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Some tips on data reduction for practical magnetic survey

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One of the most popular instruments for magnetic survey on land is proton magnetometers for its stability of the obtained data and convenience of use at the field. Recent years, the type of the proton magnetometer utilized the Overhauser effect has been often used above all. The Overhauser proton magnetometer has the ability of much more stability of measurement which can acquire data even in the high gradient magnetic field. The component of the data obtained by proton magnetometer is usually only the total intensity of the geomagnetic field.

Magnetic survey within a limited area usually requires simultaneous magnetic observation at a fixed point for a reference in order to remove time-varying component of the geomagnetic field. The fixed point observation, however, is sometimes failed to be obtain due to non-availability or breakdown of instruments. On the time of no reference data, here an example of making synthetic reference data is introduced.

On times we are sometimes suffered from the intense magnetic field from artificial obstacles such as guard rail along the road, ditches made by iron and concrete, or metal net or wires around there. An example of reduction such noises is also introduced here. The method of reduction is fitting noise data to theoretical magnetic dipoles using a kind of inversion.

These examples of reduction of magnetic data are applied practical data at a field of a pottery site where the magnetic anomalies due to thermal remanent magnetization are expected.

The magnetic survey was carried out around the Shiraiwa pottery site Senboku city, Akita prefecture. The production of potteries, however, had ceased more than one hundred years ago.

Since the Shiraiwa pottery site is the oldest one in Akita prefecture, the value as a historical heritage is very high. Consequently the exact knowledge of the positions and their scales of the kiln vestiges with buildings in surrounding area are also required.

Keywords: magnetic survey, proton magnetometer, data reduction, inversion