

## ***Interactive comment on “Model-data comparison and data assimilation of mid-Holocene Arctic sea-ice concentration” by F. Klein et al.***

### **Anonymous Referee #1**

Received and published: 30 January 2014

Review of :

Model-data comparison and data assimilation of mid-Holocene Arctic sea-ice concentration F. Klein, H. Goosse, A. Mairesse and A. de Vernal

Manuscript Evaluation Criteria

Scientific Significance: Does the manuscript represent a substantial contribution to scientific progress within the scope of Climate of the Past (substantial new concepts, ideas, methods, or data)? good (2)

Scientific Quality: Are the scientific approach and applied methods valid? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)? fair (3)

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Presentation Quality: Are the scientific results and conclusions presented in a clear, concise, and well-structured way (number and quality of figures/tables, appropriate use of English language)? Good (2)

Does the paper address relevant scientific questions within the scope of CP? yes

Does the paper present novel concepts, ideas, tools, or data? yes

Are substantial conclusions reached? yes

Are the scientific methods and assumptions valid and clearly outlined? see comments

Are the results sufficient to support the interpretations and conclusions? yes

Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? yes

Do the authors give proper credit to related work and clearly indicate their own new/original contribution? yes

Does the title clearly reflect the contents of the paper? yes

Does the abstract provide a concise and complete summary? yes

Is the overall presentation well structured and clear? yes

Is the language fluent and precise? yes

Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? yes

Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? see comments about fig 2, and my request for an additional one.

Are the number and quality of references appropriate? yes

Is the amount and quality of supplementary material appropriate? n/a

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### Major comments

If I understand well, there is only one simulation with assimilation, for MH. But no simulation with assimilation for PI. Anomalies studied in the paper are between PI no assim, and MH with assimilation. There is a kind of inconsistency here that you should comment. Unless only anomalies are assimilated, but from line17@p6520, it seems that absolute values are. Could you please justify this comparison between two simulations that does not follow the same experimental protocol ?

Fig 2 has some features not clearly visible. How many data does not have zero within the error bar ? And for the data that are kept ? As almost all of them does have zero in the error range, are the changes significant ? This point must be addressed.

### Minor comments

There is no global map of the sea-ice cover for any simulation, and I strongly miss that feature to have of general view of the changes between the different simulations. line25@p6530 (conclusions) states that "the simulated sea ice is spatially more homogeneous than the reconstructed ones", and we miss some maps to make up our mind about that. It will also help to relate sea-ice change to atmospheric circulation changes.

In 2.2 Data assimilation method. After reading some of the references, I suggests that you remind the reader that the errors in data are taken into account when eliminating solution too far from data. And give some indication about the method to re-inflate the ensemble. The papers reads about resampling, but I feel that this term is not well chosen to describe the method : perturbation of the atmospheric stream function (?), and not interpolation between particles characteristics.

Are all data points in different model grid points ?

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Interactive comment on Clim. Past Discuss., 9, 6515, 2013.