

Interactive comment on “A record of Antarctic sea ice extent in the Southern Indian Ocean for the past 300 yr and its relationship with global mean temperature” by C. Xiao et al.

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The paper presents a valuable new proxy record of sea ice extent from the southern Indian Ocean. The paper is concise and well written and improves our understanding of sea ice changes over longer timescales. The authors conclude that prior to the 1970s there is a good relationship between proxy SIE and global temperatures however in recent decades the relationship has been reversed.

Specific comments:

I would like to see some more on the calibration of MS-. The authors are eager to investigate the relationship between SIE and northern hemisphere temperature however
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the MS- record only explains ~ 16 of the variance in SIE (lower than has been reported at other sites). I think that the paper would benefit from some additional work to demonstrate the mechanism by which MS- from the sub-sector 70-80°E is transported to the ice core site. There is a reference to previous work, that low pressure systems in the Indian Ocean provides precipitation to this region, but perhaps this could be expanded upon in this paper. Potentially by adding the major transport route to the map or correlate the MS- record with wind fields from reanalysis data. Alternatively have the authors looked at the back-trajectories? The correlations with SIE are relatively weak but the interpretation would be strengthened if the transport route could be demonstrated.

My other concern is the use of northern hemisphere temperature reconstructions. I do appreciate that southern hemisphere records are sparse but a lot of the interpretation is based on very limited data. For example a major finding of the record is the SIE retreat during the “little ice age” however the temperature reconstruction during this period is derived from just four European stations. In the absence of SH reconstructions could you try using the ice core isotope records?

The correlations between MS- and the SAM are weak. Again I think further investigation of the transport of MS- to the site might help explain the statement that “changes associated with SAM directly influence MS- deposition”.

Technical corrections:

Abstract- “high-resolution records” currently infers multiple records were used.

Please make the figures larger. The legends need to be clearer on the figures and/or included in the captions.

Interactive comment on The Cryosphere Discuss., 7, 3611, 2013.