CONFESS

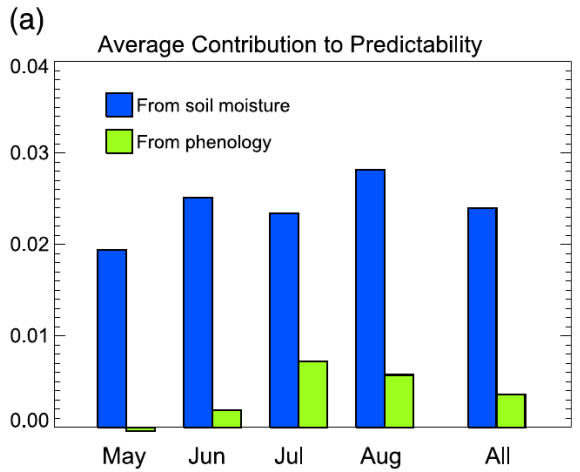
Consistent representation of temporal variations of boundary forcings in reanalyses and seasonal forecasts

Impact of an interactive vegetation scheme on seasonal forecast

G. Dayon, C. Ardilouze

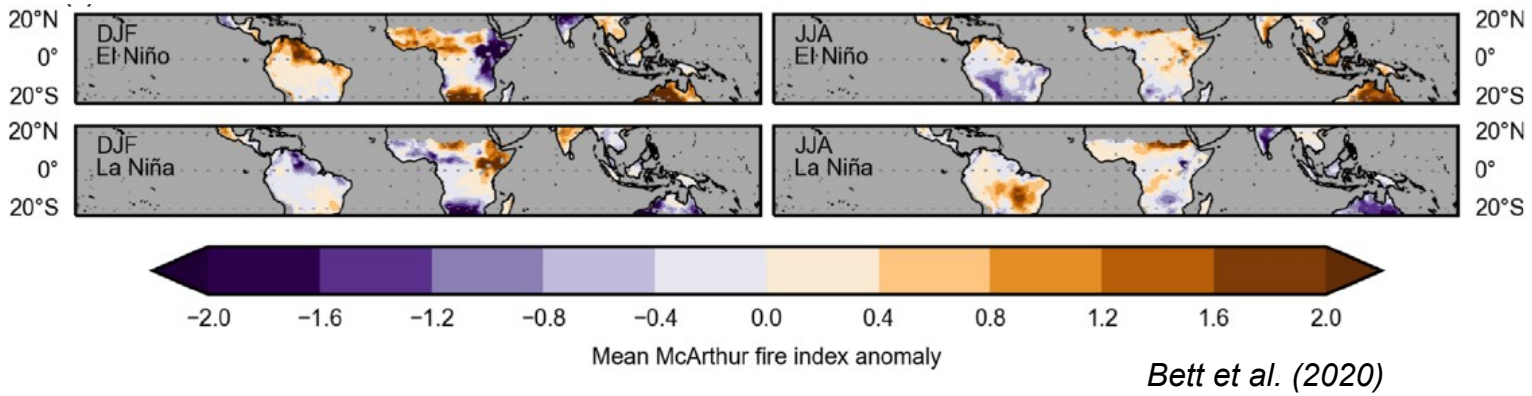
3rd Pan-GASS Meeting

- ✓ Role of the vegetation in Land-Atmosphere coupling



Koster et al. (2015)

