Geophysical Research Abstracts
Vol. 14, EGU2012-1250, 2012
EGU General Assembly 2012

Analysing structural error and parameter uncertainty of two Eucalyptus models differing in representation of autotrophic respiration

F. Minunno (1), M. van Oijen (2), D.R. Cameron (2), S. Cerasoli (1), J.S. Pereira (1), and M. Tomé (1)

(1) Tecnical University of Lisbon, Instituto Superior de Agronomia, Engenharia Florestal, Portugal (francescom@isa.utl.pt), (2) Centre for Ecology and Hydrology, Penicuik, UK

In the context of global climate change, the quantification of carbon fluxes in forest ecosystems and how they vary inter-annually are important issues. Process-based models are flexible tools that permit assessing ecosystem productivity at different spatial and temporal scales and for different management and environmental conditions. On the other hand, carbon and water fluxes at the ecosystem scale may be measured using eddy covariance techniques, thus providing useful data for testing and validation of models.
The principal aim of the work was to calibrate and evaluate two versions of a process-based model that differ in the autotrophic respiration (RA) modelling. The original version (3PGN) is based on a constant ratio between the net primary production (PN) and the gross primary production (PG), while, in a new version (3PGN*), developed by the authors, RA was modelled as a function of temperature and biomass. The two model versions were calibrated and evaluated using a comprehensive dataset consisting of forest growth experimental data and eddy-covariance measurements. The two model versions were calibrated and evaluated under a Bayesian framework consisting in model calibration, model comparison and analysis of model-data mismatch. Sensitivity and uncertainty analyses of 3PGN and 3PGN* were also carried out.
The BC showed that the data were informative for almost 70% of the parameters. BC also allowed identification of the parameters to which the models were most sensitive and to assess parameter correlations. Key parameters were those for carbon allocation, some of the parameters related to water stress and site fertility. Bayesian model comparison showed that the 3PGN*, with the new autotrophic respiration model based on maintenance and growth respiration, has higher conditional probability of being correct than the original 3PGN, based on the simple NPP vs. GPP ratio.