Geophysical Research Abstracts
Vol. 14, EGU2012-7003-1, 2012
EGU General Assembly 2012

Monitoring ground subsidence and spring water by permafrost degradation in Siberia

T. Sakai (1), T. Hiyama (1), J. Fujiwara (1), S. Gotovtsev (2), and L. Gagarin (2)

(1) Research Institute for Humanity and Nature, Kyoto, Japan (torus@chikyu.ac.jp), (2) Melnikov Permafrost Institute, Yakutsk, Russia

High latitude regions are experiencing the greatest climate warming. At Alazeya River Basin in the far north of Siberia, the annual mean air temperatures have risen by 4.6°C for the last 50 years. The warming rate is 6.1 times faster than that of global average. The increase in air temperature thaws permafrost which underlays 25% of the northern hemisphere. Effects on permafrost thawing are particularly important for global climate, because permafrost thawing promotes decomposition of soil carbon, and releases greenhouse gases such as methane into the atmosphere. It is said that high latitude regions contain one third of the global terrestrial pool of soil carbon. Therefore, there is a concern that how permafrost thawing affects global carbon balance as positive feedback. In addition, permafrost thawing also changes water balance. As flood is caused when a large amount of the thawed water flows into the river, date of permafrost thawing is important. Extreme hydrologic events such as flood have already been observed, and are predicted to further increase in the frequency and magnitude. The objectives of this research are to monitor the process of permafrost thawing using remote sensing in the far north of Siberia, and to advance the knowledge about permafrost degradation to increased temperature.
Annual mean air temperature at Alazeya is gradually increasing due to global warming, and air temperature in 2007 is extremely high. More permafrost melted during summer by warmer-than-normal air temperature. After ice wedge melting, water gushes from the ground. Then the water flows into a nearby river, leading to floods. Time-series of Landsat TM/ETM+ and ALOS/PALSAR detected flood damages. The flooded water flowed slowly toward the north, because landscape in this area is almost flat without slope. Therefore, the flood disaster in 2007 was carried over next year at Andryushkino. The local people suffer flood disasters for a long time.