Comparison of observed data and high-resolution regional climate simulations on process based modelling

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Introduction

With climate change ahead (Fig 1), land use management decisions rely more often on process-based models to provide information about climate change impacts on productivity of different land use systems.

Different climate datasets have become available through EURO-CORDEX project (Jacob et al 2014) while some complementary tools have been developed to facilitate the use datasets for forest agroforestry and agriculture process based modelling (e.g. Palma 2017). An evaluation of the quality of simulated datasets is here assessed to provide support for assessments related to climate change where agroforestry is proposed as a land use to mitigate climate change impacts.

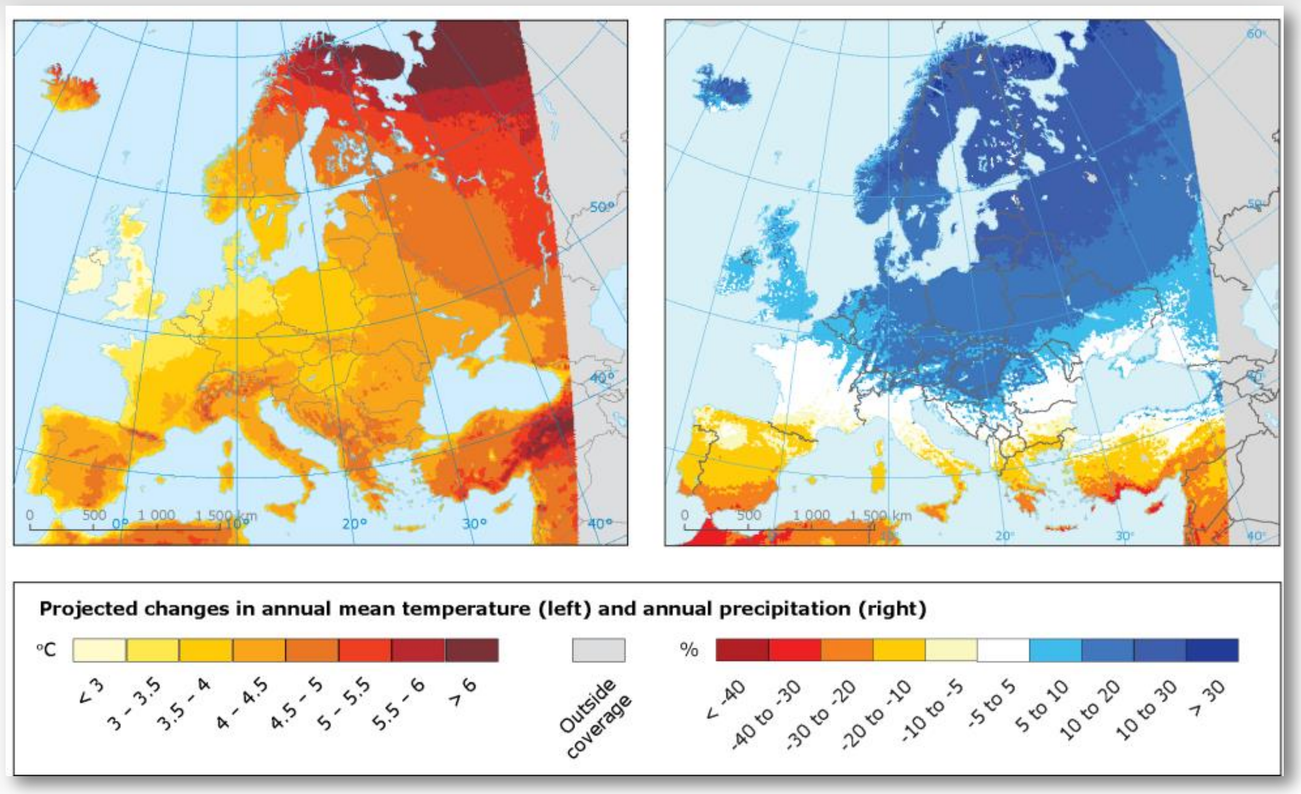
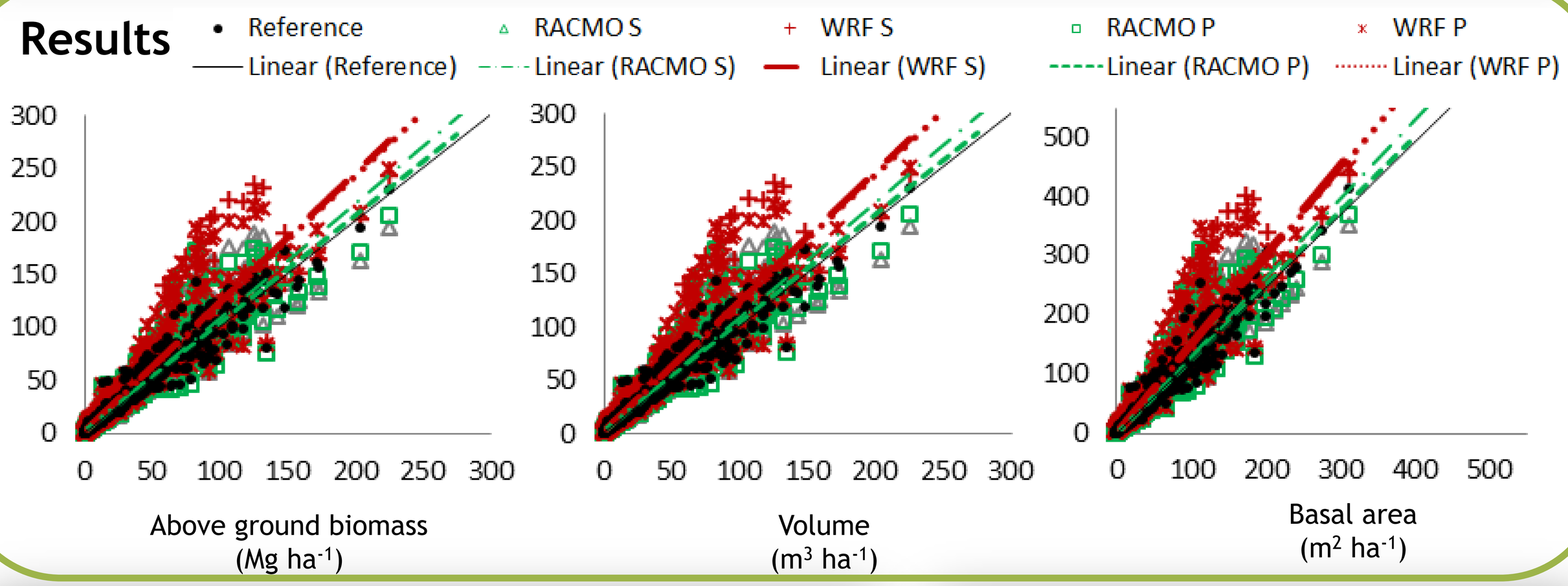


