

Aeromagnetic surveys by small unmanned aerial vehicles (UAV) and onboard magneto-resistant magnetometer

Minoru Funaki[1]; Funaki Minoru Ant-Plane Group[2]

[1] NIPR; [2] -

Small unmanned aerial vehicles (UAV) have been developed for aeromagnetic survey in the summer season of Antarctica under the Ant-Plane project. The UAV consists of 2m span and 1.8m length with 2-cycles and 2-cylinder 85cc gasoline engine, GPS navigation system by microcomputer and radio telemeter system, in case of Ant-Plane #2. The total weight is 15kg including 2 liter fuels and the coursing speed is 130 km/h with maximum height of 2000m. The magnetometer system consists of a 3-component magneto-resistant magnetometer (MR) sensors, GPS and data logger. Three components of magnetic field, latitude, longitude, altitude, number of satellite and time are recorded in every second during 5 hours. The sensitivity of the magnetometer is 7 nT and we use a total magnetic field intensity for magnetic analysis due to unknown heading of the plane.

Since autonomous navigation was succeeded by Ant-Plane #2 in Dec. 2003, we made 4 kinds UAV (Ant-Plane #2 - #5) and tested the autonomous navigation at Mt. Sakrajima Volcano, Mt. Chokai Volcano, Monbetsu Airport and Toyokoro Airport etc. Consequently, more than 500km continues flight and the maximum altitude up to 5700m were achieved. The data of onboard magnetometer were unstable when the wind speed was strong, while reasonably good data were obtained under the calm wind. The principal of the aeromagnetic survey by Ant-Plane was almost established. The onboard optical pumping magnetometer should be investigated to get reliable magnetic data under the strong wind.