

Earth Syst. Dynam. Discuss., referee comment RC2
<https://doi.org/10.5194/esd-2022-7-RC2>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on esd-2022-7

Anonymous Referee #2

Referee comment on "An updated assessment of past and future warming over France based on a regional observational constraint" by Aurélien Ribes et al., Earth Syst. Dynam. Discuss., <https://doi.org/10.5194/esd-2022-7-RC2>, 2022

Title: An updated assessment of past and future warming over France based on a regional observational constraint

Authors: Ribes et al.

Summary:

This paper assesses the past and future warming over France at the regional scale. One highlight of this paper is about the usage of Kriging for climate change, a method based on Bayesian Statistics, to get the posterior estimation of the projections after "assimilating" observations, which should substantially reduce the estimation uncertainties. As a researcher working on data assimilation, it is very inspiring and enlightening to see how data assimilation methods can be used for climate projections. The paper is well-written and clear. It would be great if the authors can show more details about the Kriging for climate change (KCC).

Recommendation:

Minor revision

Major Comments:

- More detailed procedure describing the KCC is needed (, which can be put in the appendix). Especially how you set the prior covariance for x in eq.(2). You mentioned at Line 150 that " μ_x and Σ_x are estimated as the sample mean and covariance of the CMPI6 model forced responses." But how do you calculate Σ_x exactly? How does Σ_x look like? For data assimilation, the setting of prior error covariance requires a lot of efforts. What's the dimension of Σ_x . Is it diagonal or block diagonal? Does Kriging requires the calculation of inverse of Σ_x ?
- You mentioned near line 130 that " x ...where each element is an entire 1850-2100 time series of the forced response.", but what is the exact dimension of x ? If x is large, how to you invert Σ_x ?
- Near Line 120: what's the exact dimension of your vector y ? Near line 160, you mentioned that no measurement error is assumed. Do you mean $\Sigma_y = 0$? Can you give an explanation what's the impact of setting $\Sigma_y = 0$ in KCC, specially how does your influence influence the posterior?