[EJ] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-CG Complex & General

[A-CG38]Science in the Arctic Region

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The Arctic and circumpolar region is the key area for the study of global change because the anthropogenic impact is projected to be the largest in this area due to the complicated feedback processes of the nature. A number of international and interdisciplinary research projects have been conducted for the studies on the land-atmosphere-ocean system. In order to understand the feedback processes occurring in the Arctic and to project the global warming in the future, we need to establish the intense observational network and to exchange the knowledge and information by combining the different scientific communities under the common interest of the Arctic. The objectives of this session are 1) to exchange our knowledge on the observational facts and integrated modelling and 2) to deepen our understanding on wide range of natural sciences related to the Arctic and the circumpolar region. Studies on humanities, social sciences, and interdisciplinary fields are also welcomed.

[ACG38-P11]Post-wildfire ground deformation in Eastern Siberian permafrost areas detected by InSAR

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Wildfires in permafrost area significantly change the ground cover, causing thawing of permafrost beneath the surface and subsequent ground deformation. Thawing of permafrost has attracted attention not only from its interrelationship to global warming but also from the local issues such as infrastructure development for residents in polar region and resource development of gas and oil fields. Since permafrost is defined from thermal structure, soil temperature monitoring by borehole is a standard observation method to acquire the data with high temporal resolution. However, it is impractical to perform borehole measurements over all the permafrost areas in northern hemisphere. Especially in Siberia, the boreholes by the international network (GTN-P) is very few despite the largest area in terms of permafrost distribution. Therefore, remote sensing techniques to cover wide areas are indispensable. Observing ground deformation by InSAR can tell us the state of permafrost with high spatiotemporal resolution.

Here, we report our detection of the post-wildfire ground deformation that occurred in 2014 to 2015 around Batagai, Eastern Siberia. This is the second example of InSAR observation of post-wildfire ground displacements, following the case of Alaska, and the first detection in Siberia. We used SAR images obtained from ALOS 2 (L-band) and Sentinel-1 (C-band) satellites. At the Site A (N67°46´; E134°20´) where the deformation signal was first detected near Batagai, we confirmed from Landsat and MODIS optical satellite images that the wildfire occurred from July to August 2014 and accompanied with clear changes in the groundcover over approximately 37 km^2 areas. Based on InSAR images at the Site A, it turned out that the ground deformation has been continuing since August 2014 when the fire was extinguished. Even two years after the wildfire, we detected the LOS changes of about 10 cm at maximum in the 2016 summer season from July 30 to October 8. On the other hand, in the 2017 summer from July 29 to October 7, the maximum LOS change is about 6 cm with the same sense. In addition, by visually checking the past satellite images on Google Earth, we found that similar groundcover changes by wildfires did occur between 2014 and 2015 around Batagai, which were counted more than 20 places. We focused on seven such areas (40 to 200 km^2) that are equal to or larger than Site A, and derived InSAR images at all the seven sites. In the earlier ALOS 2 InSAR data, some of 2014 and 2015 SAR data pairs could not be interfered due to the small differences in the carrier frequency. However, using band-pass-filter and frequency-shift, we could generate an interferogram. We also removed ionospheric noise by using split-band method, because it is one of the strong noises in polar region. In the future, we will extend the analysis area to the other post-wildfire areas, perform time-series analysis and physical modeling so that we can compare ground-based measurements.