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Mediterranean climate during the short-time events of the last Deglaciation and the Holocene: seasonality and gradient according to vegetation changes

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Today, the Mediterranean climate is characterised by a high seasonality and a strong north/south gradient, with an increasing temperature and a decreasing precipitation towards the South. Were such climatic characteristics the same in the past?

Pollen data, obtained from two core sediments, one in a Balkan Peninsula lake and an other in Alboran Sea, have allowed to quantitatively reconstruct and to compare the vegetation and climate changes during the following short-time events: Heinrich event 1, Younger Dryas and 8.2 ka B.P. event, in the Mediterranean basin. During the first two events, steppe vegetation develops at the expense of the temperate forest in the two sites, although during the Younger Dryas steppe taxa are less represented in the Alboran Sea than in the Balkans. During the 8.2 ka B.P. event, while the temperate forest decreases in both sites, open formation develops in Balkan Peninsula and Mediterranean elements still persist in western Mediterranean.

Climate reconstructions have been performed on this pollen data using the modern analogue technique (MAT) with a new modern pollen-climate dataset comprising about 3000 samples (Guiot, 1990; Peyron et al., 1998). During the three climate events, drastic decreases in temperature and annual precipitation has been reconstructed from vegetation changes in the Balkan Peninsula, while at time of 8.2 event, in the Alboran Sea, the vegetation changes are insufficient to yield such climate changes. Moreover, for the first time, the temperature and precipitation seasonality is

reconstructed from pollen data. Detailed monthly climate reconstructions show that the rainfall seasonality changes during these events, with a drastic decrease of autumn to spring precipitation in the Balkan Peninsula. In the western Mediterranean basin, the same seasonality change is only evidenced at the time of H1.

The differences between the western Mediterranean and the Balkan Peninsula climates during the Younger Dryas and the 8.2 ka event may be explained by an atmospheric circulation similar to the blocking weather regime described for modern climate situations. On the other hand, during the H1 event, the atmospheric situation could have been more similar to the NAO+ regime with dry conditions over the whole Mediterranean (Hurrell, 2003; Walsh et al., 2001).

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