Poster #1-33

Evaluation of High-Latitude CH_4 Emissions and their Functional Responses in the E3SM Land Model

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Climate change is a key challenge that will affect many aspects of biosphere processes. Northern high latitudes are very sensitive to warming due to ice-albedo and carbon-concentration feedbacks. In addition to permafrost soil CO_2 emissions, soil CH_4 emissions are another important factor that contribute to high-latitude warming, and these emissions are projected to increase due to soil inundation from permafrost thaw. Here we quantify Northern High latitude CH_4 production and oxidation rates in the E3SM land model (ELM). At regional scale, we conducted two sets of simulations that differ in their estimates of inundated area (prognosed and prescribed based on satellite observations). Model parameter optimization has been applied for the prognostic inundated area simulation to improve the regional scale representation of inundation. We also analyze spatial distribution and temporal evolution of soil CH_4 emissions and relate them to local environmental factors. At in situ scale, we also implemented and tested 2-D modeling capability in ELMv1 for soil thermal-hydrology-CH_4 coupling.