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Preface

GSJ Bulletin Special Issue State of the Art and Perspective of Airborne Geophysics — From Mineral Exploration to Environmental Survey —

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Shigeo OKUMA (2001) GSJ Bulletin Special Issue State of the Art and Perspective of Airborne Geophysics — From Mineral Exploration to Environmental Survey — Preface. *Bull. Geol. Surv. Japan*, vol. 52 (2/3), p. 71-72.

The challenging 20th century has gone, and the 21st century has come peacefully. The airborne geophysics (aerogeophysics) was born in the 20th century and has developed rapidly. The first airborne geophysical survey, aeromagnetic survey, was initiated after World War II in the US for exploring oil and natural resources by using submarine detecting techniques developed during the war. In the early 1950's, the airborne electromagnetic survey (AEM) was invented in Canada to explore mineral resources. Besides airborne geophysics mainly for exploring natural resources, new airborne geophysics for environmental problems such as airborne multispectral scanners for monitoring volcanic activities and laser profilers for surveying detailed topography have become common use recently.

In middle of the 1990's, the GPS (Global Positioning System) has come into practical use and drastically changed airborne geophysics. For example, an optical pumping magnetometer with a resolution of 0.01 nT was developed in the 1960's. But we had to wait until the launch of the GPS, which has a positioning accuracy within a cm by differential mode, before we could conduct practical high-resolution aeromagnetic surveys.

As airborne geophysics is now widening its coverage from mineral exploration to environmental survey, Japanese researchers and engineers involved in airborne geophysics have little communication among them. On the basis of these circumstances, we held the 264th Geological Survey of Japan (GSJ) Seminar, "State of the Art and Future of Airborne Geophysics — From Mineral Exploration to Environmental Survey" on February 3, 2000 at the GSJ in Tsukuba, Japan. At the seminar, we had 14 speakers including two Austrian researchers from the Geological Survey of Austria (GBA), who were invited to Japan by an international cooperative research program. The seminar was successful because we had more than 60 attendees even though it was at the end of the fiscal year 1999.

Because of the success of the seminar, we were recommended to edit a special issue of the GSJ Bulletin to include papers at the seminar. We tried to include as many papers as possible but the sudden eruptions of Usu and Miyake volcanoes in 2000 prevented some authors to submit their papers. These eruptions have also caused much delay for editing the special issue. As a result, we have now completed this issue, "State of the Art and Perspective of Airborne Geophysics — From Mineral Exploration to Environmental Survey —" including six papers from the seminar. Contents of the papers are outlined as follows:

First, Segawa *et al.* (2001) showed results of their R&D on a new airborne gravimeter and test flight. The result shows a remarkable improvement of detecting aircraft position by an optical-fiber gyroscope in combination with GPS receivers.

Next, Motschka (2001) introduced hardware systems of GBA's airborne geophysics including infrared and soil moisture survey systems. Supper *et al.* (2001) showed the results of airborne surveys over the southern Italian volcanoes under a special project in collaboration with other EU countries. The high-resolution aeromagnetic map of Vulcano indicates some interesting magnetic features associated with the subsurface structure of the area.

Okuma *et al.* (2001) explained the recent progress of the high-resolution aeromagnetic surveys at the GSJ. They introduced a R&D project at the GSJ including several case studies and new project on airborne geophysics for detecting unstable parts of

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active volcanoes.

Okuno *et al.* (2001) showed the result of an airborne geophysical survey with EM, aeromagnetic and gamma-ray measurements for the forecast of the lava dome collapse of Unzen volcano, Kyushu, Japan, which recently erupted from 1990 to 1994.

Finally, Nakatsuka (2001) explained the history of aeromagnetic surveys by the GSJ and building of a database system of the aeromagnetic anomalies over Japan, based on a new geodetic datum being adopted by Japan.

Unfortunately, six papers published on this issue are not enough to develop the readers' understanding of the wide variety in applications of airborne geophysics so that I recommend they refer to the abstracts of the seminar (GSJ, 2000). I hope this issue will be of help especially for people involved in airborne geophysics to promote their knowledge and exchange information overseas beyond this century.

Reference

GSJ (2000) Abstracts of 264th GSJ Seminar. *Bull. Geol. Surv. Japan.*, **51**, 215–221.

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