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Comment on gi-2021-19

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Community comment on "A towed magnetic gradiometer array for rapid, detailed imaging of utility, geological, and archaeological targets" by M. Andy Kass et al., Geosci. Instrum. Method. Data Syst. Discuss., <https://doi.org/10.5194/gi-2021-19-CC1>, 2021

40 I would not say that 8nTm is low.

40: What's the advantage of using fluxgates for a ground towed system where battery power is basically unlimited? Also, fluxgates do generally not have low noise compared to total field sensors. According to Bartington, the Grad13 has 20pTrms/sqrt(Hz)/m at 1Hz. This is a fairly high noise level, even at 1Hz. What's the sensor noise level when sampling at the sampling frequency indented for the tMag system (230Hz)?

50: what's the resolution and precision of the IMU controlling the exact orientation of the fluxgates? Just a very small angle error, generates high errors in the vector components. (I see that you have some discussion about this later in the ms, but it may be good to put some of it here)

70: I agree that the fluxgates are more robust. But e.g. the Ceasium MFAM mag of Geometrics has 1000Hz sampling and the Rubium vapour QTFM of QuSpin has 200Hz – both using 1-2W. So I do not agree on this statement about vastly higher sampling rate. Also: What do you need e.g. 230Hz for? Driving at maybe 5m/s, you would need only 20 Hz or so in order to properly sample even small subsurface features.

70: It would be nice to know how exactly the gradiometers are mounted and how that turns into error of the vector components of the field. Plus the error from the IMU.

90: Is 1m not too much for e.g. archaeology? I would use 0.5m. You risk not getting the true gradient.

100: According to Fig. 1, the GPS antennas are just next to the gradiometers. I don't understand why. Even small antennas (and these are fairly big) generate a magnetic noise signal.

115: As mentioned above, the battery power is not a limitation in this system and hence not an argument for using fluxgates

130: This is for total field measurements. For gradients, it should be 1:1