Clim. Past Discuss., 5, C12–C16, 2009
www.clim-past-discuss.net/5/C12/2009/

Climate of the Past Discussions

Interactive comment on "Terrestrial climate variability and seasonality changes in the Mediterranean region between 15 000 and 4000 years BP deduced from marine pollen records" *by* I. Dormoy et al.

Anonymous Referee #1

Received and published: 27 March 2009

Title of the manuscript : Terrestrial climate variability and seasonality changes in the Mediterranean region between 15,000 and 4,000 years B.P. deduced from marine pollen records.

Authors : I. Dormoy, O. Peyron, N. Combourieu-Nebout, S. Goring, U. Kotthoff, M. Magny, J. Pross.

General remarks

Using three quantitative methods, the aims of this study are the description of the

climate variability and seasonality changes in the Mediterranean region between 15 000 and 4000 cal BP and the characterization of climatic linkages between the North Atlantic and the Mediterranean regions. Such a work has to be based on a good knowledge of the different climates of the world, more especially the Mediterranean climate. For this reason, the lack of the fundamental reference Âń Mediterranean climate variability ; Lionello et al. ed, 2006)* (see ref. beow) is unfortunate. Different chapters of this book are devoted to the topics of the submitted paper : the characteristics of the Mediterranean climate, the seasonal distribution of the precipitation over the entire Mediterranean basin and the connections between the Atlantic and the Mediterranean sea. Other references are lacking such as Jalut et al. (2000)*, Bar Matthews et al. (2000)*, Petit Maire et al. (2005)* which would have strengthened the basic knowledge on the Holocene Mediterranean climate dynamic. The study of the seasonality of precipitation and its evolution in the Mediterranean basin implies to clearly define what is a Mediterranean climate and, consequently, in this study, to indicate when the climate was or not Mediterranean. This would have been a useful contribution to the climate dynamic of the studied area. It is not the case. The work essentially refers to the variations of average curves and it is only at the end of the manuscript that comparisons between the results given by the three models are presented. Good correlations between the models are observed, i.e during H1 and the Bölling in the two cores and during PBO-8 in the Aegean sea. The increase in PANN is also well recorded by the models at the YD/Holocene transition in the Alboran sea. Later, p. 12 and 13, the authors observe a decrease in precipitation around 7 800 and 7 200 cal BP in the Alboran and Aegean seas respectively. At 6 000 cal BP winter precipitation is dominant while summer precipitation decreases. This agrees with the increasing aridification described by Jalut et al. 2008*. Unfortunatly, a careful analysis of the curves also shows opposite responses of the models during some periods and the reliability of the conclusions is questionable (i.e. PSummer and MTCO curves in the Alboran sea between 10 800 and 12 500 cal BP). During the 8.2 ky event, Dormoy et al. claim Âń All models reconstruct wetter conditions during summer for the 8.2 ky event. . . Âż. But in the

Aegean sea MAT and GAM models indicate increasing precipitation at the end of the event only and in the Alboran sea PSL and GAM models show variations similar to the previous and following periods. Similarly, the authors define H1 as cold and dry but fail to emphasize the regular and strong increase in MTCO indicated in the two sites by the three models during its last millenium. P. 9, the interpretation of the Younger Dryas is nor clear. If, as generally admitted, wet summers characterize a continental climate, p. 9 it would be clear to say that during YD the climate was continental. As a consequence, the conclusive sentence : Âń The three methods produce patterns that show similar trends throughout the pollen records of both sites Âż have to be reconsidered. Based on a careful observation of the curves, the interpretations need to be more qualified.

Pollen data

The small number of Mediterranean taxa in the pollen diagrams is not discussed and the term Âń temperate forest Âż is not defined. Similarly, the dominance of the deciduous Quercus in the pollen diagrams is not discussed while in table 1 only the genus Quercus is indicated. During the Bölling-Alleröd period deciduous oak forests are dominant. Evergreen Mediterranean taxa are poorly represented. What kind of climate was present at that time ? The marine data do not seem sufficiently informative and continental pollen data have to be used to define the climate. In the pollen diagrams, herbaceous and/or chamaephytic taxa (Artemisia, Alboran sea and Asteraceae, Aegean sea) are dominant. Nowadays they are present both in cold and warm steppes. At this level of determination they only indicate open dry environments. Similarly, Chenopodiaceae are generally well represented in dry environments. In core ASL 152, their percentages are lower than 10% and in the Alboran sea also frequently lower than 10%. Because of these low values the drought intensity have to be discussed. In the Aegean core, the identification of the Late-glacial short events between Bölling and Younger Dryas is not always convincing on the basis of the pollen data. Refering to the papers where it was defined, a short discussion of the chronology would be useful as well as a reference

to the recent Late-glacial chronology (Lowe et al. ,2008)*. H1 cited in fig. 3 and 4 is called Oldest Dryas in the pollen diagrams.

Additional remarks

p. 11 (Holocene optimum), the sentence Âń Jalut et al. (in press)* reconstructing a similar pattern in the Aegean and Alboran seas with short dry summer periods since the beginning of the Holocene that correspond to present-day Mediterranean condition Âż is not clear. In the cited paper, the period 9500-7500 cal BP clearly belongs to the Humid Holocene, during Sapropel S1. This is coherent with the data of Allen et al. (2007) and Rossignol-Strick (1999). From Soreq Cave, Bar Matthews et al. 2000 emphasize the existence of wet summers during Sapropel S1 which excludes Mediterranean climate conditions in the studied area. These results do not agree with the results presented here which suggest the installation of a Mediterranean climate (p. 11, Holocene optimum): Âń ....precipitation seasonality increased strongly during this period, with winter precipitation attaining a maximum at both sites and summer precipitation simultaneously reaching a minimum (PSummer : 75 mm). This have to be discussed.

In fig. 1, The names of the climatic stations are not indicated (city, alt.) In fig. 2 GeoTü, Quercus ilex is missing.

* references

Bar-Matthews, M., Ayalon, A., Kaufman, A., 2000. Timing and hydrological conditions Sapropel events in the Eastern Mediterranean, as evident from speleothems, Soreq cave, Israel. Chemical Geology 169, 145-156.

Jalut, G., Dedoubat, J.J., Fontugne, M., Otto, T., 2008. Holocene circum-Mediterranean vegetation changes : Climate forcing and human impact. Quaternary International (2008), doi :10.1016 /j.quaint. 2008.03.012.

Lionello, P., Malanotte-Rizzoli, P., Boscolo, R., 2006. Mediterranean climate variability.

Developments in Earth & Environmental Sciences 4. Elsevier ed., 421pp.

Lowe, J. J., Rasmussen, S. O., Björk, S., Hoek, W. Z., Steffensen, J. P., Walker, M. J. C., Yu, Z. C., the Intimate group, 2008. Synchronisation of palaeoenvironmental events in the North Atlantic region during the Last Termination : a revised protocol recommended by the Intimate group. Quaternary Science Reviews 27, 6-17.

Petit-Maire, N., Vrielinck, B., 2005. The Mediterranean basin : the last two climatic extremes. Two maps, scale 1 : 5 000 000 and explanatory notes of the maps. CCGM, Paris, ANDRA ed.

Interactive comment on Clim. Past Discuss., 5, 735, 2009.