THE STUDY OF DENTAL WEAR IN HERBIVOROUS MAMMALS AS A TOOL TO INVESTIGATE THE RELATIONSHIP BETWEEN DIET AND CLIMATE CHANGE

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In the current context of global climate change, the accurate knowledge of climatic events in the geological record and their effects on past biomes deserves the greatest attention in order to adequately manage the conservation of endangered ecosystems and predict how the change will affect species. Despite that the speed at which the current change towards a global warmer and drier climate is occurring does appear to be unprecedented, is not the first time that such a trend have occurred in Earth's history. One of the most similar episodes is the Miocene Climatic Optimum (Early/Middle Miocene), as is considered to have been the climax of Neogene warmth. Here we use a combined analysis of dental micro- and mesowear—the study of wear patterns caused by ingested objects—to illustrate how ungulate-grade mammals responded to climatic events by exhibiting changes in their feedings. This methodology deals mostly with the reconstruction of past environments, but, importantly, also has a great potential as a tool to investigate how and why the diet within a group has historically varied through a climatic event. We have a well-documented and continuous record of a ruminant lineage from Spain that provides a wealth of opportunities for providing insights into climate behavior. It persisted through the Miocene Climatic Optimum, between 17 and 15 Ma, but became extinct at the onset of the Middle Miocene at around 14 Ma. Although only the mixed feeder dietary assignment was exhibited, several populations were able to respond to the new circumstances by substantially increasing the intake of grasses/abrasives. Despite this, it did not apparently display the sufficiently high flexibility to bring about a change in its feeding style, probably because morphological constraints. If such a change was crucial for its survival, it disappeared because it may have been unable to compensate for the low nutritional content and abrasiveness of the new food items over a prolonged period.

INITIAL OSL DATING RESULTS FOR SEDIMENTARY SILT-SIZED QUARTZ GRAINS FROM GALERIA ARCHAEOLOGICAL SITE, ATAPUERCA, SPAIN: OBSERVATIONS ON MULTI-GRAIN AND SINGLE-GRAIN DATASETS

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The endokarstic system of the Sierra de Atapuerca, north-central Spain, contains an extraordinary archive of Early-to-Late Pleistocene human remains. The chronology for these archives has been established through TL and IRSL dating of polymineral fine-grain material, ESR/U-series dating and palaeomagnetism (Berger et al., 2008). The Galería site is located within the Atapuerca endokarstic system and contains Middle-to-Late Pleistocene infill deposits. Here we provide initial results of a new luminescence dating study of this sequence employing some of the latest techniques in OSL dating of coarse-grained quartz. OSL samples were collected from sedimentary units associated with occupation layers TG4 and TG3 at Galería. Quartz grains were isolated following standard procedures and all OSL measurements were carried out on TL/OSL Risø readers. Dosimetry was determined using a combination of in-situ gamma spectrometry and low-level beta counting. This study presents results obtained after a systematic characterisation of quartz OSL properties performed at the single-grain and multi-grain level. Linearly modulated (LM)-OSL and continuous-wave (CW)-OSL analyses were undertaken to determine the signal composition of these quartz samples. Insights are provided on: (i) the level of grain-to-grain OSL signal variability, (ii) the types of grains present in the sample and their suitability for OSL dating, (iii) the existence of individual components suitable for dating beyond the conventional OSL age range, and (iv) the presence of 'supergrains' that have higher-than-usual saturation doses. Details on thermal transfer (TT)-OSL investigations, and its suitability for dating these samples, are also provided. The outcome of these investigations will underpin further application of OSL dating to unknown age deposits in Atapuerca and will significantly increase the reliability of the ages obtained for these archaeological sites.

GEOMORPHIC RECORDS OF GLACIAL RETREAT FROM THE BASPA VALLEY, HIMACHAL PRADESH, INDIA

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Abstract

The glaciers of Himalaya vary greatly with a slight changes in rates of accumulation or ablation and are good indicators of climatic change. The fluctuations are obvious in terms of the retreat or advance of glacier snouts over periods of a few years or decades. In India glaciers are a valuable source of fresh water which sustain perennial Himalayan rivers even during peak summer months and provide water for drinking, irrigation and hydel power generation. For the sustainable development of these regions, systematic mapping of glacial geomorphic features will be of great use to understand the climatic variations as the past climatic events are preserved well within the landforms. In above perspective, detailed glacial geomorphic studies have been carried out for 35 glaciers Baspa valley by using multi date high resolution IRS-1D and Resource sat data.
The out come of study reveals that , the south facing glaciers are retreating faster (33.92%) than the north facing glaciers (22.20%). Since 2001, the average snowline in the Baspa valley has gone up by 33 m .In the past the extension of glaciers were at much lower altitude i.e. at least 950 m below the present day extent of the glacier . From this limit the present day south facing glacier shows 4670 m lengthwise retreat while that of north facing show 3880 m of retreat. The retreat is supported by the presence of many empty cirques, hanging valleys, horns and aretes of different shape and size. Terminal and lateral moraines are found to be an important glacial geomorphic indicators of past glacial activity and are present in almost all the glaciers. Maximum three sets of lateral and terminal moraines have been identified and the number of sets can be correlated with the stages of deglaciation however dating is required to confirm this fact.

ITCZ-MONSOON COUPLING DURING DANSGAARD-OESCHGER CYCLES (CARIACO BASIN, NORTHERN ARABIAN SEA)

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The anoxic Cariaco Basin on the northern shelf of Venezuela preserves detailed archives of past tropical climate variability. The sediment formation in this basin is controlled by the migration of the Atlantic Intertropical Convergence Zone (ITCZ) and the corresponding rain belt and trade winds. In the oxygen minimum zone off Pakistan in the northern Arabian Sea sediments are sensitive recorders of low-latitude monsoonal climate variability. In this study marine sediments from the Cariaco Basin and the northern Arabian Sea of the last glacial are compared with Greenland ice core records. The Dansgaard-Oeschger cycles left a distinct geochemical imprint on the sediments which is investigated by ultrahigh-resolution sediment colour analysis (reflectance L*) and X-ray fluorescence scanning. An age model was set up by using the clear correlation of the reflectance L* records to the $\delta^{18}O$ record of NGRIP. The L* records reflect mainly changes in marine organic matter which is demonstrated by measurements of bromine, chlorins and total organic carbon. Changes in redox state and relative contributions of terrigenous and biogenic components can be further investigated using element proxies as for example iron, titanium, calcium and molybdenum. The new high-resolution proxy records indicate an unbroken association between warm climate conditions over Greenland, a northerly position of the Atlantic ITCZ, and a strong Indian summer monsoon during warm Dansgaard-Oeschger cycles. The tight coupling is explained by a dominant role of the North Atlantic that is communicated largely through the atmosphere. While the close correspondence of our tropical records with Greenland $\delta^{18}O$ change is compelling, there are additional insights to be gleaned from