

Project:

Project title: **Impact of anthropogenic land cover change on non-CO₂ GHGs, aerosols, and climate**

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Project summary

To improve our understanding of past, current, and future climate change, the analysis and quantification of the interactions and feedbacks between the terrestrial biosphere, atmospheric composition, and climate is one of the key challenges the scientific community is currently facing. While great progress has been made with respect to the importance of CO₂ in the climate system, less attention has been paid to the numerous other atmospheric components that may also contribute to perturbations of climate in a substantial manner. These include for example the so-called short-lived greenhouse gases (GHG) such as methane (CH₄), tropospheric ozone (O₃), related species like the biogenic volatile organic compounds (BVOCs, including isoprene and terpene), reactive nitrogen gases (NO_x), as well as several types of aerosols. In addition to being key players in the climate system, these species contribute to air quality issues in developed and developing countries. This provides additional motivation to explore the cycles of these compounds.

In this context, the main objective of this project is to investigate the influence of anthropogenic land cover change on natural emissions of non-CO₂ GHGs and aerosols and their impact on key aspects of the atmosphere-climate system, including the atmospheric oxidative capacity, the loading of aerosols, and climate itself.

The proposed project builds upon the Millennium Experiments performed by MPI-M and DKRZ. It will make extensive use of the forcing datasets developed in this context, and of simulation results from these experiments. These data will be used to perform add-on studies for times between 1600 and 2100 AD with the aerosol-chemistry-climate model ECHAM5-HAMMOZ.

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