Project: **1370**

Project title: **OptFor-EU : Optimising forest management decisions for a low-carbon, climate resilient future in Europe**

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Report period: **2023-07-01 to 2024-04-30**

Maximum of 2 pages including figures. 9 pt minimum font size.

Project overview

The European Horizon Project OptFor-EU “OPTimising FORest management decisions for a low-carbon, climate-resilient future in Europe” develops ready-to-use products, services and guidelines for the forest sector. OptFor-EU builds on state-of-the-art datasets, modelling and integrated solutions to develop a decision support system that provides appropriate climate adaptation and mitigation options to optimize forest ecosystem services and strengthen the resilience of forests and their capacity to mitigate climate change across Europe.

Model simulations will tackle the integration of European forests, including forest management practices, in a scalable modelling framework that extends from local case study areas to the European domain. Models will be enhanced to improve the representation of forest land cover and forest management practices across Europe, and simulations will be designed to improve understanding of the individual and combined impacts of forest management practices, socio-economic and climatic changes on forest processes and forest ecosystem services across Europe.

We will implement future forest management scenarios into regional earth system modelling and evaluate the simulated effects and feedbacks of land use changes and climate-resilient forest management measures in Europe under present and potential future climate conditions. The scenarios will be developed according to user priorities and the results will be tailored to forest stakeholders and support suitable climate adaptation and mitigation options for enhancing forest resilience and its capacities to mitigate climate change across Europe.

Within OptFor-EU, the simulations conducted with REMO2020-iMOVE are part of larger ensembles of regional climate model simulations conducted by the partners using regional climate models (e.g. MeteoRomania, RegCMv4.5).

Planned work, performed simulations, preliminary results

In the first phase of OptFor-EU, continent-wide simulations on 0.11° horizontal resolution for Europe following the CORDEX Flagship Pilot study LUCAS (Land Use Across Scales) Phase II experiment protocol were planned to be realized.

The LUCAS Phase II experiment protocol aims for the representation of realistic land use and land cover changes (LULCC) by implementing the LUCAS LUC dataset (Hoffmann et al., 2023). LUCAS LUC includes transient LULCC for different SSP scenarios and for the historical period 1950 - 2014 on high-resolution (0.11°). During this reporting period, we implemented LUCAS LUC in our regional climate model REMO2020-iMOVE and conducted successful test simulations with static and transient LULCC (Fig.1). We also conducted the reanalysis-driven evaluation simulation for from 1979 – 2016 (37 years), again with both transient and static LULCC. However, after our first analysis, we had to adapt and improve the surface roughness which plays a crucial role in investigating different plant functional types. Therefore, it is essential for us to repeat our first simulations (see below ‘Delays, deviations and new allocation of resources’).

