

Response to reviewer 2 (Fred Kucharski).

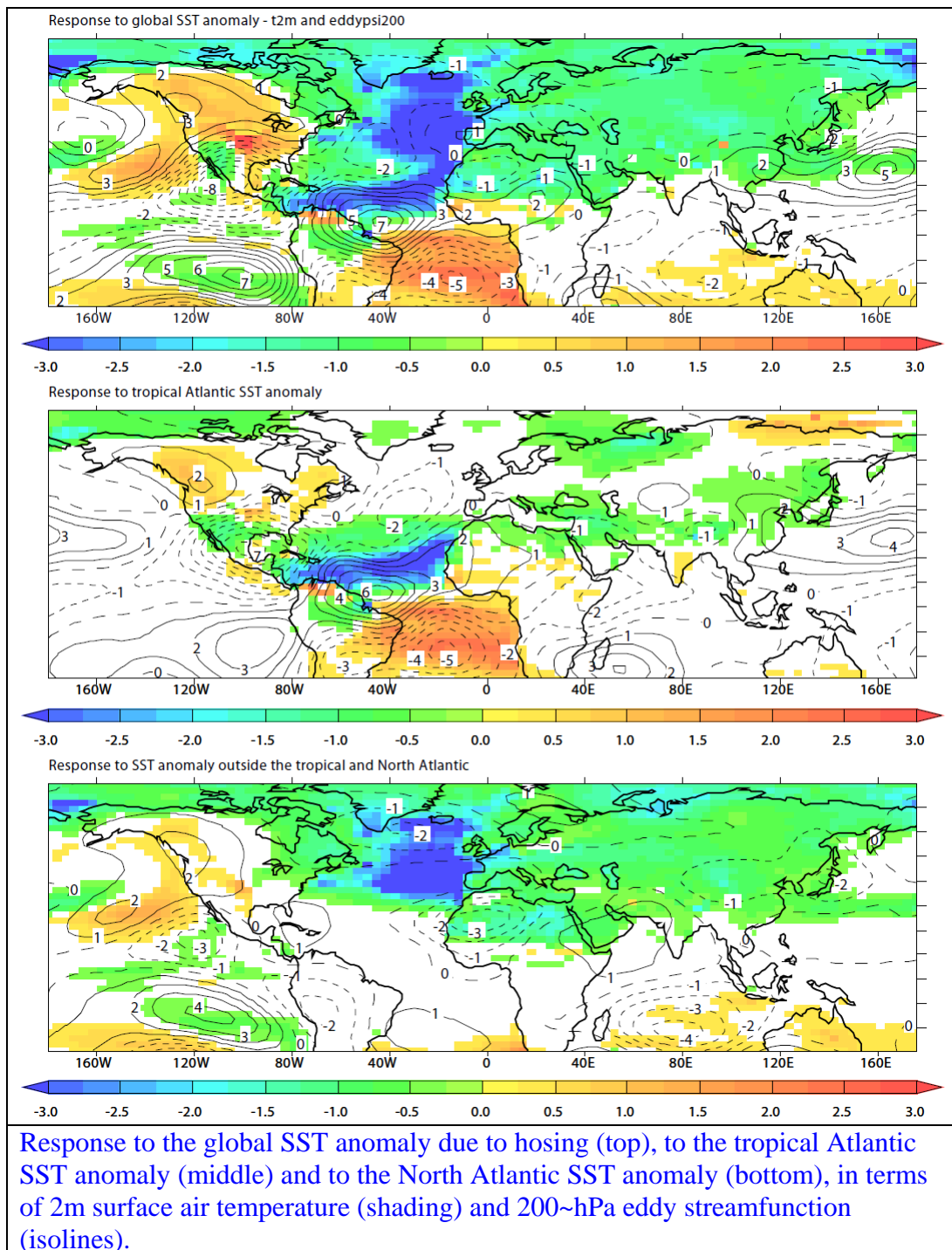
For easier reading, we have reproduced the reviewer's comments (in black and italic) and give our responses in blue.

Note for the Editor: as the review from Reviewer 2 is an extension from his short comment, we will answer his review.

Response to the review.

I have reviewed the above manuscript. I have to add that I am not an expert of Paleo reconstructions, so I can only comment regarding the numerical modelling experiments performed. Overall I found the paper well written and the results convincing and relevant. In particular the teleconnection from the tropical Atlantic is an interesting new result. I recommend publication after a minor clarification as outlined below. My comment is regarding the tropical Atlantic teleconnection to the Indian Monsoon that was highlighted in this paper. Kucharski et al. 2008, 2009 and Losada et al. 2010 suggest that the equatorial and south equatorial Atlantic warming influences the Indian monsoon through equatorial Kelvin wave propagation and modification of the Walker circulation. In particular the Gill-type response to the east of the heating induces an upper-level cyclonic flow and low-level anticyclonic flow that induces low level divergence and reduced rainfall in the Indian region via Ekman pumping. Indeed the upper-level height and wind responses to the tropical Atlantic part of the Atlantic forcing resemble that shown in the Kucharski et al. 2009 paper, and in this paper it is also shown that the (south) equatorial warming alone is able to force a dynamically induced atmospheric cooling in the South Asian region. I think this mechanism should be briefly discussed in this paper.

In the new version of our manuscript, we describe the mechanism outlined by Kucharski et al 2008, 2009 in more detail. We have also investigated whether this mechanism was active in the sensitivity experiment to tropical Atlantic SST changes only. We have computed the same diagnostic as in Kucharski et al (2009), i.e. the 200 hPa eddy streamfunction response to regional SST changes. The results are shown on the figure below.



This figure shows that while there is indeed a strong response in the upper tropospheric stream function over the tropical Atlantic, this response is of the same sign as in Kucharski et al (2009) but very weak over the Indian Ocean.

We have therefore better explained the mechanism in the introduction of our manuscript but we have not included this new figure. We mention in the discussion of the results that this mechanism does not seem to lead to a strong response in our model/experiments. This could be due to the forcing SST anomaly being different (north and south tropical instead of south tropics only) or to the climatic base state.

I also wonder if the role of the north tropical and south tropical parts could be further separated? This could be important as this could be really a completely new mechanism for the paleo teleconnection. However, it may be not necessary for the current paper and analyzed in a future work.

Unfortunately, running the additional experiments which would be needed to analyse the role of the northern and southern tropical Atlantic SST anomalies is not possible anymore due to technical reasons (the model does not run on the new machines of our computer center). But we agree that this would have been very interesting and have included this idea in our perspectives for future work.