# Thermal states and distribution of marginal permafrost

*Ishikawa Mamoru[1]

1. Hokkaido University

This paper assesses thermal conditions and distribution of permafrost in the southern limits of Eurasian permafrost region, Mongolia, using ground temperature data taken from year-round monitoring at 69 borehole sites. Ground temperatures are strongly controlled by local environmental factors, e.g., topographic depressions with cold air concentration during winter, ice-rich stratum that prevents penetration of sensible heat, and tree cover that reduces incident solar radiation. Permafrost temperatures are typically between -1 and 0 oC; colder permafrost (< -2 oC) occurs in northern ranges of continuous permafrost and at high elevations in the sporadic/isolated permafrost zones. Relict permafrost, remaining thermally disconnected from seasonal air temperature fluctuations, is present near the latitudinal and elevational limits of perennially frozen ground. Cold and thermally responsive permafrost dominates in the continuous and discontinuous zones, while warm and thermally unresponsive permafrost exists in the sporadic and isolated zones. Overall, permafrost in the colder regions is stable, but is degrading in warmer areas.

In order to map permafrost distribution, statistical correlation between permafrost states and local geographic factors were evaluated for Hovsgol and Hangai ranges. Multiple regression analysis correlated 1m-deep ground temperatures with multiple geographical factors. For the Khangai range the elevation, potential solar radiation and topographic wetness were significantly correlated with ground temperatures. On the other hand, presence of forest cover and latitudes were equivalently important facotrs determining ground temperature in Hovsgol area. These findings were used for creating regional map showing distribution of 1m-deep ground temperature with sufficient statistical significance and high spatial resolution.

Keywords: marginal permafrost, multi-borehole measurements, mapping permafrost distribution

- ACC28-06 -