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

Proposal for an international effort aimed at quantifying the impact of a realistic representation of vegetation/land cover on seasonal climate forecasts (GLACE-VEG)

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Outline

- Motivation
  - Vegetation/land cover impacts on seasonal forecasts
  - Gap and opportunity for operations
- GLACE-VEG ideas for a Multi-model intercomparison
  - Quantify vegetation/land cover related predictability
  - Ideas for a protocol
- Timeline and invitation to Join GLACE-VEG

Interannual changes in land-cover and vegetation density can considerably impact seasonal climate predictions

Previous sensitivity
MODIF vs. CTRL

MODIF -> Interannual vegetation density prescribed from OBS (LAI)

CTRL -> Climatological vegetation density

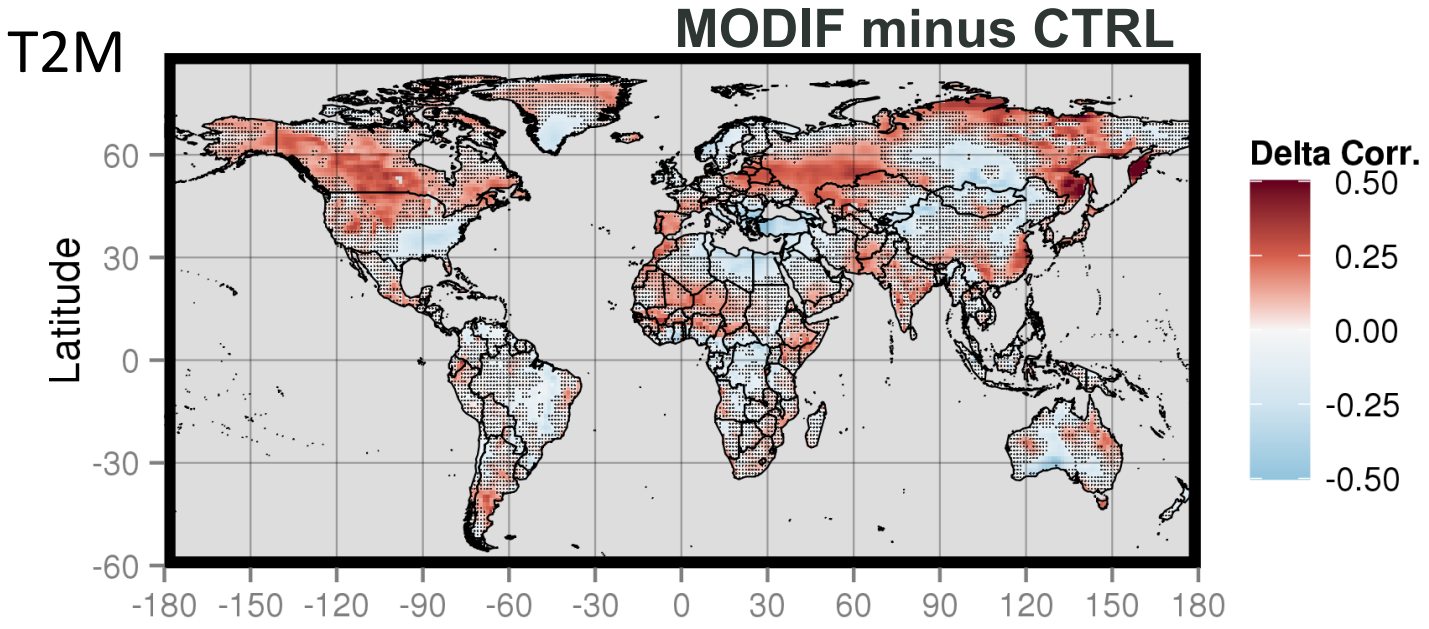
Alessandri et al., 2017, Clim Dyn.

Seasonal hindcasts - 1st Nov start date - 2m Temperature
Correlation differences (MODIF minus CTRL) vs. ERA-Interim

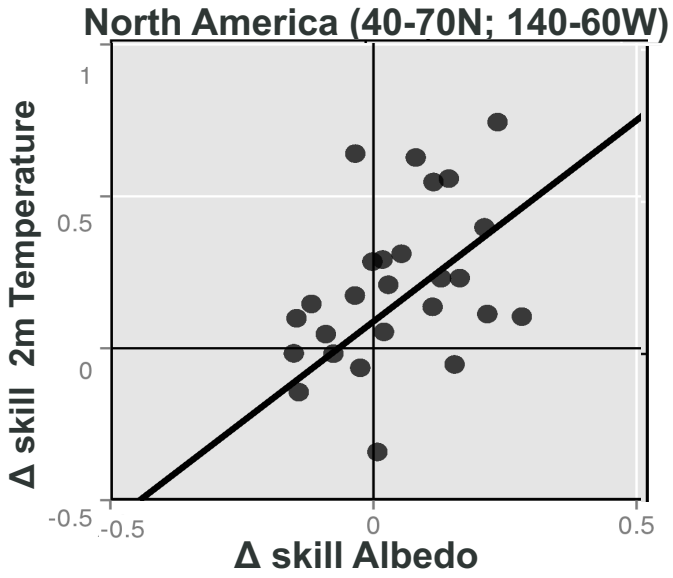
[1982-2009, 10members]

