



Joint simulation of carbon and tree diversity dynamics in an Amazonian forest succession using TROLL, an individual-based forest dynamics model

Isabelle Maréchaux (1,2) and Jérôme Chave (1)

(1) Laboratoire Evolution et Diversité Biologique, CNRS/Université Paul Sabatier/ENFA, Toulouse cedex 9, France (isabelle.mj.marechaux@gmail.com), (2) AgroParisTech-ENGREF, Paris, France

Amazonian forests are critical for biogeochemical cycles and provide also key ecosystem services. One approach for modelling forest vegetation dynamics is to parameterize species using field-measured plant traits in individual-based forest growth simulators, a method that has been successfully implemented in temperate forests. Here we extend this approach to the tropics. We parameterized the forest dynamics simulator TROLL over a hundred species and simulated the first decades of an ecological succession with tree species encountered in the coastal zone of French Guiana. The model reproduced well the empirically measured values of gross and net primary productivities (GPP and NPP, obtained from eddy-flux measurements) as well as canopy structure (obtained from aerial LiDAR scanning). Modelled species trajectories compared well with empirically measured ones at a clear-cut site for the past four decades. Modelled carbon accumulation curves show that forests are not mature even after 100 years of regeneration. Finally, we discuss how plant hydrology and responses to drought can be integrated into this modelling scheme using data from leaf water potential at wilting point.