

## ***Interactive comment on “Sea surface temperature variability in the central-western Mediterranean Sea during the last 2700 years: a multi-proxy and multi-record approach” by M. Cisneros et al.***

### **Anonymous Referee #2**

Received and published: 16 December 2015

This paper presents a detailed study of a series of cores from the Central-Western Mediterranean Sea, focused on establishing the temperature and salinity history of this region over the last 2000 years. This study uses various proxies to make this assessment, including Mg/Ca and O18 in foraminifera and alkenone unsaturation. The main conclusion of the study is that there has been a long-term secular decline in temperature, but with superimposed variations related to the NAO/AMO.

Most of my comments are focused on the application of the climate proxies in the ms., in particular the interpretation of the foraminiferal proxies. I also have some comments on the development of the age models, as well as some general comments on the

C2659

interpretation. In general, I think that the authors need to better justify some of the choices they have made in data treatment and age model development (details below). This kind of work is quite challenging because the signals involved are not much larger than the uncertainties, as the authors indicate. Overall, I think the authors have done a credible job in balancing these uncertainties with the goal of developing useful climate records, but I think the paper would be strengthened with more attention to uncertainties. In the interpretation of the data, I suggest the authors consider volcanism as a forcing that might explain both the secular trend (following McGregor et al., 2015) and the centennial scale variations.

Detailed comments (see annotated pdf for additional minor comments) p. 5449 there are several potential analytical issues here. In particular, correlations between Mg/Ca and Al need to be carefully assessed for significance (i.e., P value) rather than just rejected based on the R value. If the correlations are significant, then that indicates that there is some detrital contribution to Mg/Ca (Barker et al, 2003; Lea et al, 2005)

p. 5549 the choice of the Shackleton 1974 paleotemp equation is an odd one, because this equation was developed for benthic ff. Some *bulloides*-specific equations such as Bemis et al., 1998 have been developed. The authors should try these or others, as appropriate, and justify their final choice.

p. 5454-55 The alignment of the different cores via both Mg/Ca and Mn appears somewhat arbitrary; e.g., the peaks in Fig. 5-6 could be aligned in a number of different ways. I understand that the authors are attempting to develop the best overall chronology for their records, but some added discussion about uncertainties in this context would be welcome. For example, how large is the effect on the final stacks of the proposed alignments?

p. 5457: the inference that *bulloides* represents Spring temperatures will be heavily influenced by the choice of calibration equations for O18 (see above). How would this inference change with a different calibration choice?

C2660

Along the same lines, how does the derived Mg/Ca calibration equation compare to previous ones? Does it agree within uncertainties?

p. 5461, difference between UK37' and Mg/Ca This difference will also be sensitive to the calibration choice for bulloides O18. What do the uncertainties represent? Do the absolute values between the two temperature proxies differ according to a t-test?

Section 6.1: throughout this section, all temperature changes should be given with attendant uncertainties, in part to make clear how significant the changes are.

Section 6.2: McGregor et al., 2015, NG, called on volcanism as the main cause of the cooling trend of the last 1000 years. How does this forcing potentially influence the Med. records? Could it also play a role in driving centennial-scale variability?

Please also note the supplement to this comment:

<http://www.clim-past-discuss.net/11/C2659/2015/cpd-11-C2659-2015-supplement.pdf>

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Interactive comment on Clim. Past Discuss., 11, 5439, 2015.