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

[A-CG38]Science in the Arctic Region

convener:Shun Tsutaki(The University of Tokyo), NAOYA KANNA(Arctic Research Center, Hokkaido University), Shunsuke Tei(北海道大学 北極域研究センター, 共同), Tetsu Nakamura(Faculty of Environmental Earth Science, Hokkaido University)

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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-P10]Time lag and negative responses of forest greenness and tree growth to warming over circumboreal forests

*Shunsuke Tei[1], Atsuko Sugimoto[1] (1.Arctic Research Center, Hokkaido University)

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The terrestrial forest ecosystems in the northern high latitude region have been experiencing significant warming rates over several decades. These forests are considered crucial to the climate system and global carbon cycle and are particularly vulnerable to climate change. To obtain an improved estimate of the response of vegetation activity, e.g., forest greenness and tree growth, to climate change, we investigated spatiotemporal variations in two independent data sets containing dendroecological information for this region over the past 30 years. These indices are the normalized difference vegetation index (NDVI3g) and the tree-ring width index (RWI), both of which showed significant spatial variability in past trends and responses to climate changes. These trends and responses to climate change differed significantly in the ecosystems of the circumarctic (latitude higher than 67°N) and the circumboreal forests (latitude higher and lower than 50°N and 67°N, respectively), but the way in which they differed was relatively similar in the NDVI3g and the RWI. In the circumarctic ecosystem, the climate variables of the current summer were the main climatic drivers for the positive response to the increase in temperatures showed by both the NDVI3g and the RWI indices. On the other hand, in the circumboreal forest ecosystem, the climate variables of the previous year (from summer to winter) were also important climatic drivers for both the NDVI3g and the RWI. Importantly, both indices showed that the temperatures in the previous year negatively affected the ecosystem. Although such negative responses to warming did not necessarily lead to a past negative linear trend in the NDVI3g and the RWI over the past 30 years, future climate warming could potentially cause severe reduction in forest greenness and tree growth in the circumboreal forest ecosystem.