Magnetic full tensor gradiometry

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ABSTRACT

Airborne geophysics is a commonly used tool for the geophysical prospecting of large areas with high spatial resolution. Especially the mapping of anomalies of the Earth's magnetic field is well suited for airborne operation. Up to now the measurement of the total field and it's gradients with caesium vapour magnetometers is the most widely used method in airborne magnetic surveys. But there are advantages of using the tensor gradient instead of the total field gradients, which will be shortly discussed.

In this work we present the recent results achieved with the full tensor magnetic gradiometer (FTMG-) system developed by IPHT and Supracon AG in Jena. The tensor components are measured by six large LTS SQUID gradiometers with a base length of 3.5 cm and an intrinsic noise of better than 50 fT/(m·Hz^1/2) which are further balanced by the use of the signal of a three axis reference magnetometer. Signals are recorded by a highly sophisticated data acquisition unit containing the AD converters, inertial unit, and a pressure regulator.

We report on airborne field tests where the system was towed by a helicopter. During flight a noise level of below 10pT/m (RMS) in a signal bandwidth of 4.5 Hz was achieved.