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Deeper geological structure survey using an integrated airborne survey system

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An integrated airborne survey system is an investigation system developed by the joint research of Central Research Institute of Electric Power Industry, Hokkaido University, Kyoto University, Kyushu University, Ceres,Inc., and OYO Corporation with the "Ministry of Education, Culture, Sports, Science and Technology industry, academia and government cooperation innovation creation business subsidy". The purpose of research and development is to develop the airborne geophysics system which investigates deep geological structure, in order to use for disaster prevention of a natural disaster.
We investigated geological structure by carrying out airborne electromagnetic survey, airborne magnetic survey, airborne gamma-ray spectrometer survey, and heat infrared image investigation using a helicopter. As a result, it proved that the survey by a comprehensive aerial survey system is useful for disaster prevention of catastrophic natural disasters (a volcanic disaster, an earthquake, a large-scale slope disaster, etc.).
In the border between prefectures in Shiga and Mie, the geological survey was carried out in August, 2008 using the integrated airborne survey system.The enforced methods are airborne electromagnetic survey, airborne magnetic survey, and airborne gamma-ray spectrometer survey. Airborne electromagnetic survey is the investigating method of GREATEM which installs the source of transmission on the ground. Airborne magnetic survey is the dual bird system which hung two magnetic sensors. Moreover, airborne gamma-ray spectrometer survey was carried out at the same time using the system whose capacity of NaI (Tl) is 33.6l.
The altitude of a survey area is 200-2000m, and geographical feature is precipitous. Many high-voltage wires which have bad influence on a flight and analytical data exist in a survey place. The area which we investigated was 15km2 and the investigation total flight lines were about 700km. The geology of the survey area belongs to the Mino belt. Sandstone,mudstone,chart,green rock, and the limestone are dominated over the basement rock. The grit of unconsolidated sediment and consolidation belonging to the Tokai layer group is dominated over a gravel bed.
Several kinds of survey was conducted. First, we have grasped the whole geological structure by airborne geophysics. Moreover, in order to investigate detailed geological structure, we carried out geological reconnaissance, seismic survey , high resolution electrical prospecting, a drilling survey, the examination in a hole and well logging, and an indoor rock test.
In the GREATEM surbey (airborne electromagnetic survey), we were able to elucidate the geological structure to the depth of 1000m, and was able to clarify existence of a fault. Moreover, the changing point of surface geology and the changing point of specific resistance were in agreement in general, and the classification of the geology of a survey area has presumed from resistivity distribution. In airborne magnetic survey result, we caught the global geological structure of the survey area, and utilized the analysis result for the synthetic geology interpretation. In airborne gamma-ray spectrometer survey result, since the distribution which classified surface geology, and radioactivity intensity distribution were conformable, we were able to classify detailed surface geology.

In this meeting, I report these results of an investigation.

Keywords: Airborne geophysics, Airborne Electromagnetics, Aieborne Magnetics,
Airborne gamma-ray spectrometry, Integrated airborne survey system, GREATEM