[EJ] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-CG Complex & General

[A-CG38]Science in the Arctic Region

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The Arctic and circumpolar region is the key area for the study of global change because the anthropogenic impact is projected to be the largest in this area due to the complicated feedback processes of the nature. A number of international and interdisciplinary research projects have been conducted for the studies on the land-atmosphere-ocean system. In order to understand the feedback processes occurring in the Arctic and to project the global warming in the future, we need to establish the intense observational network and to exchange the knowledge and information by combining the different scientific communities under the common interest of the Arctic. The objectives of this session are 1) to exchange our knowledge on the observational facts and integrated modelling and 2) to deepen our understanding on wide range of natural sciences related to the Arctic and the circumpolar region. Studies on humanities, social sciences, and interdisciplinary fields are also welcomed.

[ACG38-P12]Development of a simple numerical model to simulate changes in Late Quaternary circum-Arctic ground ice and soil organic carbon

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Permafrost is a large reservoir of soil organic carbon (SOC; about half of all the terrestrial storage). Therefore, its degradation (i.e., thawing) under global warming may lead to a substantial amount of additional greenhouse gas (GHG) release. However, understanding of the processes, geographical distribution of such hazards, and implementation of the relevant processes in the advanced climate models are insufficient yet so that variations in permafrost remains one of the large source of uncertainties in climatic and biogeochemical assessment and projections. Knowledge on the “vulnerability distribution” as the high potential areas of ice-rich permafrost degradation is important for assessment and projections. However, the information from the currently accessible data is limited. On the other hand, the development of ice-rich permafrost has a long timescale (i.e., on the order of hundreds to tens of thousands of years), gone through varying stages under changing ambient conditions since the Last Interglacial period (c. 130 thousand years ago, or 130ka). This study, conducted as a part of three-year research project (2-1605, ERTDF of ERCA) aims to understand the evolution of the vulnerability distribution, we developed a simple numerical model to simulate the dynamics of ground ice and SOC in the circum-Arctic region (north of 50° N). The model has two compartments, above-ground and ground; the former is driven by annual air temperature and total precipitation to calculate the carbon input (i.e., litter fall) and thermal conditions, and the latter calculates subsurface carbon and water budget, including ice content (Figure). The driving data and boundary conditions are taken from literatures, open data, and outputs from global climate models, such as Paleoclimate Model Intercomparison Projects (PMIPs). The model results are compared to the available maps and data for permafrost and soil carbon content.