- ✓ Interest of the vegetation state (LAI) forecast

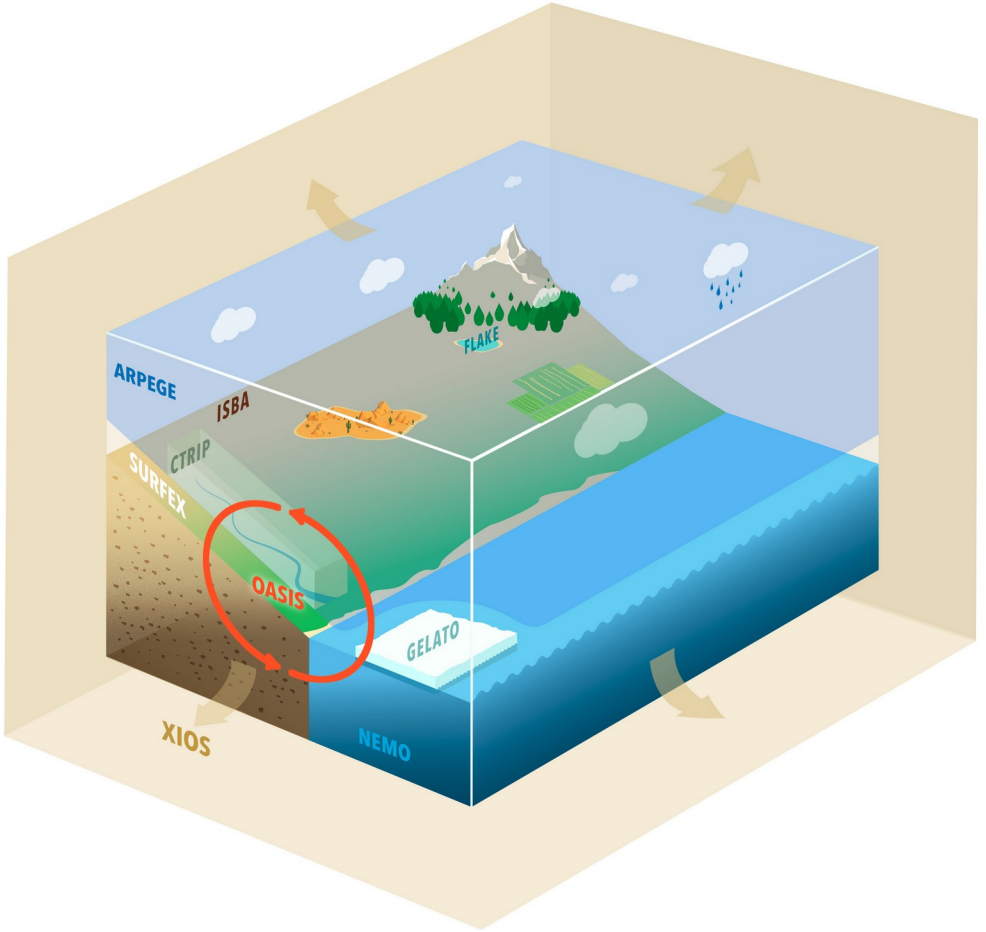


Bett et al. (2020)

Experiments

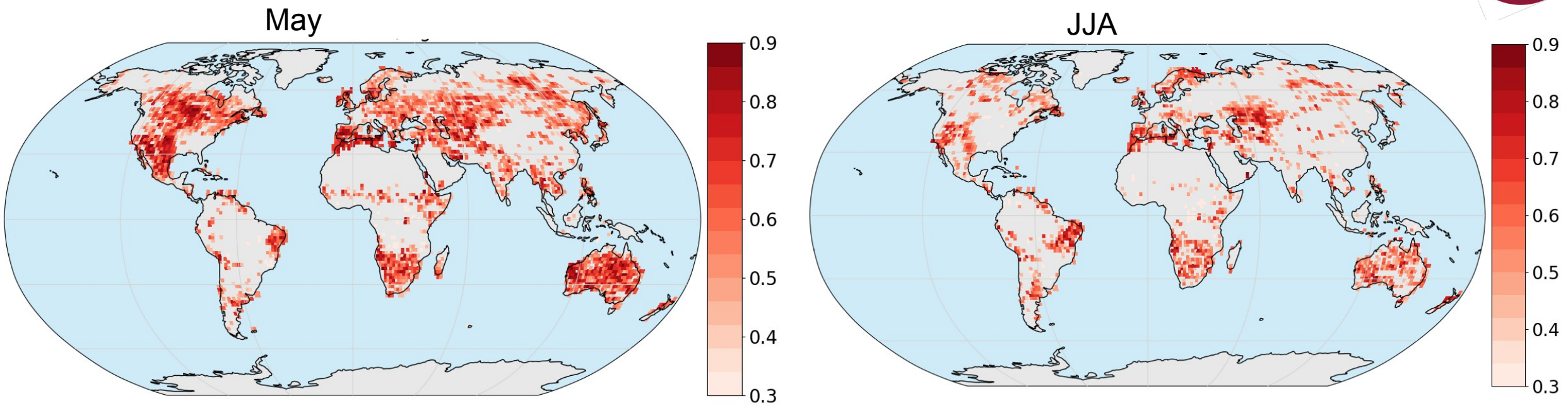
- **Land-surface** : SURFEX
  - Fixed climatological vegetation vs. Interactive vegetation
  - ERA5 – driven (1950 - 2020)

