

## Elucidation of changes of reindeer travel-route around Lena River by satellite remote sensing

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There are nomads who hunt reindeers for a living in the Arctic Circle of Siberia. The trade of the meat and the fur has become one of the most important industries. Recently, the reindeer, which has an animal behavior going along the conventional route for pasture, has been changing the travel-route. Thus, the livelihood of nomads who lives by hunting them has been menaced. The reason of changing the travel-route must be a global warming resulting from the vegetation change of the pasture. To track the travel-route, some reindeers were installed GPS devices in Sakha Republic in Russia [1]. Almost all positions of reindeer groups, however, remain unclear, because Siberia is a vast field.

The aim of this study is to elucidate changes of wild reindeer travel-route in Siberia by satellite remote sensing; 1) through the seasonal change of vegetation of the pasture, and 2) through the direct survey of reindeer groups by satellite image analyses. The study area was selected around Lena River and Olenyok valley in Sakha Republic, Russia. This work focused on 1).

First, We have investigated the effects of climate change on vegetation around Lena River where the travel-route of wild reindeer was observed. Although there is a report that the annual difference of vegetation discussed using MODIS data in Siberia, we use Landsat 7,8 images to distinguish the travel-route in higher special resolutions. We have calculated the normalized difference vegetation index (NDVI) from satellite images of the corresponding area of 2010-2015. From the result, only in 2010 and 2015, the period that NDVI value becomes a peak, had clearly shifted by about one month. It is reported that El Niño occurred during these years, leading to abnormal summer weather in the region. This result supports that the change of the wild reindeer travel-route frequently occurs due to the change in activation timing.

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