Main field: Earth Sciences & Environment

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"Influence of aerosol-cloud-meteorology interactions on extreme weather events under land use/ land cover changes"

Considering the uncertainties in modeling aerosol-cloud-meteorology interactions, the study aims to analyze the different aerosol impacts on extreme weather events, with focus on cases with convective clouds and how land use/ land cover redistribution can enhance the consequences.

Background information

Climate change and anthropogenic impacts on land use/ land cover resulted in the redistribution of aerosol emissions and impacted their transportation through changes in atmospheric circulation. Considering the complexity of numerous feedbacks in the atmosphere, accurate modeling of these effects significantly depends on uncertainties in precipitation formation, in-cloud processes, and the aerosol lifecycle. We aimed to use the Enviro-HIRLAM modeling system [1] to simulate aerosol impacts on extreme weather events based on the novel findings in aerosol-cloud-meteorology interactions. To estimate impacts and consequences, it is important to perform modeling combining different model modes with direct and indirect aerosol effects and scenarios of land cover redistribution. Additional focus will be on convective cloudiness as the reason for negative hydrological events, whose aftermaths are especially sensitive to land cover changes.

The presented study continues a set of research provided by authors within the PEEX framework [2], covering the topics of climate change impacts in forests [3], aerosol pollution during wildfires [4], aerosol effects [5,6], and land cover changes [7], where modeling was performed using the capabilities of the IT Center for Science (CSC HPC, Finland).

References

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