



WP1 overview

Progress and future work



Objectives of WP1

- Produce consistent and harmonized vegetation related dataset of Land Cover, LAI and FCOVER (Task 1.1).
- Produce and assess multi-year land simulations with enhanced vegetation temporal variability (Task 1.2).
- Produce and assess multi-year land simulations with interactive vegetation (Task 1.3).
- Recommend suitable configurations for coupled simulations to use in reanalysis and seasonal prediction (Task 1.2;Task 1.3)

WP1 within CONFESS

WP1

T1.1 Harmonization of Copernicus
observational records with focus on
vegetation

T1.2 Reanalysis-based land surface
conditions with prescribed
vegetation

T1.3 Sensitivity of land surface
conditions to dynamic vegetation

WP2

T2.1 Harmonization
of CMIP6 and
C3S/CAMS
tropospheric
aerosols

T2.2 Capability to
respond to biomass
burning events

T2.3 Temporal
consistent capability
to respond to
volcanic
stratospheric
aerosol emissions

T3.1 Impact of land surface on seasonal prediction
systems

T3.2 Impact of volcanic aerosol on seasonal
prediction systems

T3.3 Impact of aerosol forcings and land surface on
multi-year forecasts

WP3

WP4

WP1 timeline

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36
WP1 Temporal variations of vegetation and land cover																																				
Task 1.1 Harmonization of Copernicus observational records with focus on vegetation																																				
Task 1.2 Reanalysis-based land surface conditions with prescribed vegetation																																				
Task 1.3: Sensitivity of land surface conditions to dynamic vegetation																																				
WP1 Deliverables									1.1															1.2						1.3						
WP2 Temporal variations of aerosols																																				
Task 2.1 Harmonization of CMIP6 and C3S/CAMS tropospheric aerosols																																				
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												2.1						2.2						2.3						2.4						
WP3 Evaluation in initialised seasonal and near-term predictions																																				
Task 3.1 Impact of land surface on seasonal prediction systems																																				
Task 3.2 Impact of aerosols on seasonal prediction systems																																				
Task 3.3 Impact of aerosol forcings and land surface on multi-year forecasts																																				
WP3 Deliverables									3.1																										3.1	3.2
WP4 Project Management and Coordination																																				
T4.1 Project Management and Coordination																																				
T4.2 Risk and Quality Management																																				
T4.3 Administrative and Financial Management																																				
T4.4 Innovation and IPR management																																				
WP4 Deliverables		4.1	4.2	4.4		4.5												4.6																	4.7	
			4.3																																	
Project Milestones			4.1						1.1			2.1						1.2						1.3												4.2
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WP1 Deliverables and milestones

Deliverables

D1.1: Report on the vegetation dataset of LC and LAI (lead ECMWF) (Month 9)

D1.2: Report on the improved vegetation variability (lead CNR-ISAC) (Month 24)

D1.3: Report on the suitable vegetation modelling configurations (lead Meteo France) (Month 30)

Milestones

M1.1: Release of the long term gap free harmonized LC and LAI data (lead ECMWF) (Month 9)

M1.2: Release of the equilibrated land simulation that considers prescribed vegetation variability based on ERA5 forcing. (lead MeteoFrance) (Month 18 ← End of April 2022)

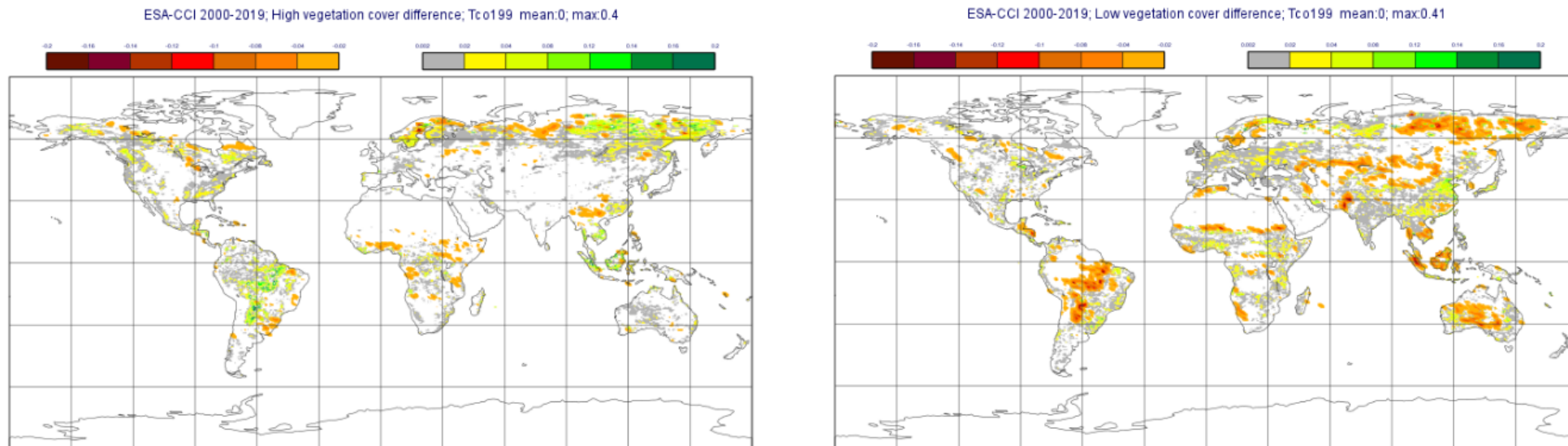
M1.3: Release of the land simulations including interactive vegetation and land cover effects based on ERA5 forcing. (lead MeteoFrance) (Month 24)

