

## ***Interactive comment on “Arabian Sea upwelling over the last millennium and in the 21st century as simulated by Earth System Models” by Xing Yi and Eduardo Zorita***

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We thank Dr. Sebastian Lüning for his interest in this manuscript and for sharing the detailed comments and the constructive suggestions. In the following, we sketch how we plan to address the two issues brought out by Dr. Sebastian Lüning in the revision.

1. The models used in this study are forced by all forcings including solar forcing, orbital forcing, greenhouse gas forcing, volcanic forcing, etc. So the answer to the first question is: yes, the models account for solar forcing. However, as also mentioned by the two anonymous referees, we agree that we need to explain more clearly the different impacts of solar forcing and orbital forcing on the Arabian Sea upwelling. We need to remark that the Earth System Models are not “calibrated” against the reconstructed

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solar irradiance. The external forcings, derived from ice-core records, are independent of the earth system models. There is no model calibration involved regarding the external forcings.

In addition, we thank Dr. Sebastian Lüning for recommending the related literature, which would help us to revise the manuscript.

2. Since our focus is on the last 1000 years, it is not clear to us why a longer proxy record is preferable. It is more suitable to use the data in Anderson et al. 2002, which contains records for approximately the same period. Also, the earth system model simulations that we analyze in our study only run for the last millennium. The proxy record used in Anderson et al. 2010 is indeed improved and extended, but as mentioned in this paper, the maximum during 1200-800 a BP, the minimum at 400 a BP, and the following positive trend were also found in their previous study (Anderson et al. 2002) as well. Therefore, during the last millennium, the updated study shows consistent patterns as the previous one. We thank Dr. Sebastian Lüning for sharing this point and in the revision we will also discuss the updated work of Anderson et al.

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