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Integrated modelling of management impacts on land-based GHG emissions and removals in EU countries

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Emissions and removals of greenhouse gases (GHGs) from land use activities play a significant role in the total GHG cycling. In the EU, the land use, land use change and forestry (LULUCF) sector removes the equivalent of 9% of GHGs emitted in other parts of the economy. This net sink is the sum of emissions and removals from afforestation, deforestation, and forest, cropland and grassland management The European Commission has recently proposed that emissions and removals from LULUCF be incorporated into EU climate policy. Successful mitigation policy and GHG management strategies as well as accounting rules require anticipation of future developments of land emissions. In particular an estimation of the direct human impact of present management and concrete management options at the landscape level is needed. Such information is essential for disentangling direct and indirect human induced effects, the aim of this session, e.g. by comparing model results with national inventory information and aggregated measured data.
We provide model-based estimates for the recent past, current and future emission pathways of land use activities, taking into account important drivers such as demand for food and wood, bioenergy demand, conservation policies etc. but also forest age class structure and past management. By carrying out sensitivity analyses in which these drivers are varied and by producing counterfactual reference scenarios, direct management change effects can be determined at the landscape level in a quantitative manner. The estimates cover the period 2000 to 2050 and include estimates for emissions from afforestation, deforestation, forest management, cropland management, grassland management and harvested wood products. We use a global land use model with detailed resolution at national level for EU28 countries also to assess mitigation potentials in the LULUCF sector and its cost effectiveness in competition with emission reductions by bioenergy use and changes in the agriculture sector (i.e. non-CO_2 emissions) also covered by the model. By doing this we can identify least cost mitigation options also under consideration of potential leakage effects outside Europe.