

Integrated geoscientific exploration for geothermal energy utilization in the Mongolian Hangai

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The Hangai Dome in central Mongolia is an intra-continental mountain range, located far from tectonic plate boundaries. The existence of numerous hot springs with temperatures of more than 90°C in the Hangai mountains is indicative of large geothermal energy resources, which are remnants of its volcanic geological history. Previous geothermal exploration surveys in Mongolia were conducted at most geothermal manifestations but they focused on geological and geochemical studies. Only near-surface (upper 150m) geophysical prospecting was performed around the hot springs of Tsenkher and Shivert, thereby missing the deeper geothermal reservoir and source region. Exploration wells drilled around Tsenkher, to find the geothermal reservoir, did not succeed.

With our project, which is supported by the Swiss Research for Development Grant (SNF R4D), we plan to establish and deploy methods and tools for geothermal prospecting in Mongolia. Our study region is located at the Tsenkher geothermal field near Tsetserleg, where we plan to conduct electrical conductivity surveys, using the magnetotelluric (MT) method. To construct a reliable conceptual geothermal reservoir model, we will use previously collected geochemical and geological data to yield an integrated geoscientific interpretation approach together with the newly collected MT data. For the MT survey, we make use of so-called inter-site transfer functions, which allow an increase in the amount of acquired data, while keeping equipment costs and survey duration low.

In a pilot survey near the Tsenkher hot springs, we measured MT field at four sites. We inverted the MT data to yield the 1D electrical conductivity structure of the area to compare it with borehole resistivity logs from the exploration wells.