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Modeling twentieth century changes in forest productivity in Sweden using LPJ-GUESS and ORCHIDEE-CN-CAN

Alex Resovsky (1), Anne-Sofie Lansø (1), Mikhail Mishurov (2), Bertrand Guenet (1), Philippe Peylin (1), Benjamin Smith (2), Johan Bergh (3), Nicolas Vuichard (1), Palmira Messina (1,4), James Ryder (1,5), Kim Naudts (1,6), Yi-Ying Chen (1,7), Julianne Otto (1,8), Matthew McGrath (1), Aude Valade (9,10), Sebastiaan Luyssaert (1,11)

(1) Laboratoire des Sciences du Climat et de l'Environnement, Sant-Aubin, France, (2) Department of Physical Geography and Ecosystem Science, Lund University, SE-22362 Lund, Sweden, (3) Department of Forestry and Wood Technology, Linnaeus University, Växjö, Sweden, (4) CEREA, ENPC, 6-8 Avenue Blaise Pascal, Cité Descartes, Champs-sur-Marne 77455 Marne la Vallée, Cedex 2, France, (5) National Physical Laboratory, Teddingtog, London, UK, (6) Department of Land in the Earth Systems, Max Planck Institute for Meteorology, 20146 Hamburg, Germany, (7) Research Center for Environmental Change (RCEC), Academia Sinica, Taipei, Taiwan, (8) Climate Service Center Germany, Helmholtz-Zentrum Geesthacht, 20095 Hamburg, Germany, (9) Institut Pierre Simon Laplace, 75010 Paris, France, (10) Global Ecology Unit CREAF-UAB, Cerdanyalo del Vallès, 08193 Catalonia, Spain, (11) Department of Ecological Science, Free University Amsterdam, 1081 HV Amsterdam, Netherlands

Productivity in Swedish forests has steadily increased over the last 100 years, but the relative contributions of atmospheric CO_2 fertilization, N deposition, warming-induced growing season extension, and management-related factors (e.g., soil scarification, improved plant material, selective species manipulation, fertilization, thinning regimes, etc.) to this trend are difficult to discern from available data. In this study, we compare relevant data on forest production and other related proxies with outputs from two complementary vegetation models (LPJ-GUESS, ORCHIDEE-CN-CAN) in order to provide insight on the roles of different environmental and management-related factors. The primary data for informing the models come from extensive historical experiments in Swedish boreal forests including CO_2 enrichment, soil water and nutrient additions, and soil/air temperature manipulations. Factorial simulations will allow for varying individual drivers singly or in combination in order to isolate the drivers, and responding processes, responsible for simulated changes. The results will be compared between the models and with forest production data from the Swedish Forest Inventory, as well as other sources such as remote sensing products and flux measurements. A resultant evaluation of model robustness at the regional scale will allow for reduced structural uncertainty, further refining the models as key tools for forestry and land use decisions under future change scenarios.