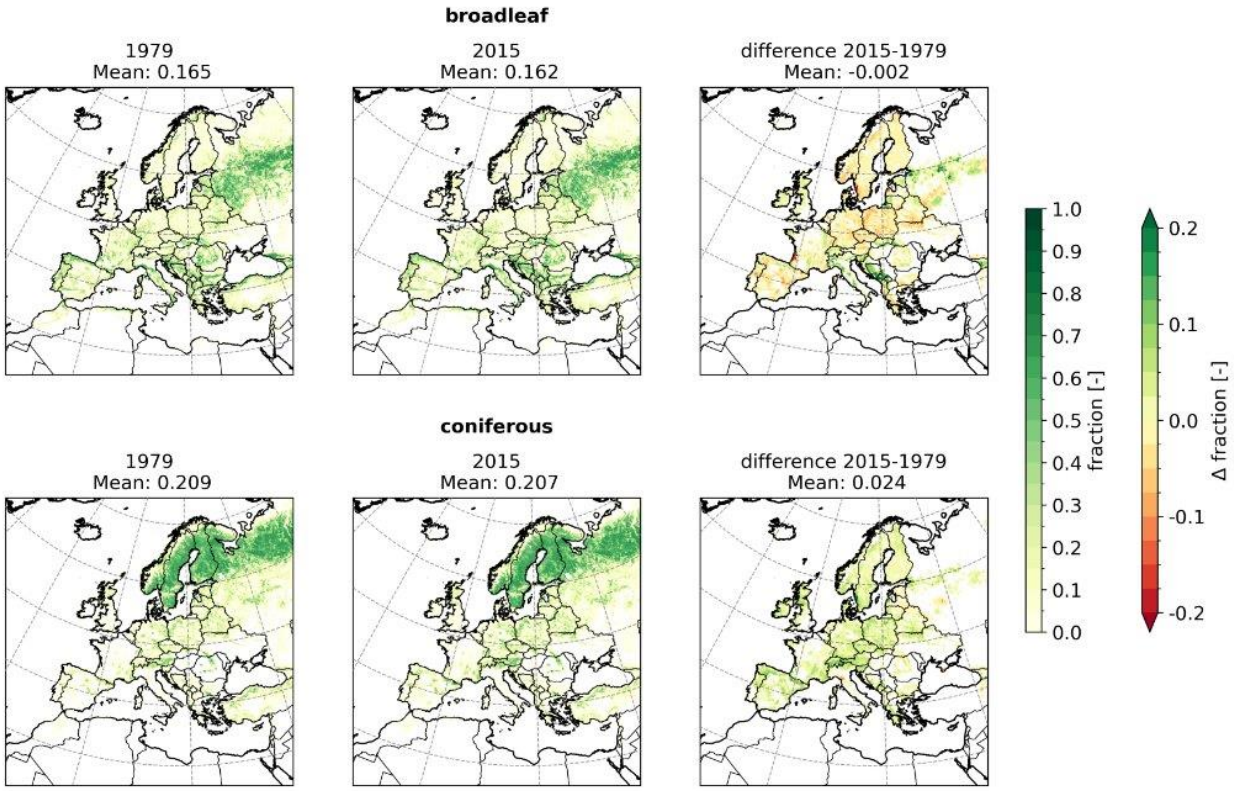

Fig. 1: Land use and land cover change in the LUCAS LUC dataset from 1979 to 2015 for aggregated broadleaf and coniferous forest types in Europe on 0.11° resolution.

Delays, deviations and new allocation of resources

During the reporting period, we faced several issues that caused delays to our original plans. First, we had substantial delays in filling the vacancy for the scientist conducting the model simulations. Therefore, allocated computing time expired and the simulations started only in 2024. While conducting these simulations using the new model version and a new simulation workflow, we noticed a higher storage space requirement by 30 % than initially estimated (2.6 TB/year instead of 2 TB/year). Once we started to roughly analyze the first simulation results, we noticed that the allocated 20 TB disk space on /work is not sufficient for the simultaneous analysis of 2 simulations, as it is the case for our experiment setup, since we compare the effect of transient and static LULCC. Therefore, we would like to request an increased disc space on /work (see request form). Further, while analyzing the first simulation results, we had to improve the surface roughness and therefore, to repeat the reanalysis-driven simulations. We are planning to run one reanalysis-driven simulation using the remaining computation time in our project. For the upcoming period, we plan to renew the second reanalysis-driven simulation, as well as to conduct GCM-driven simulations for the SSP1 scenario and for the historical period, both, with transient and static LULCC. Hence, we would like to request some additional computation time, and the overall re-allocation of the computing time originally requested for the last period for this new period. We also would like to request additional storage space in the archive, since, in particular, the GCM-driven simulations generate large data (see request form). The created data will be postprocessed and cmorized to be later published on the ESGF server. Further, the created data will be used to drive high-resolution simulations on 3 km for selected case study areas such as Lower-Saxony in the next phase of the project.

References:

Hoffmann, P., Reinhart, V., Rechid, D., de Noblet-Ducoudré, N., Davin, E. L., Asmus, C., Bechtel, B., Böhner, J., Katragkou, E., and Luyssaert, S.: High-resolution land use and land cover dataset for regional climate modelling: historical and future changes in Europe, Earth Syst. Sci. Data, 15, 3819–3852, https://doi.org/10.5194/essd-15-3819-2023, 2023.