Impact of an interactive vegetation scheme on seasonal forecast

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3rd Pan-GASS Meeting
✓ Role of the vegetation in Land-Atmosphere coupling

✓ Interest of the vegetation state (LAI) forecast
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 1\textsuperscript{st}, 4 months lead (JJA)
  - Atmosphere: ERA5 / Ocean: GLORYS
  - Land: LSM runs mentioned just above
  - 1993 – 2016 / 50 members
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 be saturated.

Does it affect other forecasted variables?
Impacts of interactive vegetation on TAS forecast – JJA

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

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

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.

The forecast can hardly do better than these score.

What do we do next?
LAI modelling skill – LSM run correlation vs. Obs.

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?
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.**

**Re-forecast skill**

**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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