- **Re-forecast** : CNRM-CM6
  - Fixed climatological vegetation vs. Interactive vegetation
  - Initialisation in May 1st, 4 months lead (JJA)
  - Atmosphere : ERA5 / Ocean : GLORYS
  - Land : LSM runs mentioned just above
  - 1993 – 2016 / 50 members



CNRM-CM

LAI forecast – May initialization – 1993-2016



Some skill in mid-latitude : Europe, USA. It drops quickly in summer.

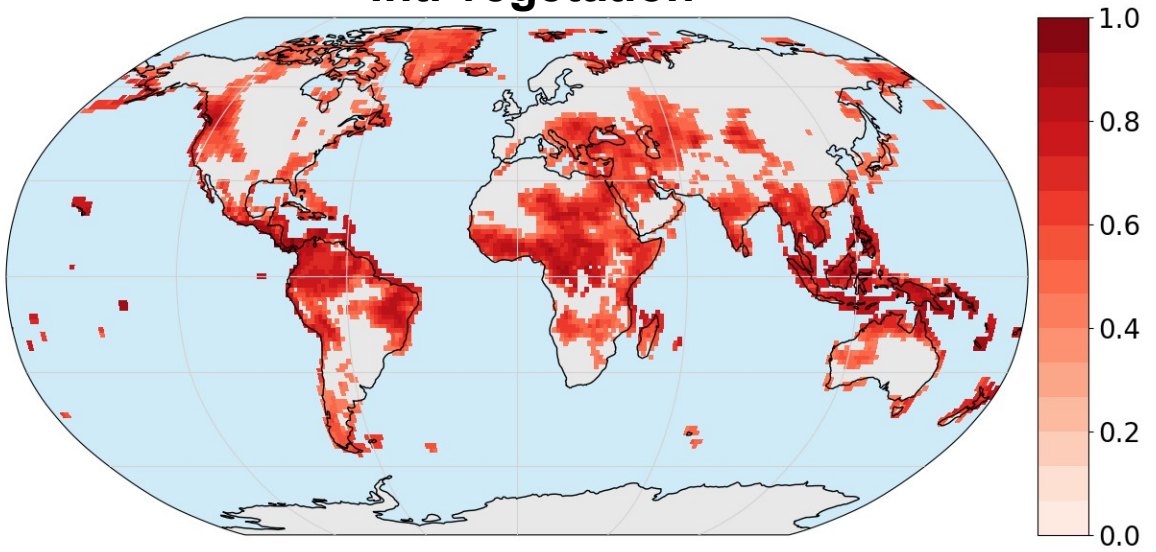
Skill in semi-arid regions : Australia, South Africa

Curiously, no skill in the tropics. Relatively small changes and observations might saturated.

Does it affect other forecasted variables ?

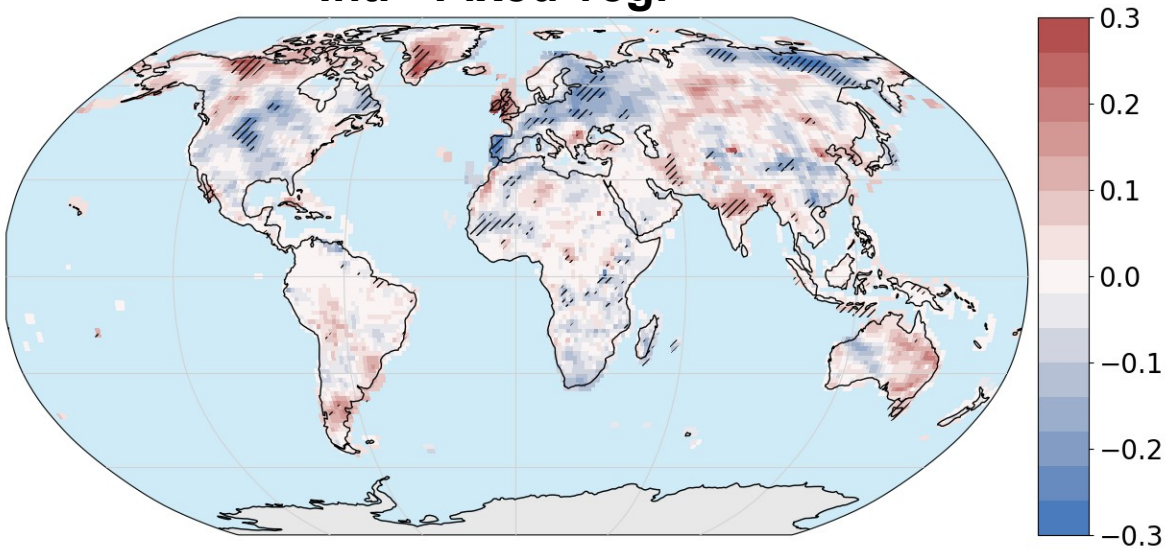
Impacts of interactive vegetation on TAS forecast – JJA

