

Response to Interactive comment RC1 on gi-2021-30 - "Contributors to Fluxgate Magnetic Noise in Permalloy Foils Including a Potential New Copper Alloy Regime" by David M. Miles et al. by Dave Sheppard on 30 Nov 2021

*We thank the referee for the constructive comments which we have incorporated into the manuscript. Dave Sheppard raised an important issue, which we address below. Referee comments are in plain text our responses in italics and any content added to or changed in the manuscript are in "quoted italics"*

This work is important and relevant to the field of magnetometry. The new copper alloy is novel and builds upon work done many decades ago. The direct comparison with the research standard 1" ring core permalloy sensors is useful in evaluation of the materials. The construction and evaluation of the material is well described in this paper. That is unique in that work done several decades ago on this topic was either not well described or not published in unclassified documentation. This is a good reference for fluxgate materials going forward.

The paper is clear and well written. The plots and diagrams are appropriate and well done. The references are good.

One small comment: On line 126, we read "e quasi-toroidal drive windings are time-consuming to apply, but the closed flux path of the racetrack should reduce stray fields and offsets error compared to traditional parallel rod sensors" However, there are neither measurements nor references used to support this statement. Additionally, the racetrack is compared to parallel rods here, but in the rest of the paper, the racetrack topology is compared to ring cores. This section is potentially improved by citing offset measurements, providing reference(s), and/or comparing the racetrack versus ring core topologies, as is done in the remainder of the document, in place of the parallel rods.

*Our intention here was to explain one of the reasons why the racetrack geometry was selected for experimentation rather than to assert results beyond the scope of this manuscript. We have rephrased this section to make this clear and added relevant references.*

*Change made. Text now reads:*

*"The quasi-toroidal drive windings are time-consuming to apply; however, some literature (e.g. Janosek, 2017) suggests that the closed flux path of the racetrack may reduce magnetic noise, stray fields, and offsets error compared to traditional parallel rod sensors by avoiding the presence of an un-saturated or weakly saturated end region (e.g., Moldovanu et al., 2000) and this will be examined in future work."*

This is a good work and I look forward to following this research in the future. It is both important and relevant to the field of fluxgate magnetometry.