M1.4: Release of the land simulations that include new developments to close the gap between short-term and latest developments in land modelling for long-term climate (Lead CNR-ISAC) (Month 24)

Vegetation dataset of Land Use/Land Cover and Leaf Area Index (Task 1.1)

Task 1.1 progress

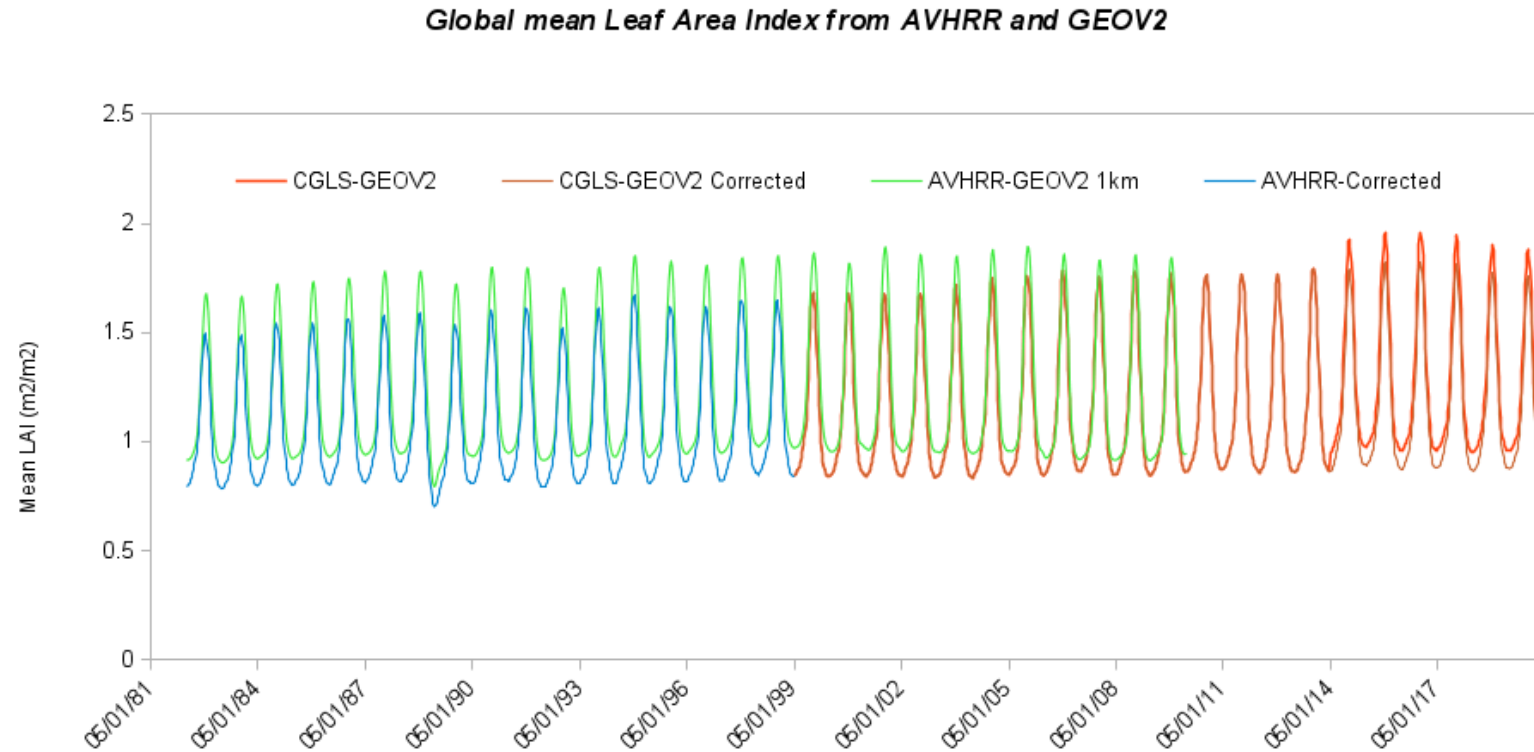
- ECMWF retrieved, harmonized and shared ESA-CCI LU/LC data and CGLS LAI
- ESA-CCI LU/LC translated into IFS-BATS classification and adapted to the target resolution