Int. vegetation



Skill in TAS in the tropics.
Limited in the mid-latitudes.

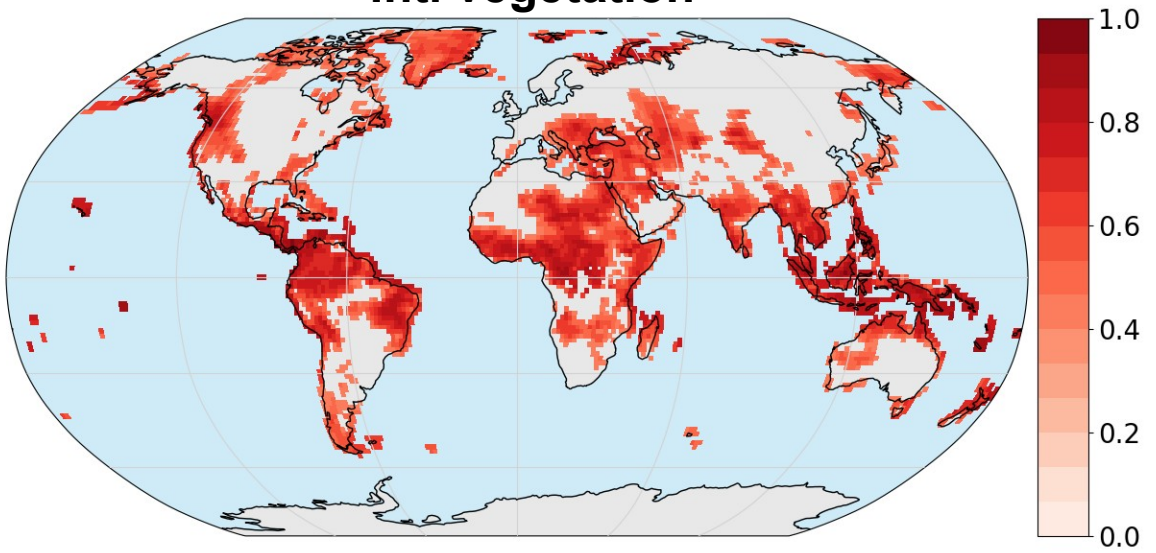
Int. - Fixed veg.



Impact of int. veg. is at best limited or tends to deteriorate results.

