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Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "The Effect of Construction Material on the Thermal Gain Dependence of a Fluxgate Magnetometer Sensor" *by* David M. Miles et al.

Anonymous Referee #2

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Following comments may be made. 1. There is said in the text that main influence on the transfer function has measuring winding, whereas it is known that main influence has feed-back winding. 2. The calibration using AC field is not new – it was proposed still in ∼ 1985 (see Yu.Afanasyev, Fluxgate sensors, 1986). 3. The tests conducted are far from exact ones: a) Temperature influence on Helmholtz coils geometry and reference signal stability are not discussed; b) It is an erroneous conclusion from the data ginen at Fig.14 about negligible influence of the room temperature on measurements precision. Even at very small change (say, 0.05 - 0.07 Đą) the output signal drift at 1 Hz was ∼ -100 ppm, what corresponds to -(1500...2000) ppm/C instability of test signal. At the given change of room temperature ∼ 2 C expected instability of

test signal can be ∼ -(3000...4000) ppm, what may considerably spoil measurements results. c) The signal amplitude is too small. The deviation in 100 ppm corresponds to the output signal deviation only at 234 nT/10000 ∼ 23 pT. 4. The possible change of the sensor orientation in thermal chamber at temperature change is not discussed. 5. There is no explanation of too high harmonic content in test signal, what may influence measurements precision. 6. The conclusion of the thermal drift value equal to about a half of thermal expansion factor of the material seems to be a partial case only for the described sensor construction. There may be several other influencing factors, would be good to discuss. The thermal drift of the compensation winding field is made only for a point in the solenoid center, what considerably differs from real sensor geometry. 7. There is a small difference of thermal factors for the sensors from macor and glass plastic, whereas the properties of these materials differ much more. Need to be explained. 8. Only one component with each material were tested what is not representative. Necessary to have statistics – as practice shows, even the properties of sensors from the same material may differ considerably. 9. The reference below cannot be reached: Miles, D. M.: Data and Source Code for: The Effect of Construction Material on the Thermal Gain Dependence of a Fluxgate Magnetometer Sensor, [online] Available from: http://dx.doi.org/10.7939/DVN/10993, 2017. We believe that these comments will be useful for authors.

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