Detection of buried magnetic objects by a SQUID gradiometer system

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Abstract: We present a magnetic detection system based on superconducting gradiometric sensors (SQUID gradiometers). The system provides a unique fast mapping of large areas with a high resolution of the magnetic field gradient as well as the local position. A main part of this work is the localization and classification of magnetic objects in the ground by automatic interpretation of geomagnetic field gradients, measured by the SQUID system. In accordance with specific features the field is decomposed into segments, which allow inferences to possible objects in the ground. The global consideration of object describing properties and their optimization using error minimization methods allows the reconstruction of superimposed features and detection of buried objects. The analysis system of measured geomagnetic fields works fully automatically. By a given surface of area-measured gradients the algorithm determines within numerical limits the absolute position of objects including depth with sub-pixel accuracy and allows an arbitrary position and attitude of sources. Several SQUID gradiometer data sets were used to show the applicability of the analysis algorithm. © 2009 SPIE. SPIE.

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