Impacts of interactive vegetation on TAS forecast – JJA

Int. vegetation



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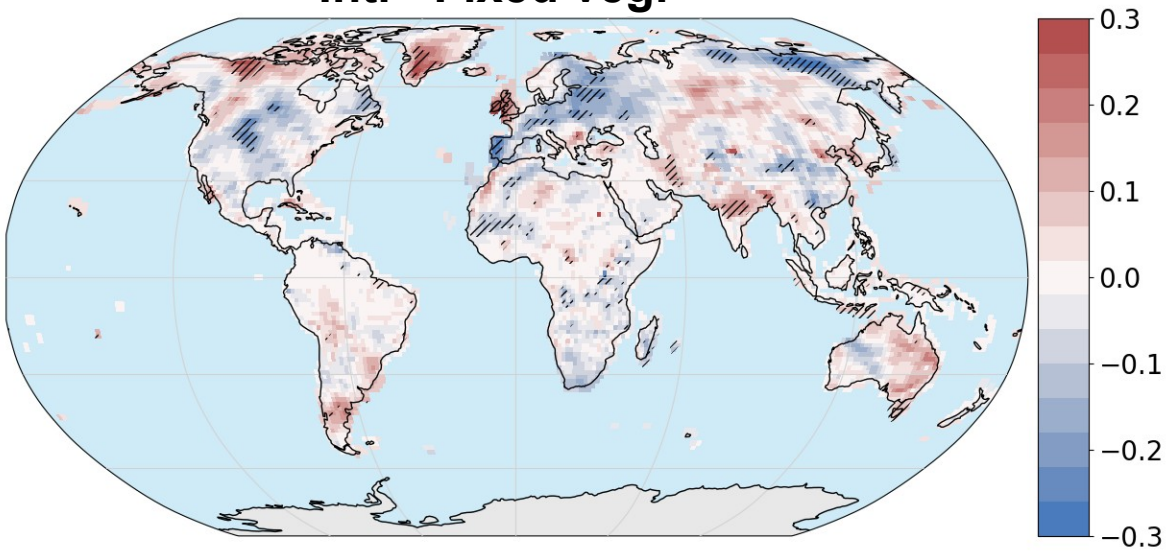


Skill in TAS in the tropics.
Limited in the mid-latitudes.

Impact of int. veg. is at best limited or tends to deteriorate results.

What about variables closer to the water cycle ?

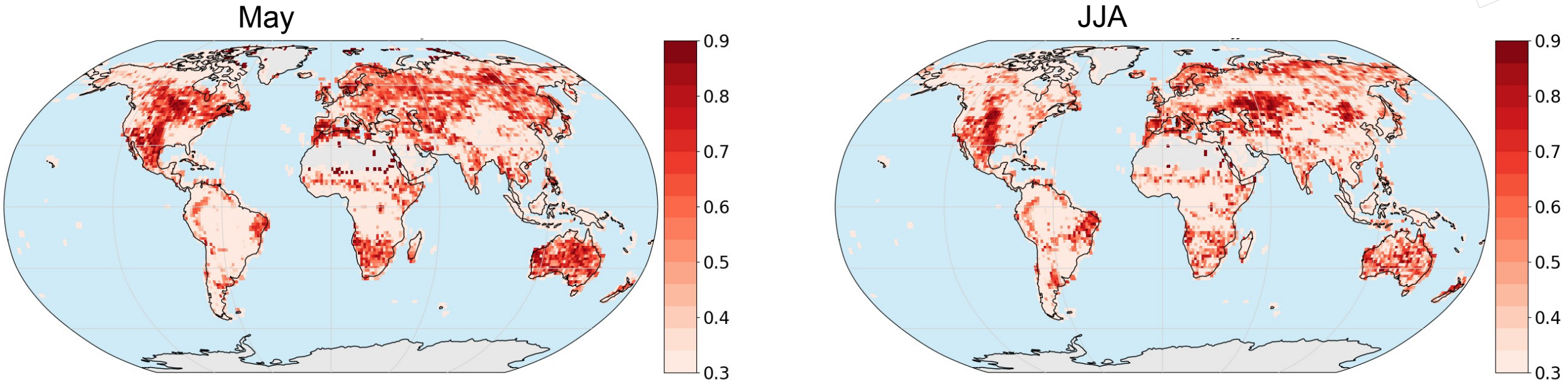
Conclusions are not different looking at other variables and using other references

Preliminary conclusions

- ✓ **There is some skill in vegetation state forecast**
  - Is it enough for a practical use ?

- ✓ **Improvements from the interactive vegetation in seasonal forecast are limited**
  - Why ?

LAI modelling skill – LSM run correlation vs. Obs.

