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Spatial and temporal variability of Yukon River plume using MODIS data

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Carbon cycling and storage at high latitudes has become a critical issue in global change science. Hydrology is changing across subarctic and arctic regions. Permafrost degradation, construction of hydroelectric dams, and changing climate have resulted in changed amount and/or timing of water discharge in recent decades. We must consider how much such change affects to ocean productivity through the discharge from river connecting to arctic and subarctic oceans. In the past studies, satellite remote sensing was very useful tool to study river plume and their dynamics. In this study, we examined the dynamics of river plume distribution from Yukon River using satellite remote sensing. We used MODIS (Moderate Resolution Imaging Spectroradiometer) data on Terra and Aqua satellites for the period June 2004 to October 2008. The spatial resolution and temporal resolution are 1 km and daily, respectively. We selected the images displaying clearly river plume patterns.

The result in this study shows that the dynamics of river water plume by the satellite observation is related to a change of the discharge. We made it possible to understand river plume for an index of the river water in nLw551 in this study. The visual observation from the satellite images was able to confirm the turbid river water that a color was different from the seawater clearly so that it was caught river water plume with different optical signature. And, as a result, it appeared by a difference of the suspension density of the river water that a river outflow of the Yukon River happened with two phases of the snow melting period and the glacier melting period.

Keywords: Yukon River, Plume, MODIS, Remote Sensing