

PROJECT INFORMATION

Project title: ERC-DOFOCO: Do forests cool the Earth? Reconciling sustained productivity and minimum climate response with portfolios of contrasting forest management strategies

Project ID: 60

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PROJECT DESCRIPTION

The DOFOCO project aims to better understand how forests can help lessen the effects of global warming, by bringing together advanced models and data from the life and earth sciences. Such research takes an additional dimension this year, in the context of the United Nations International Year of Forests 2011.

Within this project Yuan Yan (yuan.yan@uantwerpen.be) is planning this project:

ORCHIDEE-CAN (stands for ORCHIDEE-CANOPY) branch of the land surface model was specifically developed to quantify the climatic effects of forest management. The forest management module (Bellassen, Le Maire et al. 2010) contains an explicit distribution of individual trees, which is the basis for a process-based simulation of mortality. The aboveground 'stand-scale' wood increment simulated by ORCHIDEE is distributed on a yearly time step among individual trees according to the rule of (Deleuze, Pain et al. 2004): the basal area of each individual tree grows proportionally to its circumference. Tree mortality is then determined by the density and size distribution of the stand. Mortality due to natural competition relies on the self-thinning rule of (Reineke 1933), whereas another set of rules drives the mortality processes due to human interventions such as thinnings and clearcuts as the stands mature (Bellassen, Le Maire et al. 2010). All management types are parametrized based on forest inventory data, yield tables and guidelines for forest management.

My research contributes to self-thinning parameters and yield models of the new forest management model by calculating diameter-density relationship from national forest inventories (NFI) and European species-level yield tables. Currently I want to valid the model with flux data and field observations. Since re-measurements of NFI plots are not accessible to us, it is difficult to test the model behaviour of ORCHIDEE-CAN in the estimates of annual forests growth. In addition, it is also necessary to test the representatives of general yield model to European forests. If possible, I also would like to extract species ratios (according to my current results) to see if the yield and growth are influenced by species compositions. The use of LAI is to valid the canopy status against estimated LAI dynamics.