Geophysical Research Abstracts
Vol. 13, EGU2011-9953-1, 2011
EGU General Assembly 2011

Early Holocene rapid climate change and its impact on semiarid landscape dynamics: evidence from the Bardenas Reales Natural Park (NE Spain)

Miriam Gómez-Paccard (1), Juan C. Larrasoaña (2), Carlos Sancho (3), Arsenio Muñoz (3), Eric McDonald (4), Edward J. Rhodes (5), Maria C. Osácar (3), Elisenda Costa (6), and Elisabet Beamud (7)

(1) Institut de Ciències de la Terra Jaume Almera, CSIC, Barcelona, Spain (mgomezpaccard@ictja.csic.es, +34 934110012), (2) Instituto Geológico y Minero de España,Unidad de Zaragoza, C/Manuel Lasala 44, 9ºB, 50006 Zaragoza, Spain, (3) Departamento de Ciencias de la Tierra, Universidad de Zaragoza, C/Pedro Cerbuna 12, 50009 Zaragoza, Spain, (4) Desert Research Institute, 2205 Raggio Parkway, Reno, NV, USA, (5) Department of Earth and Space Sciences, University of California, Los Angeles, 595 Charles Young Drive East, Los Angeles, CA 90095-1567 USA, (6) Grup de Geodinàmica i Anàlisis de Conques (GGAC), Departament d′Estratigrafia, Palaeontologia i Geociències Marines, Universitat de Barcelona, C/Martí i Franquès s/n, 08028 Barcelona, Spain, (7) Laboratori de Palaeomagnetisme UB-CSIC, Institut de Ciencies de la Terra Jaume Almera, CSIC, C/Solé i Sabarís s/n, 08028 Barcelona, Spain

The Bardenas Reales Natural Park (western Ebro Basin, NE Spain) constitutes a fragile landscape where the prevailing semiarid climate and the erodability of the bedrock have resulted in a high sensitivity in terms of erosion/sedimentation oscillations during Holocene. In this paper we present new chronologic, sedimentologic, palaeomagnetic and environmental magnetic results from the oldest unit (Qah1) of a system of nested cut-and-fill alluvial sequences, which is 18 m thick and crops out extensively in the central part of the natural park at the Blanca Depression. Radiocarbon dating indicates that Early Holocene unit Qah1 is younger than 9376-8892 cal yr BP, and gives ages of 8918-8419 and 7588-7373 cal yr BP in the middle and uppermost parts of the unit, respectively. Sedimentologic data indicate that distal alluvial sediments of unit Qah1 accumulated in sandy mud flats and ephemeral playa-lakes under arid conditions. The coincidence of enhanced magnetite contents with moderate to intense root bioturbation in the lowermost and likely also uppermost sediments of unit Qah1 suggest that magnetite formed authigenically in response to relatively wetter conditions at the beginning and end of this dry period. These results indicate that onset and cessation of alluvial aggradation mark the passing of a geomorphologic threshold, most likely plant cover in the watershed, during a progressive drying-wetting event. The radiocarbon-based age model of unit Qah1 indicates that alluvial aggradation under arid conditions begun at 9.13 cal kyr BP and ended at 7.16 cal kyr BP. This period is strikingly centred at around the 8.2 kyr cold event but spans a longer time period, which supports the notion of a global climatic deterioration as the underlying cause for this event. Our results demonstrate a quick and strong response of alluvial systems to Early Holocene climate variability in fragile Mediterranean landscapes such as those at the semiarid Bardenas Reales Natural Park.