Geophysical Research Abstracts,
Vol. 11, EGU2009-9710, 2009
EGU General Assembly 2009

Magnetometers for geoscience

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Magnetometers for the Earth's magnetic field measurements were probably the first metrological action of the humankind. The progress in recent 20-30 years in the different kinds of magnetometers development is very impressive and now practically all scale of the magnetic field values can be measured – from huge magnetic fields of astronomical objects till atto-Tesla levels. A table with dynamic ranges of main magnetometers types is presented. From this table it follows that the most perspective model for the measurement of the magnetic field in the range applicable for geophysics is flux-gate magnetometer (FGM). Really, modern FGM may cover unprecedented dynamic range of the magnetic field changes – from 10^{-4}till 10^{-12}T and even lower and its second from the most important parameters – zero line drift – may reach below $10^{-4}$from the full measurement scale per year.

Surely, the creation of so high class FGMs needs a deep research in many different areas: metrology, electronics and material science to name a few.

The present report deals with the peculiarities of the development of FGMs with record parameters as to noise level and power consumption for different applications. Also a very peculiar question of permanent monitoring of Earth's magnetic field with temporal resolution of 1 second (now- 1 minute) is analyzed and the corresponding solution is proposed.

In the conclusion, the best available for today FGM parameters are discussed.