Vegetation cover differences between 2000 minus 2019 (right) for low vegetation and (left) for high vegetation covers.

Task 1.1 progress

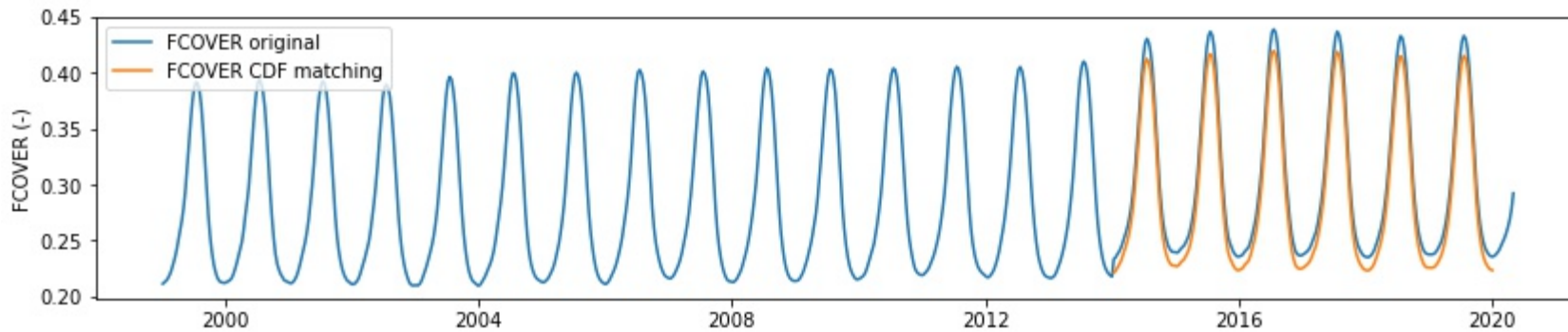
- - Production and release of harmonized 1993-2019 LAI dataset



- Upcoming presentation *“Harmonization of Copernicus based LULC and Leaf Area Index data for NWP and Reanalysis applications »*

Task 1.1 progress

- > CNR-ISAC :
 - Retrieval of 1999-2019 CGLS FCOVER dataset
 - “CDF-matching” harmonization procedure for FCOVER similar to that used for LAI



Fraction of green Vegetation Cover global mean from CGLS GEOV2 time series (blue) and CGLS GEOV2 CDF corrected (orange).

Task 1.1 next steps

- > MF :
 - Generation of Land Cover maps derived from LUH2 for SURFEX at the target resolution

Reanalysis-based land surface conditions with prescribed vegetation (Task 1.2)

Task 1.2 progress

No simulations performed with prescribed vegetation so far, but significant preparation work

> All partners have agreed on a list of simulation output data :

<https://docs.google.com/spreadsheets/d/1BX544q9NbXuMzBi-JKYyM5-uDLYryiT5GOvY3VBREvc/edit#gid=572339624>

> ECMWF :

- implementation of offline and forecast experiments to adapt the model parameters with the new maps
- implementation of the technical infrastructure to ingest the multiannual varying maps

> MF :

- Control 1993-2019 simulation with climatological LAI and fixed LC already carried out
- Disaggregation of the observed 1km LAI dataset by vegetation cover at the model target resolution

