

## ***Interactive comment on “The Paleoclimate reanalysis project” by S. A. Browning and I. D. Goodwin***

### **Anonymous Referee #2**

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Reanalyses combine numerical simulations of a dynamical system and observations by means of data assimilation to provide comprehensive estimates of the state of the system. The longest timespan of existing reanalysis datasets is 160 years (20CRv2c) and there is undoubtedly a need for longer datasets, which require assimilation of paleo proxy records.

The existing reanalysis datasets were obtained by means of advanced data assimilation methods such as 3D/4D-Var, Ensemble Kalman Filter (see <https://reanalyses.org/>). These methods have been already employed in atmosphere and ocean science for some decades. Data assimilation in paleoclimate is a relatively new field; however, a considerable progress has been made over the past ten years, and I am wondering if the authors are familiar with these works, since they are using a primitive data

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assimilation method while, for example, in Annan and Hargreaves (2012) a Bayesian data assimilation ensemble-based method was tested with pseudo-proxies offline. This method is also inexpensive but takes into account the errors both in proxy records and in a dynamical model in contrast with the fitting method the authors are using. Therefore, the obtained dataset should not be called “reanalysis”.

I believe this paper should not be published as it ignores the developments in data assimilation for paleoclimate applications over the past ten years, moreover, I doubt the results present in this paper since the timeseries of indices obtained by the model alone without the data fitting are not shown and I suspect that they will give moderate correlations as well.

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