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Modelling carbon fluxes of forest and grassland ecosystems in Western Europe using the CARAIB dynamic vegetation model: evaluation against eddy covariance data.

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Eddy covariance measurements are an essential resource to understand how ecosystem carbon fluxes react in response to climate change, and to help to evaluate and validate the performance of land surface and vegetation models at regional and global scale. In the framework of the MASC project (« Modelling and Assessing Surface Change impacts on Belgian and Western European climate »), vegetation dynamics and carbon fluxes of forest and grassland ecosystems simulated by the CARAIB dynamic vegetation model (Dury et al., iForest - Biogeosciences and Forestry, 4:82-99, 2011) are evaluated and validated by comparison of the model predictions with eddy covariance data.

Here carbon fluxes (e.g. net ecosystem exchange (NEE), gross primary productivity (GPP), and ecosystem respiration (RECO)) and evapotranspiration (ET) simulated with the CARAIB model are compared with the fluxes measured at several eddy covariance flux tower sites in Belgium and Western Europe, chosen from the FLUXNET global network (http://fluxnet.ornl.gov/). CARAIB is forced either with surface atmospheric variables derived from the global CRU climatology, or with in situ meteorological data. Several tree (e.g. Pinus sylvestris, Fagus sylvatica, Picea abies) and grass species (e.g. Poaceae, Asteraceae) are simulated, depending on the species encountered on the studied sites. The aim of our work is to assess the model ability to reproduce the daily, seasonal and interannual variablility of carbon fluxes and the carbon dynamics of forest and grassland ecosystems in Belgium and Western Europe.