

Advanced magnetic sensors with special parameters

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SUMMARY

The current state of electric and magnetic sensors parameters for field magnetotelluric instrumentation proves to be satisfactory with their acceptable noise levels.

However, in special cases, e.g., for deep and super-deep sounding (up to ~ 200-300 km, requiring long-term deployment) challenges arise due to the considerable influence of sensor tilt and temporal drift, which cannot be compensated by further processing. Also, the accelerating urbanization leads to high-level pollution by mains frequency, causing saturation in sensitive sensors. Because of the sensor saturation, filtering mains interference in loggers or by further processing becomes impossible, necessitating specialized solutions to compensate mains signal in the sensor volume to avoid saturation.

Next, today, regular BBMT application uses separate instruments for different frequency bands with their own data loggers. The modern trends in IM sensors development and the recently available broad-band high-sensitive data loggers, led to the emergence of BBMT sensors, offering extra-wide band sensitivity in one sensor. Such IMs may cover a wide frequency range, up to 160 dB with accepted sensitivity. Still, the development of the UAV technique created the necessity for both FGMs and IMs to be robust and light, offering the possibility to be transported by drone

To overcome these limitations, the original solutions were developed and implemented in flux-gate (FGM) and induction (IM) magnetometers which were successfully tested in field conditions. Some examples are given in the report.

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