W213-P001 **Room: Poster Session Hall** **Time: May 15**

Hydro-thermal sensitivity of high-latitude climate to thermal soil representation evaluated by a 1-D model and a GCM

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The land cryosphere, mostly underlain by permanently or seasonally frozen ground, is projected to experience a largest increase of near-surface temperatures under the Global Warming at the end of this century. Changes in hydro-thermal regimes in those regions, such as degradation of permafrost, or changes in the active layer depths and seasonally-frozen layers, are anticipated to exert a large impact both on the local socio-economy and eco-climate system. Such changes, however, will not be contained at a local scale but may affect other regions and the globe through several physiochemical (e.g. albedo and freshwater discharge to the Arctic) and biological (e.g. anaerobic decomposition of tundra) pathways.

Knowledge and understanding of the hydro-thermal mechanisms in the soil-freezing regions, and channels bridging the local disturbances to global consequences, are essential for accurate and reliable modeling to estimate the impacts at global climate change. Among the most fundamental of those processes is the thermal soil process, which determines the way to distribute the energy under the ground. Changes in thermal conductivity parameterization (e.g. consideration of unfrozen water, organic layers) and resolved depth and numbers of the soil layers can significantly alter the resulted hydro-thermal regimes of the regions. However, complexity and resolution need be optimized for the use in global climate models (GCMs).

This presentation will show results of the preliminary evaluation by a 1-D physical model for thermal regime changes due to different thermal soil representations, and of the hydro-thermal impacts evaluated by a land-atmosphere coupled GCM. The CCSR/NIES/FRCGC version 5.7b AGCM was used at a moderate horizontal resolutions (T42; typical land grid interval is about 250 km) for the global evaluation; the employed land surface scheme was based on MATSIRO, which includes ground heat and water transfer, and canopy structure and vegetation biophysical processes.