems to have taken place an intensification and diversification of dietary resources from very early on that included grease-rendering. Interpretation of the site and of the diversity of human occupations will be presented, focusing on differences across time, and interpreted based on various aspects, such as site formation processes on slope deposits, intra-site spatial organization, subsistence, technology and social and symbolic behavior.

#### **THE MAGDALENIAN IN CENTRAL AND SOUTHERN PORTUGAL: HUMAN ECOLOGY AT THE END OF THE PLEISTOCENE**

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During the Magdalenian in Portugal, between ca. 16,500 and 10,000 BP, there was a fairly mild and temperate environment in southwestern Iberia due to the distance to the polar front, as well as to the proximity to the Mediterranean, North Africa and the Atlantic warm currents coming from the tropical band. Thus, Portugal was marked by a highly stable diversity of animal species, both terrestrial and marine, that were fully exploited by the human population during this period. The differential use of caves, rock shelters and open-air sites together with the raw material economy suggests various patterns of land use. These were likely related to different hunter-gatherer groups sharing the natural resources available in central and southern Portugal. These patterns were characterized by inland-coastal routes through the river valleys, as well as the use of the Atlantic seascape, aspect that had started in the Late Mousterian. Data suggest that the mobility of the Portuguese Magdalenian hunter-gatherer groups based on both diversification and specialization of natural resources, used an increasing highly mobile logistical pattern of settlement and land use through time.

#### **THE CHRONOLOGY OF THE MESOLITHIC OCCUPATION OF THE MUGE VALLEY, CENTRAL PORTUGAL**

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Although the Muge shellmiddens have been the object of research and excavation for almost 150 years, data is still scarce and, frequently, problematic. The chronology of the Mesolithic occupation of Muge is based on a series of radiocarbon dates from various sites. These results allowed the establishment of upper and lower boundaries for the Mesolithic in the region, as well as for the sequencing and the cultural explanations of both sites and lithic technology. However, most of those dated samples have insoluble problems of provenience and stratigraphy and thus, the dates have very little significance to understand the chronology of the sites and of the human occupation in the valley. Recently, a new project, started in 2008, was funded by the Portuguese National Science Foundation (FCT). We present here the first AMS results of this project, in a total of close to 30 new dates. These provide a complete and detailed new perspective of the chronology of one of the most important shellmiddens (Cabeço da Amoreira) as well as the direct relation to the time of settlement of Mesolithic complex hunter-gatherers in the region and the following occupation with the reuse of the shellmiddens by Neolithic populations.

#### **EROSIVITY OF THE GREENLAND ICE SHEET MONITORED WITH IN SITU AND METEORIC 10-BE IN EXPOSED BEDROCK AND BOULDERS AND IN ICE-CARRIED CLASTS AND SILT**

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Erosion under the Greenland Ice sheet (GIS) is poorly constrained. To understand such erosion, we measured 10-Be in >200 samples collected from 3 locations on the west-central margin of the ice sheet as well as in 4 samples from the basal, dirty-ice zone of the GISP2 ice core. The cosmogenic 10-Be content of bedrock and boulders samples collected outside the current ice margin (but once covered by Pleistocene ice) suggests that erosion efficiency under the GIS varies spatially. In Ilulissat, adjacent to a large, fast moving ice stream, paired bedrock and boulder ages are well

matched and correspond to other deglacial ages, indicating ice was highly erosive, removing nuclides produced during prior interglacials. Only 400km north at Upernavik, many boulder/bedrock pairs give discordant ages indicating significant inheritance of 10-Be from prior interglacial exposures, more so in bedrock samples and in samples from higher elevations. Samples from the ice provide a different view. Meteoric 10-Be adhered to silt and sand in ice collected from the present-day GIS has highly variable concentrations ( $10^6$  to  $10^8$  atoms/g). The 4 basal GISP samples have uniformly high meteoric 10-Be ( $10^8$  atoms/g). These data show that at its center, the GIS is only weakly erosive. The lower concentrations measured in most marginal samples indicate zones of higher erosivity away from the center of the ice sheet. Analysis of 86 clasts, collected directly from the GIS, indicates that all but about a dozen have measurable levels of 10-Be. Most clasts have between 500 and 1000 atoms/g, the equivalent of a few hundred years of surface exposure or excavation from deep within pre-glacial regolith. Nine clasts have over 5 katoms/g; these likely record either mid Holocene exposure and reworking or less deep excavation of regolith. One clast has >100 katoms/g, consistent with interglacial exposure and reworking without erosion. Silt and clasts appear to be sourced from different sub-ice locations.

#### **CHANGES IN DECADAL VARIABILITY AND DEPOSITIONAL FLUX OF AEROSOL CONSTITUENTS RECORDED IN THE EPICA DOME C ICE CORE BEYOND THE LAST INTERGLACIAL PERIOD**

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Ice core records of water-soluble aerosol constituents reveal past climate changes related to both, their source and their long-range transport. Here we present total depositional flux records of sodium, calcium and ammonium derived from the EPICA Dome C ice core covering the last 173'000 years. Largest changes are observed in non-sea salt calcium, a proxy for terrestrial aerosols, while only moderate changes occur in the marine sea salt proxy sodium. In agreement with previous studies, we find that only considerable glacial-interglacial source changes can explain these observations. In contrary, ammonium, a proxy for marine bi-productivity, remains rather constant, pointing to an almost unchanged transport and source strength over glacial-interglacial cycles. The unprecedented high-resolution of our data allows for the first time to examine decadal variability back to the penultimate glacial period. While we find occasional fast shifts occurring within a few years, the variability generally shows only moderate changes in contrast to the total depositional flux. During glacial periods, slightly lower variability is found, concurrent with slightly higher correlations, which points to a more uniform and stronger coupled atmospheric long-range transport of the different aerosol species to the East Antarctic Plateau and less influence of cyclonic activities. The opposite is observed for interglacial periods with probably even reinforced importance of cyclonic influences during Marine Isotope Stage 5.5. This period reveals no evidence for abrupt climatic changes in any of our aerosol species; however, sea salt sodium shows a distinct minimum followed by a pronounced increase. This pattern is explained by significantly reduced sea ice production in the Indian Southern Ocean sector at that time, which is believed to be the dominant source of sodium for Dome C during interglacial periods.

#### **HUNTING PRACTICES UPON LARGE MAMMALS COMMUNITIES OF THE PARIS BASIN DURING THE UPPER PLEISTOCENE**

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This communication aims to tackle the evolutionary role of Upper Pleistocene hunter-gatherers, namely through their interactions with large mammal communities. The modeling of various African savanna ecosystems allows discussing such interactions for prehistoric periods. This framework provides an opportunity for Pleistocene specialists to get a better understanding of the functioning and the structure of animal communities. More than this, it is now possible to highlight how fit together the top-down and bottom-up mechanisms of herbivore