UAS magnetics as a non-invasive exploration technology

Yuleika Madriz, Robert Zimmermann, Junaidh Shaik Fareedh, Sandra Lorenz, and Richard Gloaguen
Helmholtz-Zentrum Dresden-Rossendorf, Helmholtz Institute Freiberg for Resource Technology, Freiberg, Germany
(y.madriz-diaz@hzdr.de)

The growing demand for innovative and sustainable exploration technologies is boosting opportunities for non-invasive geophysical surveys using unmanned aerial systems (UASs). During the last few years lightweight magnetometers have been increasingly developed for their use on UASs. Aeromagnetic surveys can provide a rapid and cost-effective technology to improve the detection of shallow targets and to delineate magnetite-pyrrhotite-rich mineralizations. With low altitude flights and tight flight lines, magnetometers lifted by rotary wing UAS systems can deliver high resolution maps in small-to-medium scale areas (<100 sq.km). We propose an adaptive workflow for aeromagnetic survey acquisitions by using multi-copters that in combination with a programmed processing tool can efficiently achieve valid observations and reliable maps. Results suggest that minimizing and compensating for the magnetometers attitude changes during flight as well as the removal of temporal variations plays an important role to avoid small anomalies to go undetected. For this study we present a comprehensive data set where UAS aeromagnetic surveys aids to overcome the scale gap between ground and airborne magnetics in potentially hazardous environments where UAS have operational advantage over traditional techniques.