



Changes of land use and land cover, biogeochemistry, and their feedbacks to climate in northern Eurasia

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In recent decades, the largest increase of surface air temperature and related climate extremes have occurred in northern Eurasia. This temperature increase and extreme climate are projected to continue during the 21st century according to climate models. The changing climate could affect land cover and the biogeochemical cycles in the region. These changes in biogeography and biogeochemistry, in turn, will affect how land use evolves in the future as humans attempt to mitigate and adapt to future climate change. Regional land-use changes, however, also depend on pressures imposed by the global economy. Feedbacks from future land-use change will further modify regional biogeochemistry and climate. Using a suite of linked biogeography, biogeochemical, economic, and climate models, we explore how six future climate projections may influence vegetation distributions, carbon stocks and fluxes, and economic activity in northern Eurasia during the 21st century. Preliminary results indicate a northern shift of biomes such that, in the absence of land use, tundra areas in the region will decrease by 48 to 96% whereas steppe areas will increase by 22 to 82% and areas of temperate forests will increase by 66 to 86% in response to climate change. These biome shifts lead to new economic opportunities that have different land-use change consequences on terrestrial carbon dynamics in the region than would be predicted in the absence of biome shifts. In the presentation, we will also present the progress on how radiative forcing will change due to changes of albedo, evapotranspiration, and biogeochemistry resulting from changes of land use and land cover in the region.