

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

M. Moldwin (Referee)

mmoldwin@umich.edu

Received and published: 16 May 2017

This paper describes a systematic test on the thermal properties of material used for the base and bobbins to hold wire windings for fluxgate magnetometers. It is inspired by a desire to find a replacement for MACOR ceramic that is very difficult to machine. MACOR was used in many early magnetometers especially those from Acuna/NASA-GSFC. The paper is a good reference for not only validating the use of PEEK for the sensor housing, but also provides in the appendix useful material that was previously found in a difficult to find Report.

(1) Title. Suggest replacing “Construction” with “sensor housing” or “winding and core support” or some other words to describe what the material is used

C1

for “Bobbin and Winding Support”? (2) Line 10, add a comma before “but” (3) Page 2, Line 25, the Ukrainian’s have looked at the temperature dependence of material (including MACRON) on fluxgate gain though they don’t publish in easy to find journals. KOREPANOV, V. and MARUSENKOV, A.: Modern fluxgate magnetometers design, International Conference on Magnetism, Geomagnetism and Biomagnetism : Conference Proceedings, Sezana, 2008. p. 31-36. http://www.viviss.si/download/viviss/ZBORNIK%20MGB/Korepanov_paper_31_36.pdf (4) Page 2, Line 33. Though the sensor housing material is not explicitly named in publications, UCLA’s fluxgate magnetometers have used Lexan (DSX) and have moved to PEEK. Mark B. Moldwin, “Vector Fluxgate Magnetometer (VMAG) Development for DSX,” UCLA, Final Report, June 3, 2010, URL: <http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA529004> for exactly the reasons described in this research article (cost, ease of machining, and good thermal behavior). (5) Page 8, Line 5, “Reference values...” (6) Page 11, Line 20, to be consistent with British English Spelling used throughout “Characterised” (7) Page 12, Line 12. To be consistent, use SI (or at least mm/cm) as used in other dimensions in text instead of symbol for inch. (8) Figure 11. What reasons have you eliminated for the large amplitude harmonics at 2, 3, and 4 Hz seen in the data? Is there a mismatch in the driver circuit that isn’t exactly tuned to give 1 Hz signals? (9) Figure 13, Are there any other potential explanations of the Y offsets of the different trials? Any simple tests that you can do? Is the alignment of the Helmholtz coils thought to be due to a temperature effect? Do you get similar variations of off-set without the thermal test set up? (10) Page 23, Line 17, “Data are...” (11) Page 30, Line 16 “localised” (12) Page 31, Line 8, “PEEK”

Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., doi:10.5194/gi-2017-32, 2017.

C2