Clim. Past Discuss., 11, C1842–C1844, 2015
www.clim-past-discuss.net/11/C1842/2015/

Climate of the Past Discussions

Interactive comment on "The MIS 5 palaeoenvironmental record in the SE Mediterranean coast of the Iberian Peninsula (Río Antas, Almería, Spain)" *by* T. Torres et al.

T. Torres et al.

joseeugenio.ortiz@upm.es

Received and published: 29 September 2015

We appreciate the suggestions made by Referee #1

In spite of we deeply respect the anonymous referee opinion about the use of MIS scale only supported by isotopic data (δ18O) from marine foraminifera we cannot agree with this reductionist approach. A wide number of researchers and scientific papers use Marine Isotopic Stages for the definition of chronostratigraphical position of: -Coarse to very coarse raised marine deposits where foraminifera are mostly absent have been attributed to MIS stages or substages (Strombus bubonius was considered as a MIS5e biomarker). -The stratigraphy of many lacustrine records, where marine forams are

clearly absent, has been correleted with to MIS stages. -A great number of tufa deposits have been correlated with Marine Isotopic Stages and their paleoclimatological interpretation was established. -Finally karst deposits, speleothems and mammal remains, have been dated and published using the MIS scale.

In our manuscript, we do not establish the age (MIS and sub-stages) according to paleobiological or sedimentological interpretation but based on Amino Acid Racemization Dating. This dating method has been proved to be a feasible dating method in a special way when, as in this case, the samples consisted on ostracod shells. But as local thermal history differences can slightly interfere with the calculated ages we confirmed the accuracy of our data comparing with the U/Th published ages of the Alfaix tufa deposits, where we recovered our own samples for AAR dating (see manuscript). The Alfaix tufa deposits were dated by Schulte et al. (2008) using U/Th dating (169$\pm$9 ka and 148$\pm$8 ka)

a) We do not agree with the referee interpretation that there are "high number of age inversions" in AAR ages. For the comparison of the ages it is definitive to look at the standard deviation, and not only to the mean. In this sense, age uncertainty is the standard deviation of all the numerical ages calculated from the amino acid D/L values of many samples of the same horizon. In general, the standard deviations of amino acid racemization ages (obtained using 5-6 analytical samples) were higher than those usually obtained with other dating methods which, traditionally, are performed using a single sample, the standard deviation being attributed only to the analytical error. in short, the error of radiometric (e.g 14C or U/Th) ages corresponds to the analytical error, but the error of AAR ages corresponds to the sum of analytical and sample errors. Our results highlight the importance of dating numerous specimens per horizon in geochronological studies (e.g., Goodfriend, 1989), that is to say, dating numerous individuals and using their ages to estimate the mean age of the horizon. This explains the higher values of samples dated by means of the standard deviations of samples dated by means of the amino acid racemization compared to other ages, as the former results involve the addition of genus-linked, intra-shell, taphonomical and analytical errors. In any case, we will expand our discussion about AAR ages. b) Due to the characteristics of the sedimentary environment (alluvial fan and lagoon) the presence of benthic foraminifera is not continuous. Moreover, the continental influence would have significant influence in the foraminifera δ18O record, and most of the record reflected warm conditions (based on the palynological study). Thus, in our view, the lagoonal δ18O signal here is not directly comparable with marine δ18O record. c) In our view, the three types of information derived from sedimentary environments, organic geochemistry, and palynology were sufficiently integrated (see Figure 2), but we will re-organize the Results and the Discussion sections (especially this latter) to integrate more clearly the information provided by the different environmental proxies. According to the suggestions of another anonymous reviewer, we will amplify the comparison of our results with other Mediterranean sites Samples were prepared and observed under microscope but pollen was absent in the lower part of the record (MIS 11). In the rest of the core, we selected samples at 30 cm intervals, but in levels made of sands and conglomerates, we did not find pollen. In our view the number of samples (37) along 19-3 m is sufficient to observe main palaeoenvironmental changes. d) In our opinion the palynozone boundaries were already established (see figure 2). We will indicate them in figures 4 and 5. We will discuss about the relationship between palynology and lithology. e) It seems that some samples between 460 and 300 cm were not represented in Figure 4. We will add them. f) Figure 2 shows the combination of the information provided by environmental proxies. We will try to complete it in order to show more clearly the relationship between them.

Interactive comment on Clim. Past Discuss., 11, 3897, 2015.