Geophysical Research Abstracts
Vol. 19, EGU2017-6887, 2017
EGU General Assembly 2017

Fire history and climate variability during the Mid-Late Holocene in the Picos de Europa (Cantabrian Mountains, NW Spain), based on sedimentary sequence of Belbín

Jesús Ruiz-Fernández (1,2), Alexandre Nieuwendam (3), Marc Oliva (3), Vera Lopes (4), Anabela Cruces (4), Maria Conceição Freitas (4), Ana Janeiro (4), José Antonio López-Sáez (5), and Cristina García-Hernández (1)

(1) Centro de Cooperación y Desarrollo Territorial (CeCodet), University of Oviedo, Oviedo, Spain (ruizjesus@uniovi.es), (2) Department of Geography, University of Oviedo, Oviedo, Spain, (3) Centre for Geographical Studies - Institute of Geography and Spatial Planning, Universidade de Lisboa, Lisboa, Portugal, (4) IDL, Faculty of Sciences, Universidade de Lisboa, Lisboa, Portugal, (5) Center for Humanities and Social Sciences, CSIC, Madrid, Spain.

The environmental changes during the last millennia in the Mediterranian Region (including the Cantabrian Mountains in the NW part of the Iberian Peninsula) are partially related to fire activity, generated by early human societies for grazing purposes. Fire activity has mostly been reconstructed based on the analysis of pollen, spores and other macro- and microscopic organic remains, such as charcoal particles. However, new techniques (as the analysis of micro-scale frost weathering of quartz grains), can provide further information about the magnitude and intensity of fire as a landscape modeler. The purpose of this work was to analyze a sedimentary sequence collected from Belbín depression in the Western Massif of the Picos de Europa (Cantabrian Mountains, NW Spain) by using an innovative multi-proxy approach, in order to reconstruct the fire history in this area.
The Picos de Europa Mountains constitute the highest and most extensive massif in the Cantabrian Mountains. This area encloses three different massifs separated by deep gorges carved by four rivers (Dobra, Cares, Duje and Deva). The Western Massif is the largest of the three units (137 km2). The Picos de Europa are essentially composed by Carboniferous limestones. This mountain area was heavily glaciated during the Last Glaciation, though the post-glacial environmental evolution is still poorly understood. Within the Western Massif, the mid-altitude area of Belbín is a karstic depression dammed by a lateral moraine generated by Enol Glacier during the Last Glaciation. Between 23 and 8 ky cal BP this depression was a lake that became progressively infilled with sediments, and nowadays it is occupied by grasslands (Ruiz-Fernández et al., 2016).
In order to study the environmental changes during the Mid-Late Holocene in this massif, a 182 cm-long sequence was retrieved in the Belbín area. The core was subsampled every centimeter in the top most superficial 60 cm. The laboratory analyses were: 1) texture and organic matter (OM) content, including labile and refractory OM, Rp index and C/N relation; 2) quartz grains microstructures; 3) Charcoal accumulation rate: macroscopic charcoal (>125 μm) was identified and counted from subsamples of 1 cm3 at every 1 cm depth by sediment sieving; 4) the geochronological framework was established with three samples selected for 14C accelerator mass spectrometry (AMS)-dating (Laval University, Canada).
Oscillating warm and cold stages corresponding to the Mid-Late Holocene were identified in the study area. Warmer temperatures were recorded between 6.67-4.95 ky cal BP, 3.66-3.01, 2.58-1.06, 0.86-0.51, and 0.13 ky cal BP until nowadays, and colder regimes occurred between 4.95-3.66 ky cal BP, 3.01-2.58, 1.06-0.86 and 0.51-0.13. The warmer stages were defined by the dominance of chemical weathering of the quartz grains and relative increases of the C/N ratio, while colder stages corresponded to intense physical weathering of the quartz grains and lower C/N values. With exceptions, the organic content increased from bottom to top of the core. The charcoal particles didn't show a different concentration in colder or warmer conditions, which may be linked to human-induced fire management of the landscape. The most significant period of fire activity occurred between 3.5 and 3 ky cal BP, during the Bronce Age (other significant periods occurred at 2.6, 0.71 and 0.36 ky cal BP).

References

Ruiz-Fernández, J., Oliva, M., Cruces, A., Lopes, V., Freitas, M.C., Andrade, C., García-Hernández, C., López-Sáez, J.A., Geraldes, M. (2016). Environmental evolution in the Picos de Europa (Cantabrian Mountains, SW Europe) since the Last Glaciation. Quaternary Science Reviews, 138: 87-104.