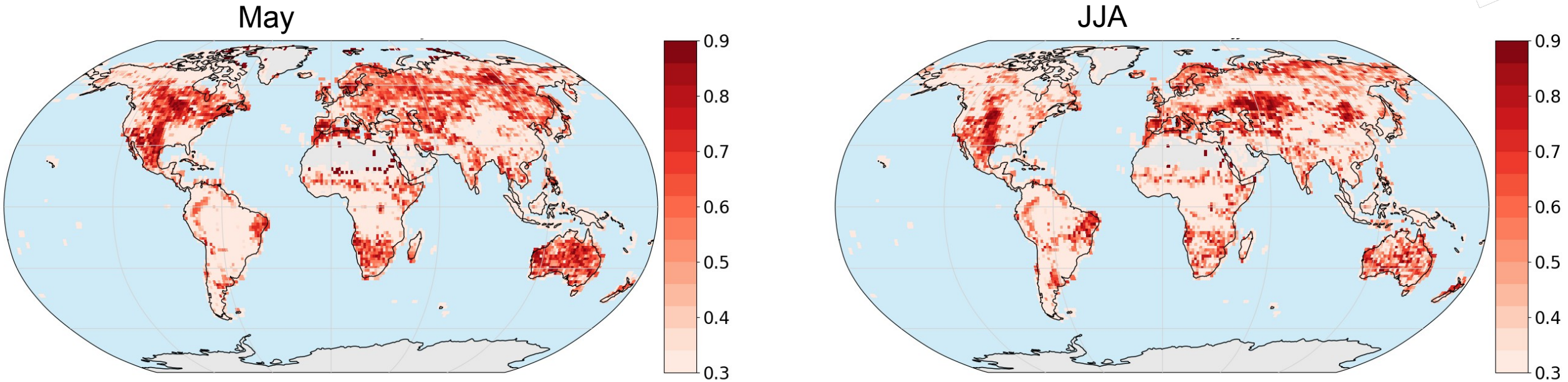


Not shown : correlations are very similar using a second reference of LAI.

The forecast can hardly do better than these score.

What do we do next ?

LAI modelling skill – LSM run correlation vs. Obs.



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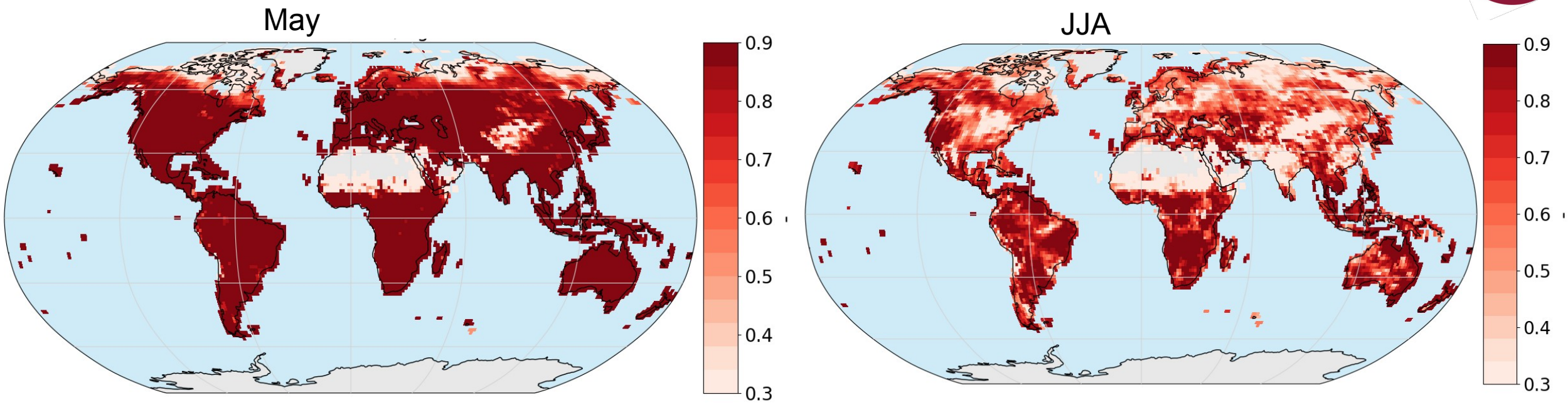
The forecast can hardly do better than these score.

What do we do next ?

What if we were in world where the land surface model is perfect ?

LAI forecast skill – "pseudo-perfect" framework



We compare the re-forecasted LAI to the LSM run LAI.

In May, forecast is very good. It is somehow expected as initialisation is perfect and vegetation as some persistence.

