5C - Reducing Uncertainties for Permafrost Carbon Feedbacks

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Surface warming, amplified in the Arctic, is expected to accelerate over time due in part due to greenhouse gas (GHG) emissions from thawing carbon-rich permafrost (primarily CO_2 and CH_4), resulting in permafrost carbon feedbacks that affects the entire Earth system. Permafrost carbon feedbacks involve biogeochemical carbon cycles in three primary environmental settings: near-shore, terrestrial, and aquatic. In addition, there is geologically sourced CH_4 from sedimentary basins that reaches the atmosphere through taliks, which may enlarge as permafrost degrades. A general lack of data and great uncertainty in estimates of Arctic GHG emissions reflect our poor understanding of natural processes in the Arctic.

Though CH_4 is 25 times more powerful a GHG than CO_2¬ over 100 years and responsible for 30% of global warming since pre-industrial times, there is high uncertainty about Arctic CH_4 emissions because CH_4 quantification to date has focused primarily on anthropogenic sources. Key elements to determining the impact of CH_4 emissions from permafrost on global climate are understanding (1) the amount of carbon stored in permafrost dictated by geological history; (2) the biogeochemical processes in the primary environmental settings that regulate how much CH_4 will be released and over what time frame; (3) the relative emissions of CH_4 versus CO_2; and (4) the relative contributions of CH_4 from biological (biogenic) versus geological (thermogenic) sources.

In this session, we seek presentations about multidisciplinary research to examine CH_4 sources, biogeochemical processes, and fluxes from thawing permafrost across varied spatial and temporal scales.

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