

# Airborne Geophysical Survey for the Evaluation of Geothermal Potential in Japan

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Airborne survey is one of the most effective methods which can investigate subsurface structures in areas where are difficult to access and/or exploration activities are restricted by surface conditions. Most of geothermal areas in Japan are located in mountainous regions. Furthermore, about 80% of geothermal resources are situated within areas designated as a national park, where geothermal development activities causing big impacts on environment are limited. In recent years, regulations on geothermal development in the natural parks are gradually relaxed because accelerating renewable energy is required to mitigate global warming. However, geothermal development movements by private companies are not active in those areas due to huge risk of subsurface uncertainty caused by lack of geological information. Therefore, since 2013, according to a government policy, Japan Oil, Gas and Metals National Corporation (JOGMEC) has been conducting airborne geophysical surveys to provide regional basic information for evaluation of geothermal potential, which leads to promote the geothermal development.

Airborne Gravity Gradiometry (AGG) method and time domain electromagnetic and magnetic method using a helicopter (HELITEM) are applied in the surveys. AGG survey is suitable for delineating geological structures in detail. HELITEM survey has an advantage over frequency domain electromagnetic survey as it has deeper penetration. A helicopter can fly at lower altitude with lower velocity than a fixed wing, which provides higher resolution and higher signal intensity data. Adopting the helicopter is beneficial especially for topography with steep slopes such as the mountain regions in Japan.

We are studying analysis methodologies for the acquired geophysical data. For example, we tried a variety of filtering to extract structural features such as lineaments from AGG data. Ground truth surveys with outcrop sampling are also conducted to ascertain the analysis results of the airborne geophysical surveys. We have completed the airborne geophysical surveys in more than 10 areas in Japan, so far. In this presentation, we will introduce results and our experience from the surveys recently acquired. The authors acknowledge local municipalities and related organizations for their understanding and cooperation with us to conduct the airborne survey.

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