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CLIMATE@COA project: Climate and human adaptation during the Last Glacial Period in the Côa Valley region (Portugal)

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In Portugal, climate fluctuations of Late Pleistocene are well-known from marine record on the western Iberian continental margin, particularly of Marine Isotope Stages 4, 3 and 2, and they include various events of secular abrupt climate changes. During cooling phases the Heinrich Events (HE) occurred, corresponding to episodes of massive ice-discharges from Northern Hemisphere ice sheets. Furthermore, several climate phases with relatively warmer conditions, known as Dansgaard-Oeschger (D-O) cycles, characterized by an abrupt warming (D-O event) followed by a more gradual cooling, took place in-between HE. This pronounced climate instability that characterizes the Last Glacial Period between ca. 80-12 ka is recorded in a variety of marine and terrestrial archives worldwide. It had a recognized impact on the bioclimatic zones and, possibly, on the Neanderthal and Anatomically Modern Human (AMH) settlements of Iberia.

Based mainly on the study of geoarchaeological records preserved in caves and rock-shelters of Iberia, a correlation framework with climate shifts has been proposed to explain the observed discontinuities between sequences containing late Middle and early Upper Palaeolithic remains. Moreover, a climate driven model has been advanced to explain the chronological differences between northern and southern Pyrenean data by a later dispersion of AMH and the persistence of last Neanderthals in Southern Iberia, which were interpreted as a direct impact of HE4 (40-38 ka) in the distribution of large ungulate populations.

Despite all these data, the exact impact of HE on terrestrial systems, the evaluation of the latitudinal differentiation of their impact and time-gap, as well as the correlation between periods of relative stabilization/soil formation and the D-O events remain to be clearly established. In addition, the whole framework relating to the Middle-to-Upper Palaeolithic transition has been excessively dependent on karst archives and it should be investigated in other geomorphological settings - among these the fluvial and Iberian plateau ("Meseta"), both present in the Côa Valley region (Douro Basin, north-east of Portugal). Alluvial and colluvial deposits preserved in the Côa Valley (e.g. at the Cardina-Salto do Boi, Quinta da Barca Sul, Penascosa, Fariseu, Olga de Ervamoira sites) have demonstrated to be a valuable record of information about Late Pleistocene sedimentary processes, depositional environments, and hunter-gatherer's behaviour at local and regional scales.

In this context, the CLIMATE@COA project (COA/CAC/0031/2019), funded by the Fundação para a Ciência e Tecnologia (FCT), proposes an integrated multi/interdisciplinary approach based on the stratigraphical, sedimentological, geochemical, geomorphological, geoarchaeological, and geochronological analyses of terrestrial record (natural and cultural) preserved in the Côa Valley and surrounding plateau areas, with the aim to develop an evolutionary model for the region and to deduce the environmental forcing factors for such evolution - namely climate and ecosystem changes. In addition, the project's data will allow to define better the chronology of the transition between Neanderthal and AMH and to infer on land use and social organization in its environmental context.