

# ***Interactive comment on “Parametric Decadal Climate Forecast Recalibration (DeFoReSt 1.0)” by Alexander Pasternack et al.***

## **Anonymous Referee #2**

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### General comments

This paper presents what may be a very important work in the study of decadal climate prediction. The authors presented the methodologically oriented post-processing model "Parametric Decadal Climate Forecast Recalibration (DeFoReSt)," to correct decadal climate prediction. The method uses earlier published approaches, and extend it to the long-term prediction by allowing the forecast errors to depend on forecast lead time. The performance of the presented approach is well established using different assessment measures.

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## Specific comments

1. It is mentioned in section 3.3 on lines 1-2 that the parameters are estimated by minimizing the average CRPS over the training period. Does this mean only the portion (the training) of the data was used for estimating the parameters? if yes, why the whole data was not used? it is expected that a training-validation grouping of data for checking the performance of DeFoReSt. But a parameter within DeFoReSt has to be primarily estimated from the whole data.

2. DeFoReSt was defined based on ensemble mean and variance functions (by my reading on the paper), where 15 ensemble members were selected. However, systematic errors vary widely between ensemble members, a simple ensemble averaging limits the relevance of DeFoReSt for long-term prediction. Arisido et al (2017) and Tebaldi et al (2005), see below, demonstrated that the common ensemble averaging method where each ensemble member has the same weight poses serious issues. I encourage the authors to discuss this issue supporting their argument with these papers and take into account the advisories in their revision.

- Arisido, M.W., Gaetan, C., Zanchettin, D. et al. Stoch Environ Res Risk Assess (2017). <https://doi.org/10.1007/s00477-017-1383-2>

- Tebaldi C, Smith RL, Nychka D, Mearns LO (2005) Quantifying uncertainty in projections of regional climate change: A Bayesian approach to the analysis of multimodel ensembles. Journal of Climate 18:1524-1540

3. How are the orders chosen for the polynomials used in equations such as (9) and (10). Without some cross-validation study it is not clear how a third order polynomial suffices for the drift along lead time. A sensitivity analysis for different order scenarios should guide for closer to the optimal choice needed for capturing the underlying features in a data.

## Technical corrections

1. line 19 page 2, the acronym "PDF" should be defined on the first use.
2. line 1 Page 15, "..to change polynomially.." Remove "polynomially", then it is clear that the conditional bias and the ensemble dispersion change with lead time, while they change linearly with start time.
3.  $v_5$  in (A9) page 17, the coefficient of  $\tau^2$ , is typos error?

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Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2017-162>, 2017.

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