Figure 1: Projected climate change in Europe. Source: Climate change projections for Europe based on an ensemble of regional climate model simulations provided by the EURO-CORDEX initiative. Note: Projected changes are for 2071-2100, compared to 1971-2000, based on the average of a multi-model ensemble forced with the Representative Concentration Pathways (RCP) 8.5 high emissions scenario. All changes marked with a colour (i.e. not white) are statistically significant. Individual models from the EURO-CORDEX ensemble or high-resolution models for smaller regions may show different results.

Material and Methods

- A forest growth process-based model (3-PG), previously calibrated for Eucalyptus (*Eucalyptus globulus* Labill.) was used.
- 2683 tree measurements, from 1988 to 2013, in 12 sites, in 1235 experimental plots used for comparison
- Climate from 1) nearby weather stations were used (**Reference**) and 2) simulated datasets from regional Climate Models: WRF (Soares et al 2012) and RACMO (van Meijgaard 2012)
- Observed and predicted forest growth was plotted using observed climate (Reference) and simulated climate (WRF, RACMO) nearby the observed weather station (**WRF S**, **RACMO S**) and nearby the experimental forest plot (**WRF P**, **RACMO P**)

Results



Conclusions

Despite over estimations that can be improved in the climate models, results suggest that, by using the RACMO model, a reduced loss of modelling performance can be achieved with the use of simulated climate datasets. The use of such data can certainly widen the usage of process based models, improving the support for decisions in land use management, especially when considering climate change, one of the cornerstones for what modelled climate is developed for.

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