

***Interactive comment on “On the origin of multi-decadal to centennial Greenland temperature anomalies over the past 800 yr” by T. Kobashi et al.***

**Anonymous Referee #3**

Received and published: 23 January 2013

The paper by Kobashi et al. is addressing the causes of the deviations of the Greenland temperature record from the Northern Hemisphere (NH) one over the last 800 years using a recently published temperature record derived from the air trapped in the GISP2 ice core and the two NH temperature reconstruction by Mann et al. (2009) and Moberg et al. (2005). The authors decompose the Greenland temperature record in a background (NH) and a regional climate defined as Greenland Temperature Anomaly (GTA). They start their investigation from the more recent period using observational data and extend their inferences to the past 800 years. The authors relate the Greenland climate variability to atmospheric processes like the NAO/AO atmospheric circulation pattern, also induced by variation of the solar activity through ozone feedbacks

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in the stratosphere. A negative correlation between Greenland temperature and solar forcing is thus suggested.

The paper is interesting and it represents an original contribution although I have found the reading sometimes difficult. Limiting the use of parenthesis could help.

I recommend its publication after minor revisions listed below.

Page 5458, line 8: delete “to” after resembling.

Page 5458, line 20: not very clear what is “a spatial temporal data fusion”.

Page 5459, lines 27-29: the NAO index is not shown in figure 1. It would be better to add it.

Page 5460, lines 3-4: the sentence that the solar signals are out of phase between NH and Greenland temperature needs a reference or the authors put forwards their arguments?

Page 5460, line 10: the figure 1 has no middle panel; moreover what is the sign “-“ before  $r$ ?

Page 5460, line 21: how did you derive this lag?

Page 5461, line 10: since in the calculation of the two GTAs one input is the same, I do not think that you can suggest that this is a robust feature.

Page 5462, lines 20-25: the first of this paragraph is not clear at all. May you explain better?

Page 5463, lines 5-6: how do you produce synthetic NH temperature? Not clear.

Page 5481, figure 1 caption: please, add that the GTA is on a reversed axis.

Page 5483, figure 3c: I do not think that plotting in red the negative GTA is a good idea. May you put in blue and in the red the negative and positive temperature anomalies, respectively? Please, check also in the figure caption accordingly.

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Page 5487, figure 5 caption: please, add that the GTA is on a reversed axis.

Page 5488, figure 6 caption: please, add that the GTA is on a reversed axis. Moreover, What is solar 2 in Fig. 2, it does not correspond.

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Interactive comment on Clim. Past Discuss., 8, 5455, 2012.

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