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Reply on RC2

Zhijian Zhou et al.

Author comment on "Analysis and reduction of the geomagnetic gradient influence on aeromagnetic compensation in a towed bird" by Zhijian Zhou et al., Geosci. Instrum. Method. Data Syst. Discuss., <https://doi.org/10.5194/gi-2021-15-AC2>, 2021

Thanks for your comment.

The title should be reformulated –(analysis and reduction?)

Title changed: Analyze and reduction the influence of geomagnetic gradient on aeromagnetic compensation in a towed bird

L.39 "The traditional fixed-wing platform produces interference from the helicopter platform" – unclear statement.

This sentence was deleted.

L.43-44 "The geomagnetic gradient changes greatly in the large swing mode"- How large is a swing? A few meters? Does geomagnetic gradient change noticeably along this distance? Explanations are needed.

The swing amplitude is 10 meters. The geomagnetic gradient is 0.5nT/m, I will re-explain it in the data introduction below.

L.61 "other factors in the swing process." What do you mean?

The imperfections of this sentence have been changed.

L.83 "fixed-wing interference is generated by the helicopter platform." –This is in contradiction with your statement in L. 56 "The interference generated by the helicopter in the towed bird is small and .. can be ignored".

This paper uses the towed bird system. The sensor is 30 meters away from the helicopter, so the interference from the helicopter can be ignored. For fixed-wing aircraft platforms,

the sensors are fixed on the aircraft, so fixed-wing interference is generated by the helicopter platform.

L.103-104 "is the aeromagnetic interference feature." – u is the combination of direction cosines and their derivatives. – Should be reformulated.

Changed this sentence □ u is the the aeromagnetic interference feature, which is the combination of direction cosines and their derivatives.

L.130 "helicopter towed bird system has a large change range" – What range? How large? Unclear!

During the movement, the swing distance is 10 meters. Because the geomagnetic gradient is 0.5nT/m, the geomagnetic gradient cannot be ignored.

L.140 "The filtered horizontal geomagnetic field obtained through band-pass filter processing is as follows" – Optical pumping magnetometer is a total field instrument. It does NOT measure horizontal component of geomagnetic field.

The horizontal geomagnetic field is obtained through latitude and longitude modeling. It is not measured by an optical pump magnetometer.

L.179 –" aeromagnetic interference and the geomagnetic field can be linearly superimposed" -However in L.38 you mentioned "there is a strong coupling relationship between the geomagnetic field and magnetic interference"

The T-L model considers the geomagnetic field to be constant, which is obtained by linear superposition. In reality, the geomagnetic field changes, so there is a coupling relationship between the geomagnetic field and magnetic interference. This paper addresses the influence of changing geomagnetic field on aeromagnetic interference.

L.183-184 "Because of the small aeromagnetic interference generated by the bird, the geomagnetic gradient is larger and the geomagnetic gradient changes little before and after compensation"- Unclear! Larger than what is geomagnetic gradient?

The maximum difference of the geomagnetic field gradient is 250nT in figure 4(b), and the geomagnetic field gradient changes very little before and after compensation, while the aeromagnetic interference value is only 5nT. Therefore, this paper uses a 0.03Hz high-pass filter to obtain the aeromagnetic interference value, and evaluates the improvement ratio of the standard deviation before and after compensation.

L.210-215 Why there is a difference in south and west flight directions relative to north and east?

I have not found any comparison of Tolles Lawson coefficients obtained by means of suggested method relative to standard procedure. Does this new technique make sense?

Since this paper uses a helicopter pod system, it is affected differently by wind in different directions. When flying northward, the swing is less affected by the wind, so the compensation effect is better. When $N=0$, it is the traditional T-L model. This paper compares the solution with the traditional T-L model in Figure 6. Although the improvement ratio has only increased by 6%, I believe it is an improvement in aeromagnetic compensation.

Quality of English language is poor.

Thank you for your comments, I re-written the paper.