Geophysical Research Abstracts
Vol. 12, EGU2010-3429-3, 2010
EGU General Assembly 2010
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Response of the European ecosystems to climate change: a modelling approach for the 21st century.

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According to projections, over the 21st century, significant climatic changes appear and will be strengthened all over the world with the continuing increase of the atmospheric CO2 level. Climate will be generally warmer with notably changes in the seasonality and in the precipitation regime. These changes will have major impacts on the environment and on the biodiversity of natural ecosystems. Geographic distribution of ecosystems may be modified since species will be driven to migrate towards more suitable areas (e. g., shifting of the arctic tree lines). The CARAIB dynamic vegetation model (Carbon Assimilation in the Biosphere) forced with 21st century climate scenarios of the IPCC (ARPEGE-Climat model) is used to illustrate and analyse the potential impacts of climate change on tree species distribution and productivity over Europe. Changes in hydrological budget (e. g., runoff) and fire effects on forests will also be shown. Transient runs (1975-2100) with a new dynamic module introduced in CARAIB are performed to follow the future evolutions. In the new module, the processes of species establishment, competition and mortality due to stresses and disturbances have been improved. Among others, increased atmospheric CO2 and warmer climate increase tree productivity while drier conditions decrease it. Regions with more severe droughts will also be affected by an increase of wildfire frequency, which may have large impacts on vegetation density and distribution.