

東シベリアの森林における水・エネルギー循環：概要と今後の研究

Water and energy exchange in an East Siberian forest: Synthesis and Future Works required

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The high latitudes are characterized by low precipitation and short growing seasons due to the cold winter climate. Some projects of Water, Energy and Carbon (WEC) cycles have been carried out in high-latitude regions, including the Northern Hemisphere Climate Processes Land Surface Experiment (NOPEX) on the Scandinavian Peninsula (Halldin et al., 1998) and the Boreal Ecosystem-Atmosphere Study (BOREAS) in North America (Sellers et al., 1995). In Siberia, WEC cycles observations began in the late 1990s. The Terrestrial Carbon Observation System-Siberia (TCOS-Siberia) study examined WEC exchanges in European and western Siberia (Schulze et al., 2002). Through intensive observations and analyses, the study revealed numerous characteristics not only of grasslands and bogs but also of forests, as well as distinctive characteristics of high-latitude WEC cycles.

Despite its having a more severe climate than the regions mentioned above, much of Eastern Siberia is covered by taiga forests dominated by *Larix cajanderi*. Yakutsk, located along the middle reaches of the Lena River, has an annual average temperature of only -10.2C and annual precipitation of 235 mm. Moreover, extensive continuous permafrost exists in Eastern Siberia, while relatively little permafrost exists in North America, Scandinavia, and central Siberia. Therefore, the interactions between forests and permafrost in Eastern Siberia likely result in unique hydrological features in this region compared with other climate zones. As a first attempt to understand WEC cycles in Eastern Siberia, Kelliher et al. (1997) conducted field studies for a short period during summer 1993 using an eddy correlation method. Long-term studies near Yakutsk have subsequently been carried out, including collaborative research between Russia and Japan as part of the Global Water and Energy Cycle Experiment (GEWEX) Asian Monsoon Experiment-Siberia (GAME-Siberia; Lowfard et al., 2004; Yasunari et al., 2007), the Core Research for Evolutional Science and Technology (CREST)/Water and Energy Cycles in Northern Forests (WECNoF) project (Dolman et al., 2008; Maximov et al., 2008), the JAMSTEC activities, and the Russian_Dutch project PIN-Matra (Moors et al., 2006). Based on these long-term in situ observations, we could find the distinctive characteristics of interactions among soil-vegetation-atmosphere in an Eastern Siberian Larch forest. For example, the importance of tree phenology, constant annual evapotranspiration rates due to the existence of permafrost, characteristics of surface conductance etc.

In this presentation, we synthesize characteristics of WEC cycles obtained in the Eastern Siberian Larch forest, especially at Spasskapa Pad of the middle reaches of Lena River basin, so far. Finally, we will talk about the further works required for the deeper understandings of WEC cycles in high latitude forests.

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