GC31B-1170: Quantifying Biogeochemical Cycles of CO2 and CH4 over the Land and Aquatic Ecosystems in Northern Eurasia

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Under the auspices of the NASA Land-Use and Land-Cover Change Program, we have made a significant progress on quantifying both CO2 and CH4 biogeochemical cycles of the land and aquatic systems in Northern Eurasia over the last several decades. Our quantification is based on in situ and satellite data of ecosystem distribution, land cover distribution, carbon, water and energy fluxes, fire disturbances, plant biomass inventory, atmospheric CO2 and CH4, and meteorology. The evaluated process-based modeling systems for both land and aquatic ecosystems for the historical period have been used to project carbon fluxes during the 21st century over this region. The uncertainty associated with these carbon-based gases is also quantified. This presentation will update these quantifications by examining: 1) the impacts of fire disturbances on land ecosystem CO2 budget in the last few decades; 2) net CO2 and CH4 exchanges of the land and aquatic ecosystems in both historical and future periods. Our study has also assessed the role of permafrost dynamics in both land and aquatic ecosystem carbon and water dynamics in this region. Our research provides an integrated land and aquatic ecosystem model that can be used to address biogeochemical cycles of carbon and water in this climate-sensitive region.