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DC resistivity tomography as a highly valuable tool in mapping permafrost characteristics and transitions in arid mountain permafrost - case studies from northern Mongolia

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The region of Lake Hövsgöl, northern Mongolia, lies at the southern edge of Siberia and forms the southern-most fringe of the Siberian continuous permafrost zone. Being at the fringe of permafrost existence, increasing temperatures and changes in land surface cover will have a major impact on permafrost degradation. This further affects the environment in interaction with human activities like nomadic pasture use. The objective of this study is to define the distribution of permafrost and the depth of the active layer zone in detail, as the response on climatic, topographic and biological forcing. Within this study, more than 20 DC resistivity tomography profiles with lengths between 200 and 600 m were obtained in different topographic and land cover settings. In 10 locations the profiles are calibrated with ground temperatures measurements in bore holes. Long profiles visualize the transitions between permafrost and no permafrost locations in a high grade of detail. On three sites profiles were remeasured with a three years interval (2002 to 2005), allowing estimations of larger resistivity changes during this time period. The study evaluates the technique of being highly valuable in characterizing permafrost types under different topographic and land cover settings. This information is highly useable for the management of such areas prone to permafrost thaw, climatic change and anthropogenic interest. The project is funded by a five-year grant from the Global Environment Facility to the Mongolian Academy of Sciences (MAS), implemented by the World Bank and a foundation of the Mongolian Long Term Ecological Research Program at Lake Hövsgöl.