WINTER DJF
1-month lead

T2M



(dotted non significant
10% level)



- $\Delta \dfrac{\left(X^i_{\mathrm{mod}} - \overline{X}_{\mathrm{mod}}\right)\left(X^i_{obs} - \overline{X}_{obs}\right)}{\sigma^X_{\mathrm{mod}} \cdot \sigma^X_{obs}}$

i = each single year

Δ MODIF minus CTRL

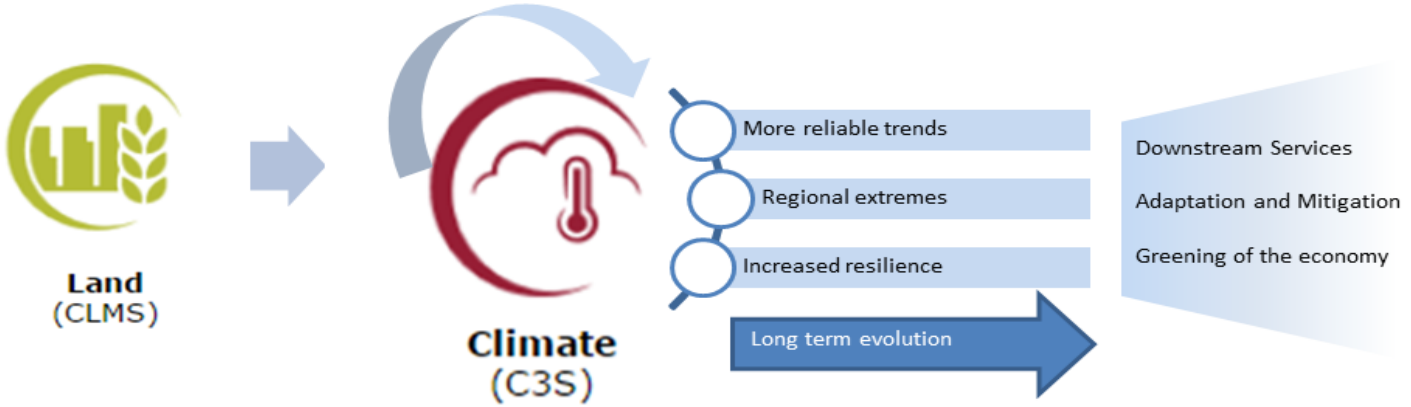
Regression line (coefficient significant at 5% level)

Alessandri et al., 2017, Clim Dyn.

Gap and opportunity of improving representation of land cover and vegetation in seasonal forecasts

Gap and opportunity of improving representation of land cover and vegetation in seasonal forecasts

Objective: integrate the unprecedented land cover/use & vegetation information from latest Earth observation programmes (e.g. Copernicus) in the land surface models included in seasonal prediction systems and for their initialization (analysis/reanalysis).



CONFESSION	OPPORTUNITY	EXPECTED IMPACT
Land Cover and Vegetation in seasonal forecasts are represented by climatological values. Suboptimal.	New data records of Land Cover/Use/Vegetation delivered by Earth Observation campaings.	Improved biophysical processes representation in land models to enhance forecasting capabilities.