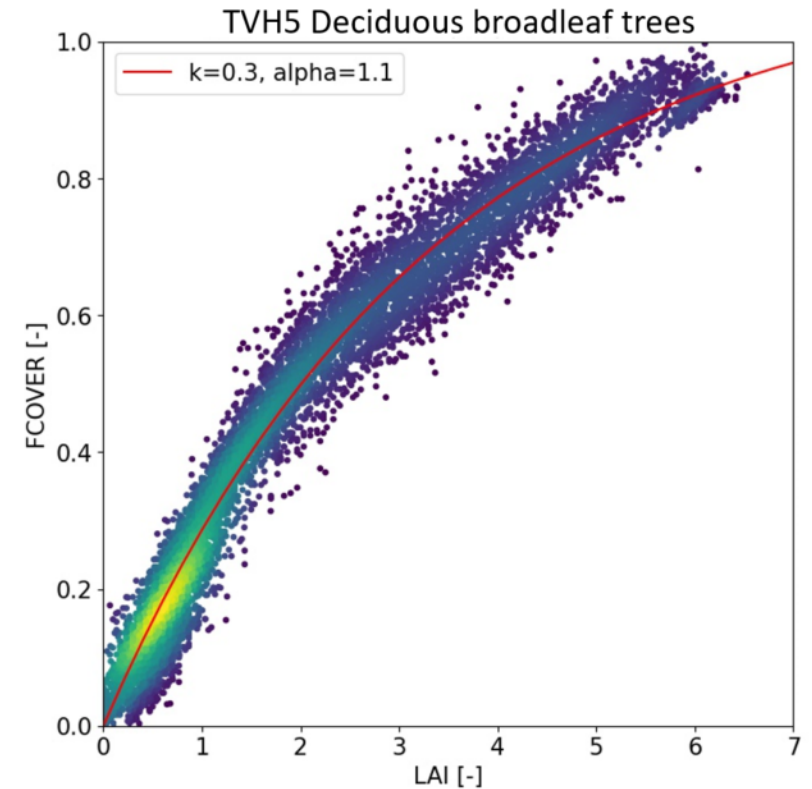
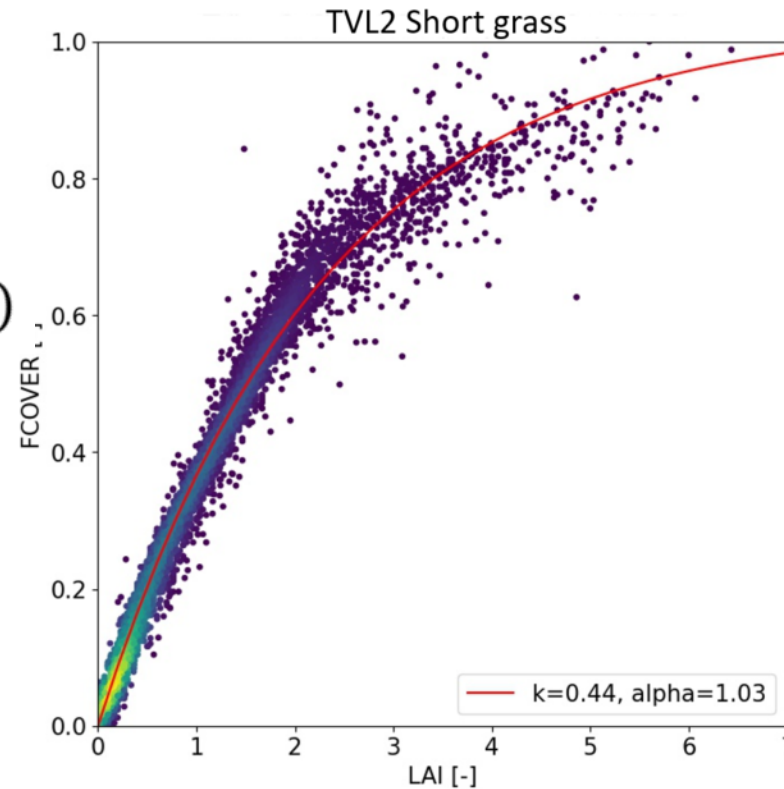
> CNR-ISAC :

- Optimization of the effective cover parameterization based on FCover and LAI and consistent with ESA-CCI

Task 1.2 progress

- Optimization based on observed 1999-2019 CGLS FCover and LAI

$$\text{FCover}_i = \alpha_i (1 - e^{-k_i * \text{LAI}_i})$$



Fitting of LAI and FCover observations for ESA-CCI land cover types TVL2 Short grass (left) and TVH5 Deciduous broadleaf trees (right). The dots represent observations coloured by density and the red line represents the optimized lambert beer relation (Eq. 1)

Task 1.2 next steps

- All 3 partners to perform historical land simulations with prescribed vegetation
- Simulation data to be released by the **end of April 2022** (M. 1.2)

Sensitivity of land surface conditions to dynamic vegetation (Task 1.3)

