

Excessively dry soils hamper summer seasonal prediction skill: can this be avoided?

ABSTRACT

BACKGROUND

Context : Climate models suffer from a warm and dry bias in summer over mid-latitude continents.
 ➔ A too low soil moisture could alter the predictive capacity of dynamical forecast systems

What was our aim ? To implement an in-run correction of the precipitation flux feeding the land surface to mitigate soil moisture bias, and to evaluate the impact on temperature bias and prediction skill

METHODS

Model : CNRM-CM6-1 (Voldoire et al. 2019)
 Resolution : ~1,5° (land+atmosphere), 1° (ocean)

Setup : 2 summer hindcasts CTRL and PERT -1993-2014 summer (MJJA) hindcasts, 30 members

- Init : 1st May (Land : ERA-I/GPCC forcing, atm : Era-I, ocean/sea-ice : Mercator)

CTRL hindcast : No correction

PERT hindcast : In-run precipitation correction

CONCLUSIONS

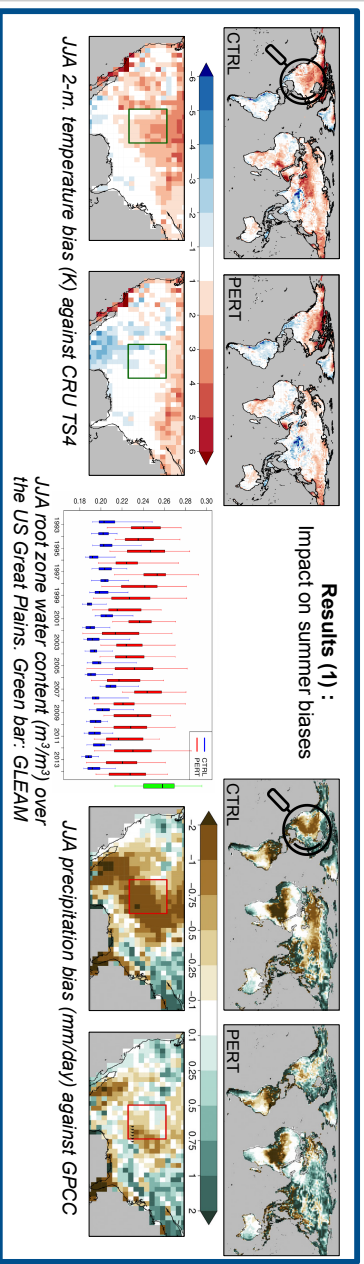
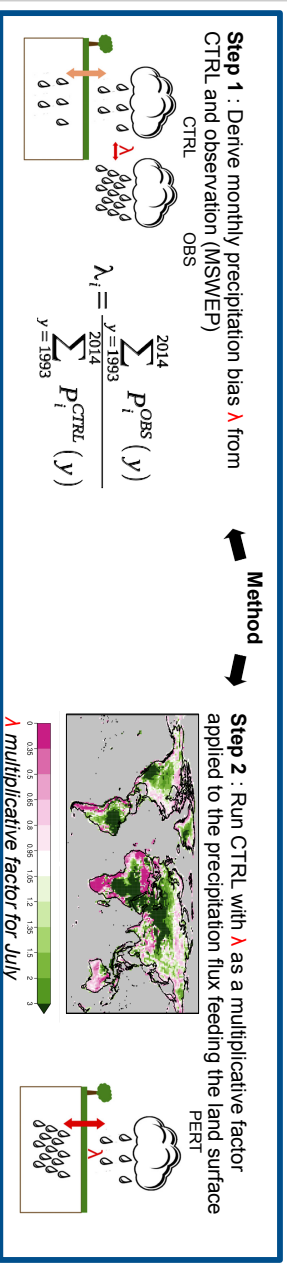
Key findings : the method efficiently reduces warm and dry biases over central US and eastern Europe. It increases soil moisture mean and variability, as well as latent heat flux. The summer temperature forecast skill is significantly improved over the US Great Plains.

Implications : our method is now used in operations in the Météo France assimilation run for initializing seasonal forecasts.

The method mimics an irrigation flux. Irrigation could thus be a key process missing in the model to achieve more skillful predictions.

Climate model precipitation bias over continents in summer: in-line mitigation strategy and impact on seasonal prediction skill

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Reference : Ardilouze, C., L. Batté, B. Decharme, M. Déqué, 2019 : On the link between summer dry bias over the US Great Plains and seasonal temperature prediction skill in a dynamical forecast system. Weather and forecasting, doi:10.1175/WAF-D-19-0023.1

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