GLACE-VEG – being proposed in the frame of

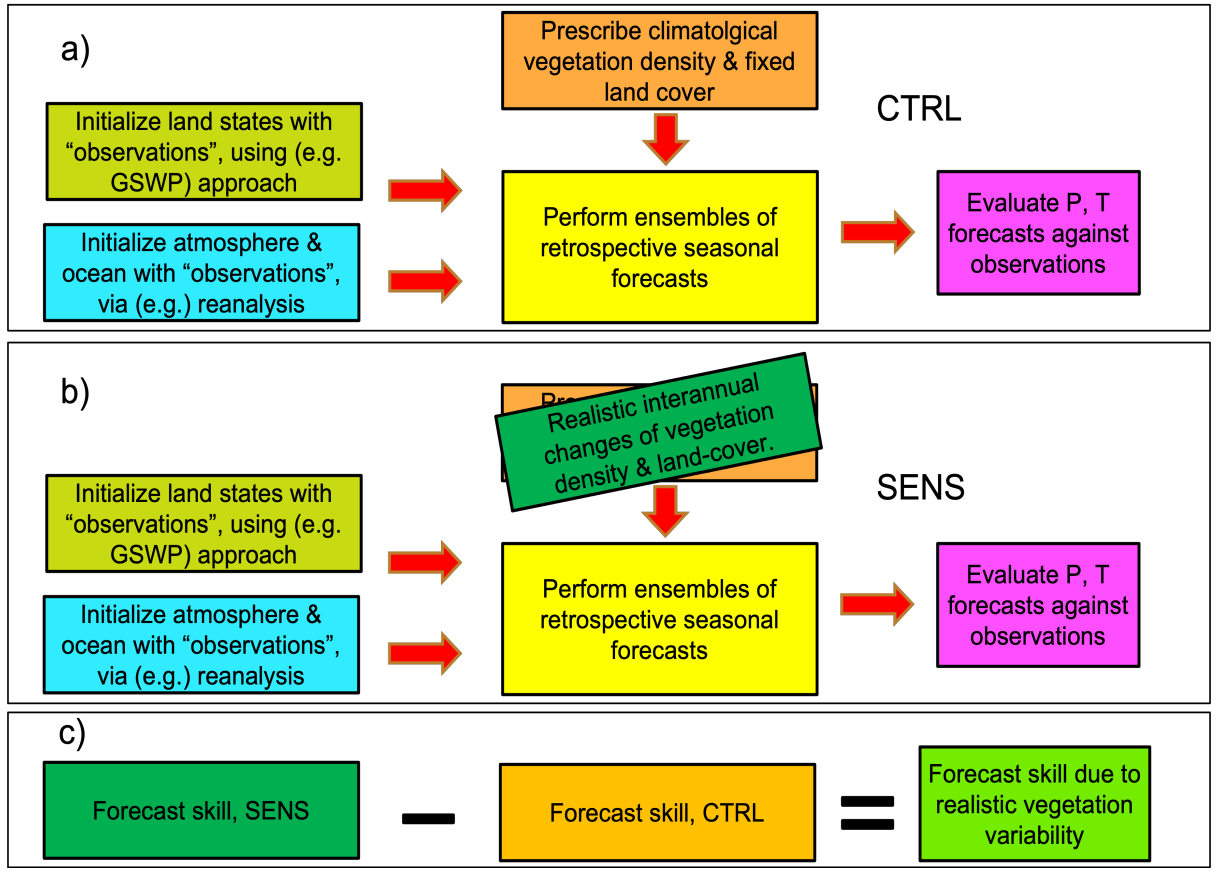
i) GEO WP 2023-2025 -> for a new GEO Pilot Initiative

and

ii) GLASS-GEWEX, which has welcomed the initiative and will push it within the community

GLACE-VEG to Quantify Vegetation & LC related Predictability

Stemming from **GLACE2** experience & building on **EO Vegetation & LC data availability** and the CONFESS EU project (https://confess-h2020.eu). GLACE-VEG has desirable links with SNOWGLACE, LS3MIP, ESM-snowMIP, LS4P.



Ideas:

- CTRL and SENS Seasonal Hindcast experiments with different Vegetation Conditions
- Multi-Model participation (3-systems at present within the CONFESS project) to increase sampling & relevance
- Availability of EO processed data for Land Cover/Land Use & Vegetation state from 1993 withing EO programmes (e.g. Copernicus).

Ideas for a protocol

- 20+ years reforecasts (from 1993-onwards)
- Forecast start dates: 2+ dates each year (May and Nov; Feb and Aug optional)
- 10+ members per start date
- Forecast length (4-months or more)
- Flexible ocean SSTs (both 1-tier and 2-tier)
- Vegetation datasets (Land-Use yearly, LAI/FCOVER Monthly) (*)

(*) Long memory vegetation-states prescribed [or persisted] from observations and (optionally or phase-2) initialized and dynamically simulated.

Tentative timeline

Q2/2022 Earth Observations data for IC/BC processing & availability

Q3-Q4/2022 VEG-GLACE initial design and protocol preparation

Q1-Q2/2023 First set of demonstratory runs by first contributing group (ECMWF, MF, …)

Q3-Q4/2023 VEG-GLACE final protocol preparation for consolidation runs

Q3-Q4/2024 Finalization of second set of runs

Q3-Q4/2025 Dissemination & Outreach

To express interest to join the GLACE-VEG initiative email us:

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Questions?

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