Task 1.3 progress

- 1993-2019 SURFEX-ISBA simulation with dynamic vegetation has been completed
- In this model, interactive LAI derived from biomass (B) evolution due to photosynthetic activity :

$$B(t + \Delta t) = B(t) + \Delta B^+ - \Delta B^-$$

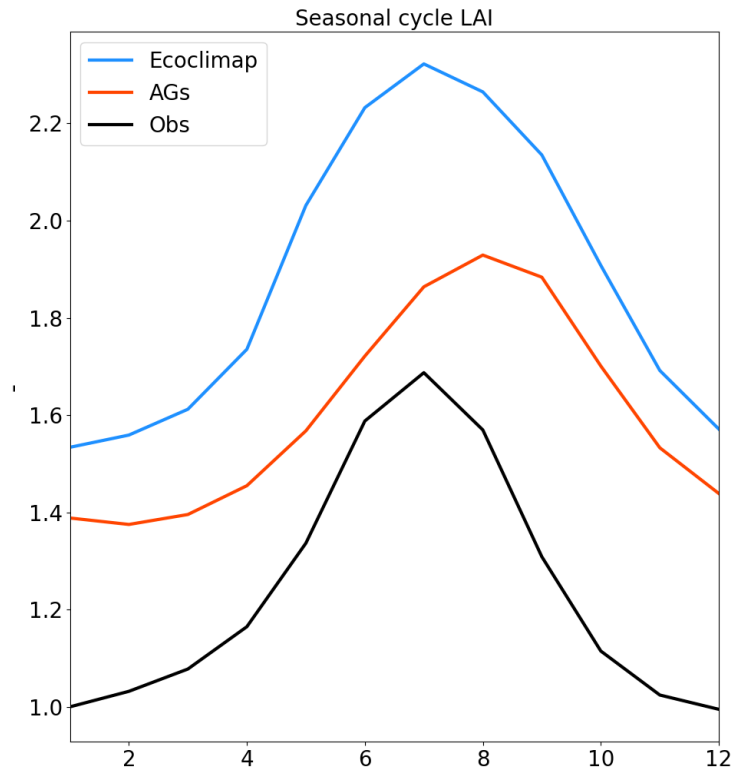
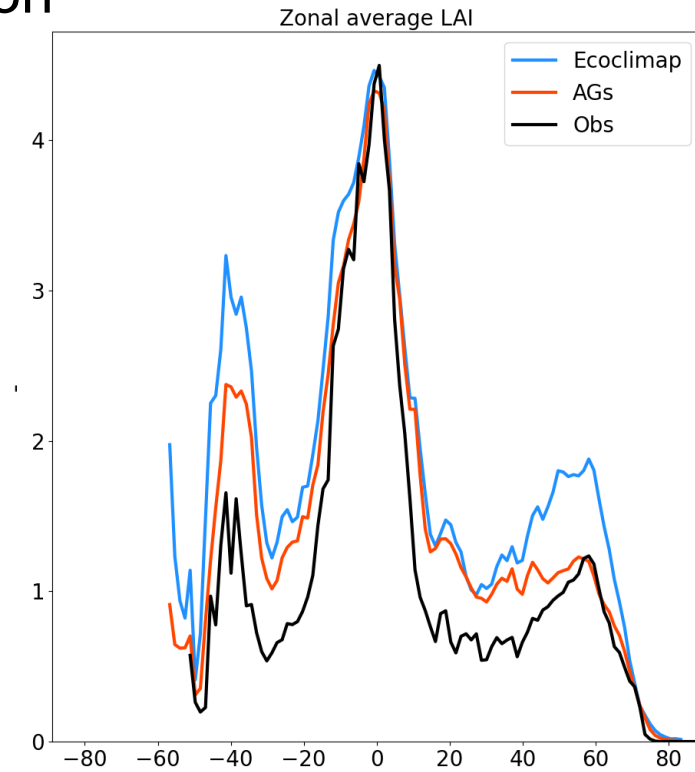
Growth : $\Delta B^+ = \alpha A_n^{\text{day}} \Delta t$ (A_n^{day} is the daily net CO₂ assimilation = photosynthesis + respiration, see Delire et al. 2020)

Mortality : $\Delta B^- = B(1 - e^{-\Delta t/\tau})$ (τ is a life expectancy term, see Calvet et al, 1998)

And finally : $LAI = B/\alpha_B$ (α_B is assumed constant for a given vegetation type, Gibelin et al 2006)

Task 1.3 progress

- LAI evaluation



- More results in the upcoming presentation

Task 1.3 next steps

- Run a SURFEX simulation with dynamic LAI + yearly evolving Land cover
- All partners to perform historical land simulations with dynamic vegetation
- Simulation data to be released by the **end of October 2022** (M.1.3)

WP1 dissemination and outreach

=> see dedicated presentation by Andrea Alessandri

Questions?

Constantin Ardilouze
CNRM – Météo France
Constantin.ardilouze@meteo.fr



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