Interactive vegetation influences on climatological meteorological fields and trace gas emissions

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The atmospheric chemistry climate model EMAC (ECHAM MESSy Atmospheric Chemistry) model has been augmented by the dynamic vegetation model LPJ-GUESS allowing a two way coupling between vegetation and weather and climate. Due to the interactively varying vegetation and its properties (such as leaf area index, vegetation biomes and forest fraction) key parameters for atmosphere-land interactions such as roughness height, evaporation fluxes and surface albedo are directly influenced by the vegetation scheme. Furthermore, the dynamic vegetation allows for variable consistent boundary conditions for biogenic trace gas emissions as required for atmospheric chemistry modelling for both present day, but also future climate conditions.

In this study we analyse the impact of the dynamic vegetation on key meteorological variables via the hydrological cycle, the radiation budget and surface drag influencing the lower tropospheric weather and circulation. Additionally, we compare interactively calculated trace gas emissions with those from prescribed vegetation properties and prescribed emission fluxes.