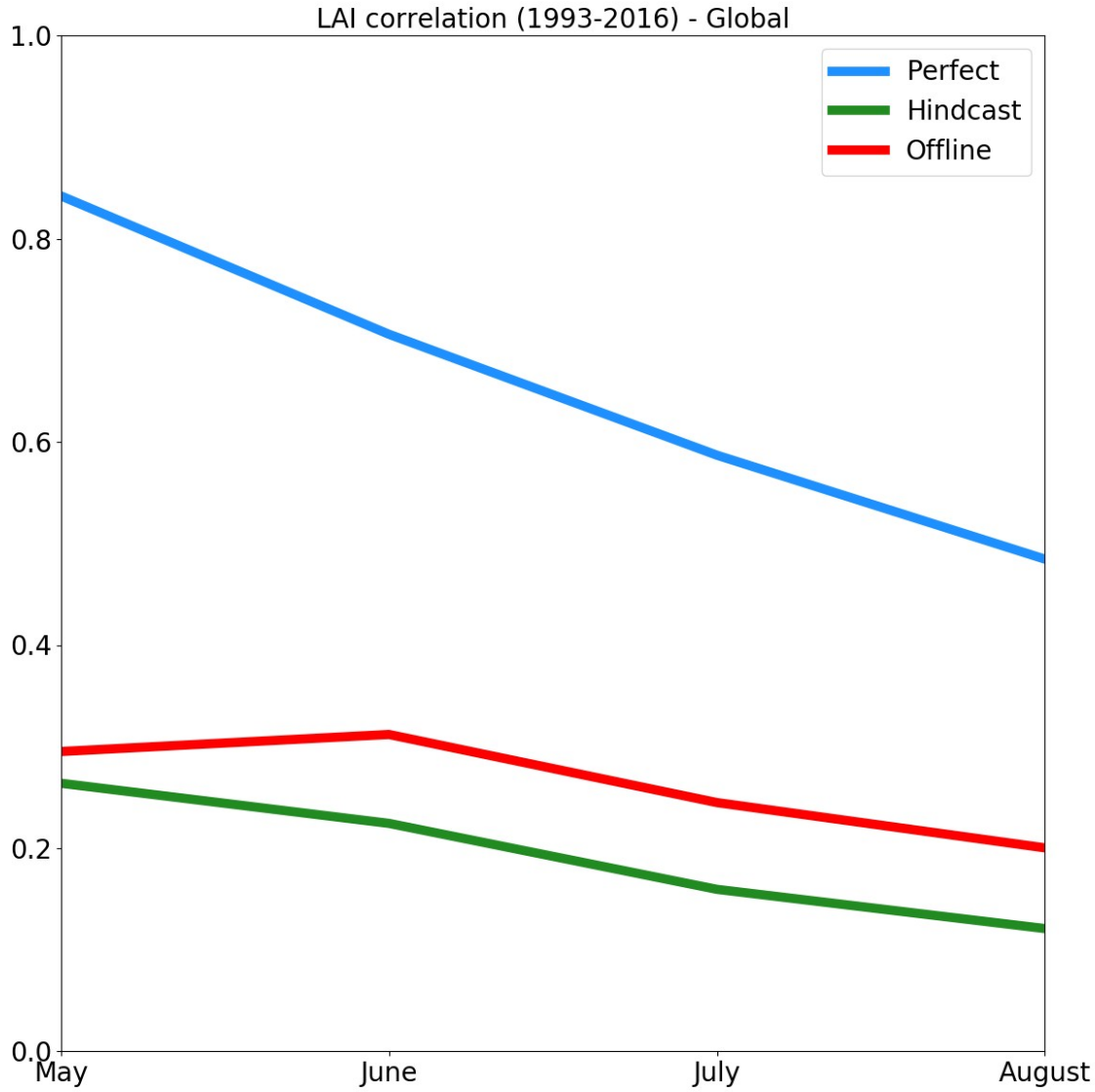
With a "perfect" land-surface model and real ocean-atmosphere forecast, skill remains high in JJA.

If we try to summarize

LSM vs. Obs.

Re-forecast skill

Pseudo-perfect skill



If we try to summarize

LSM vs. Obs.

