Two-year results of the Arctic river surface temperature monitoring from space with GCOM-C/SGLI thermal infrared images

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Japan Aerospace Exploration Agency (JAXA) launched an Earth observing satellite for climate studies named "GCOM-C" on December 23, 2017 which carries an optical sensor SGLI (Imaoka et al., 2010). The SGLI observes sunlight reflection and infrared emission from the Earth's surface at 250 m spatial resolution on a global scale. In particular, the capability of observing daily changes in thermal environments of the high latitude land and ocean at the 250 m resolution is a unique and key function of SGLI that enables us to monitor fine structures of land and ocean surface temperatures. In this study, we focus on the monitoring spatio-temporal variations in surface temperature of the six major Arctic rivers in Russia and North America flowing into the Arctic Ocean using SGLI thermal infrared images. Recently, while the snow cover extent in the Northern Hemisphere has been decreasing in all seasons during the past three decades (Hori et al., 2017), the Arctic rivers have been discharging increasing amounts of freshwater and heat into the Arctic Ocean (Shiklomanov and Lammers, 2009) and thus could influence not only the freshwater cycle but also thermohaline circulation in the Arctic Ocean. Therefore, the monitoring the temporal and spatial variations in the Arctic river surface temperatures is an important step to elucidate the mechanism of the freshwater and heat discharge from the northern Continents (Eurasia and North America) into the Arctic Ocean. Our preliminary analysis results using the first two-year observation data of GCOM-C/SGLI show that SGLI has enough capability to observe the detailed variations in surface temperature of the major Arctic rivers as well as small tundra ponds.

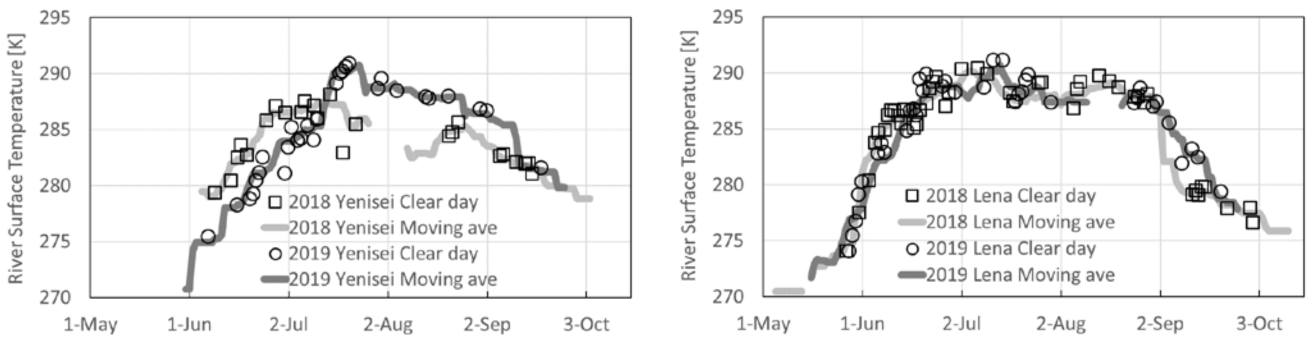

Figure 1. Temporal variations of river surface temperatures in 2018 and 2019 for Yenisei river (left) and Lena river (right) retrieved from SGLI thermal images at the grids nearest to the in-situ stations of ArcticGRO.

References

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