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Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "Magnetic interference mapping of four types of unmanned aircraft systems intended for aeromagnetic surveying" *by* Loughlin E. Tuck et al.

Anonymous Referee #1

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Reviewer comments in yellow:

General comments: I think it's critical that the author clearly states what's actually new in this study – except for just mapping four drones. The scanner has already been used in a recent study. Also, other studies have already carried out this semi-automatic mapping of drones. So I don't really see any critical new information in this study. To be honest, this study seems to me like a fast publication in mind - but without spending proper time on providing a new method or interesting new results. Please re-think this study accordingly. Also, the Discussion needs to be far more substantial that what is presented. If the method and approach is new, the authors should be able

to properly discuss pros and cons of the system against other studies etc. as well as improvements.

Line 131: How do you filter way 60Hz background noise when mapping with much lower frequency using a GSMP35U magnetometer?

Line 155: Does this imply that the minimum noise level of any data collected over a drone is 4.2-1.1 nT? Why not carry out these measurements in the open and remove this source of noise?

160: Is it not possible to fixate the TF mag to a rod instead to remove any swaying error?

265: You map 30cm above the UAS but typically a magnetometer is just below the center of gravity. Would you then downward continue the anomaly map, to what level (if staying above the sources according to field theory) and what about the noise when downward continuing. I can't really see how a single map 30cm above the UAS provides the full answer – at least not if the ultimate goal is to achieve industry standard noise levels well below 1nT, which is needed if drones are to be used extensively.

Comments related to the method presented: o Line 160: Pendulum swing of the TF magnetometer is mention and justified by air turbulence. At such reduced travelling speeds, the aerodynamics should be negligible. The swing movement could be better described, is it perpendicular or parallel to the rail/track? Other reasons for the swing could be lack of rigidity of the set-up, the accelerations on the beginning of each line or even the amplification of motor vibrations. This could be a possible improvement on the set-up. o Line 165: Is there information loss with the application of a 0.25Hz cutting frequency filter to the data? Was the high frequency signal also present in the background lines? As the goal is to map as accurately as possible each UAV one could consider attempting to further improve the grid and reduce the need of filtering the data. o General: the GSMP-35 has the capability of sampling at 20Hz. Why was such capability not employed? o Line 209: The study/map of the SRH does not add

valuable information to the publication. So I would consider not including it. A possible way to load the engine could be the addition of a low radius drag blades just to load the motor, resulting in a more meaningful current and mapping. o Line 118: Why were two step motor used when there is only movement along one rail? Could this be simplified with the use of a single motor? Other comments o Line 217 and 226: How do the 10A and 5A current used for the standard test relate with the real operation of the UAV. It could be nice to mention how these relate to flying conditions, e.g. is 10A hovering with a specific payload? is 5A half throttle in leveled flight? o General UAV: I understand that the main focus of the publication is the method description but it could be nice to have some further details on the UAVs used. Such as weight, payloads, location of the diverse components on each UAV. This would add on the previous point about the current load. o Line 206: Could there be a confusion regarding with "Flaperons and Ailerons"? In common UAV with two actuators on each wing they are used as "Flaps and Ailerons". I would be surprised if the actuators near the root of the wing are used as Flaperons in addition to the ailerons for roll actuation. o General: Specifically for the FW UAV it could be interesting to explore additional variables in the future, such as aileron, flap, elevator and rudder deflections. For a FW UAV these are permanently being adjusted during flight. In a wing tip magnetometer setup the ailerons are the closest actuator, it is therefore interesting to understand how such deflections change the UAV signature.

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