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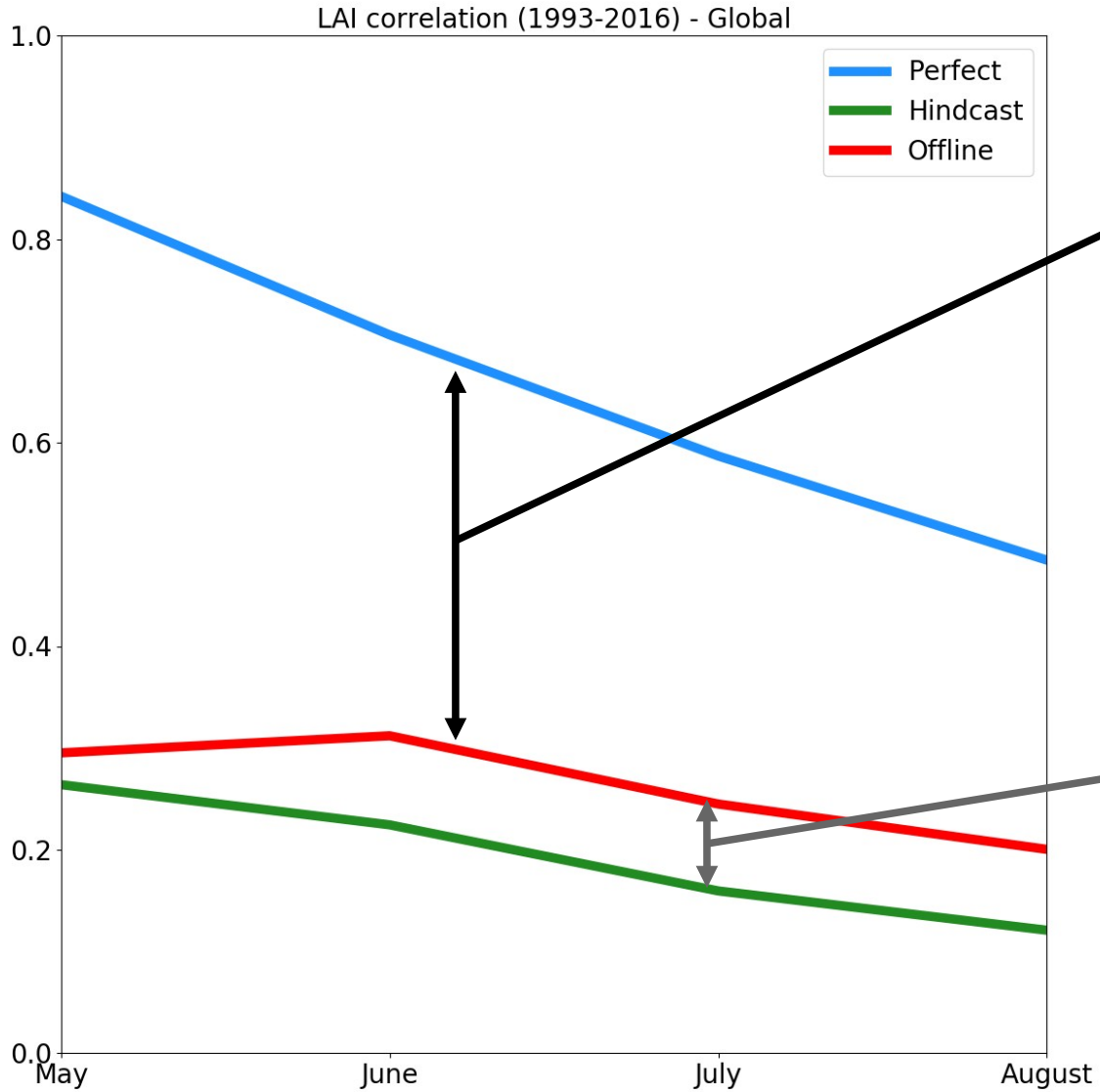
Pseudo-perfect skill



Improvement we could expect from an improvement of the vegetation model

(assuming that the model represents correctly the real predictability of vegetation)

Improvement we could expect from an improvement of the seasonal forecast

(assuming no side-effects of the offline mode)

Conclusion and perspective

- ✓ There is some skill in vegetation state forecast
- ✓ It seems that there is room for improvement

- ✓ With a better forecast of the vegetation, could we expect an improvement of the seasonal forecast ?
    - How to evaluate this potential contribution of interactive vegetation ?

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