GROUND DEFORMATION MAPPING BY ALOS1/2 INSAR: CASE STUDIES AT HERSCHEL ISLAND, CANADA, AND BATAGAIKA CRATER, SIBERIA

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The permafrost area covers about 1/4 of the northern hemisphere and its thawing can lead to ground deformation. That ground deformation has been studied as a serious problem in the Arctic Ocean coastal area such as Russia for a long time, because the deformation causes damage to architectures at these areas. However, there have been no quantitative observation data, and the spatial and temporal distributions have hardly been investigated. On the other hand, by the recently global warming influence, the importance of organic carbon stored in permafrost is pointed out. Although the release of methane gas is confirmed in some thermokarst lakes, it is very difficult to observe the permafrost in a wide area by field study. Instead, it is technically possible to monitor the subsidence and uplift of the ground over the permafrost area, which could potentially make a significant contribution to the monitoring thawing process of permafrost.
In this study, we attempted to detect ground deformation signal in permafrost area by remote sensing using interferometric synthetic aperture radar (InSAR). Using the data of two SAR satellites ALOS and ALOS2 launched by JAXA, we observed recent ground deformation from 2007 to 2016. Focusing on the slump terrain with relatively fast fluctuation velocity as the observation target, we detected ground subsidence in Herschel Island in Canada and Batagaika Crater in Russia. In Herschel Island, we observed the subsidence and coastal erosion in recent years by ALOS2 which has not been repoted. At the Btagaika Crater, however, it is not yet certain if the detected signals really indicate subsidence, because the employed digital elevation models seem to have biases.

Keywords: ALOS, InSAR, permafrost, thermokarst, remote sensing

