

Interactive comment on “Holocene vegetation and climate changes in central Mediterranean inferred from a high-resolution marine pollen record (Adriatic Sea)” by N. Combourieu-Nebout et al.

Anonymous Referee #1

Received and published: 6 May 2013

This is a very interesting manuscript that results from the pollen analysis of the Adriatic marine core MD90-917. The authors show pollen changes related with climatic variations at long- and short-scales related with Holocene changes in insolation and millennial-scale variability.

The ms is well organized, very clear, concise and the illustrations are good. I therefore suggest publication in *Climate of the Past* after some suggestions that should be addressed before publication.

-My main concern with this paper is about the lack of discussion of the estimates obtained by the pollen data. This is a very common behavior: the authors estimate

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climate parameters with their pollen data but do not explain what pollen changes triggered those changes in the climatic parameters and if they make sense. For example, in these estimations the summer precipitation maxima occurred during the Holocene climatic optimum. Following this study, precipitations were higher than 200 mm at ca. 7000 cal yr BP (Fig. 3). This was estimated based on what pollen species? This is quite a lot of summer precipitation. On the other hand, winter precipitation was lower (around 150 mm)? However, the area was then characterized by a Mediterranean climate (Fig. 1)? Could this be due to the river pollen transport from the Alps? Or are you assuming a summer monsoon? This is a very controversial topic reviewed by Tzedakis (2007).

Were temperatures (TANN) higher during the YD than during the Holocene? The lowest TANN of the past 13 ka was reached at ca. 7.5 ka? Please explain.

Section 6.2. Precipitation

-What pollen species are giving us information about summer and winter precipitation?
-The maximum in precipitation (PANN) is reached during the Holocene climate optimum. That makes sense. However, how do you know that the precipitations did not occur during winter, as indicated by the speleothem records (lines 21-23)? How do you explain climatically such high summer precipitations, higher than during the winter? -
Lines 11-13: If climate was driven by insolation changes the estimated temperatures would not record minima at ca. 7.5 ka...they would record maximum values. -It is interesting to see how the authors explain the observed vegetation changes mostly triggered by changes in summer precipitation. However, this would imply important atmospheric reorganization during the Holocene, as summer precipitation is basically zero in the Mediterranean area Today and what really controls the humidity and thus vegetation is winter precipitation (and the North Atlantic climate dynamics).

Other minor comments:

Abstract: Change “to” for “look at” . Pollen data is plural: correct “allow us” Remove the

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second "vegetation" from line 10 Change "southern-western" for "southwestern".

Introduction: Change "heat" for "warming" (line 4). The last sentence needs to be rewritten: the authors analyzed the clay fraction, not just "dust" so I would change that sentence for: "By examining the clay fraction we will be able to discuss. . .".

Text (section 2) and Table 1: AMS 13C ages? Radiocarbon dating is based on 14C decay. . .not 13C! Correct in page 14 (line 20) and also the reference by Siani et al., 2004!!!

Section 3.3. Line 17: what does "ecological significance" mean? How does it control the vegetal organization? Do you mean elevation?

Section 3.4. Line 21: Italian "coast".

Section 4.1. The lack of pollen in the upper 80 cm of the core is very interesting. The authors believe is due to poor pollen preservation, but related to what process? More oxygenation? Is this somehow related with climate change?

Section 5. Sentence starting in line 7: Please change: "This supports the paleoecological inferences coming from the MD 90-1917 core, revealing regional vegetation changes due to climatic events during the last 13000 cal yr BP in the central Mediterranean area."

-Line 18: Change "prevailing" for "prevailed". Correct: "in the Adriatic basin".

-Paragraph starting on line 20: Add some discussion about why the Preboreal oscillation occurred earlier in this record than globally. For example, is it due to age control uncertainties?

-Line 23: I don't think Quercus, Carpinus, Corylus or Abies are thermophilous taxa. . .maybe "more" thermophilous taxa than the steppe plants but they are mostly temperate. I would then add "more thermophilous" taxa there.

-Page 14, line 20: 14C!!!

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-In page 14 the authors discuss about the inferred SST records obtained by foraminifera and alkenones from the same core. Why are these plots not shown here? I think they would be very useful for comparison and interpretation of the pollen data.

-Line 23: Please explain why. Are planktonic foraminifera only affected by temperature? With respect to the vegetation, what kind of precipitation changes? An increase? Please specify.

-Line 25: rewrite the sentence: ". . .dominated by Quercus with regular occurrences of Corylus, Carpinus. . .".

Page 16: Please use past tense when talking about the past. For example in line 2: "Quercus became less abundant while . . .increased".

Interactive comment on Clim. Past Discuss., 9, 1969, 2013.

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