

Geosci. Instrum. Method. Data Syst. Discuss., referee comment RC1
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Comment on gi-2021-19

Anonymous Referee #1

Referee 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-RC1>, 2021

Thanks for a well-written article. It's clear that you have put a lot of work into the system, which has paid off.

Line 43; You state that the system differs from other systems in two ways; towing design and fluxgate magnetometers.

I did find other systems using fluxgate; for example, Bartington instruments offer a solution (<https://www.bartington.com/archaeology-forensics/>), which also use the same magnetometers as you do.

Concerning the towing design, do you find your design superior to other system designs like the Bartington "Non-Magnetic Cart"?

Line 46: Low noise compared to what?

Line 71: Cesium is only one kind of vapour used for optically pumped magnetometers. You could use "alkali vapor" instead to include all types of optically pumped magnetometers using vapour.

Line 90: What is the argument for using the 1m fluxgate separation? I would expect archaeological structures to be relatively shallow targets.

Figure 1(a): both the IMU and the two antennas are relatively close to the magnetometers; this may cause some magnetic distribution. Furthermore, wires are passing close to the sensors. Since you don't mention it, I assume it's not an issue but have you tested/measured it?

Figure5(a); It is hard to differentiate between the colours. It would be more informative if you came with an estimate of how low a degree you need.

Line 244: 2000nT at 6 degree.

Line 315: I'm rather confused about your noise estimate. Is it 6nT/m or 8nT/m (line 42, 62 and 347)? Do you define your noise floor as one standard deviation? And how do you calculate the noise of the total vertical gradient [nT/m]?

Line 328: What accuracy and resolution of an IMU would be sufficient for your

application?