

Interactive comment on “Solving the orientation problem for an automatic magnetic observatory” by A. Khokhlov et al.

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The referee has made a few comments, the major ones relate to:

The authors' conclusion that following a calibration as outlined, an observatory can operate as an automatic observatory fitting INTERMAGNET standards for time scales of years is theoretically demonstrated in the paper (albeit to a 2nT accuracy rather than the 1nT stated in the abstract), under the simulated conditions set out in the paper. The practical problems of operating an absolute magnetic observatory – stabilising instrument and environment parameters – are only lightly discussed yet are known to significantly influence absolute data accuracy. The effect of assumptions made by the authors, such as an accurate internal calibration, on the proposed calibration process

C183

are not quantified in the paper although these are non-trivial problems for the typical variometers (i.e. non full-field magnetometers) employed at the majority of absolute magnetic observatories currently in operation. It is not clear whether statements such as 'this error ... is a direct function of the errors on the absolute measurements' (line 341:10) can be made when no other errors are considered. For example, what would be the consequence if the equality in line 343:9 was invalid or if $V(t)$ in Eq. (3) had an error term?

The comment refers again to some other errors, not considered here. As we already indicated, a statement has been introduced in the manuscript to cover this topic.

The authors' remark on the requirement of long-term accuracy over short-term accuracy for specific application (line 449:20) is acknowledged, although this and the 99% rule in line 349:2 are not in line with the current INTERMAGNET standards referenced in the paper.

The referee is right, and the current INTERMAGNET standards have been introduced.

The 15 recommendations for minor corrections have been considered, the large part of them being implemented. Some of them need some extra comments.

2. Indeed, the physical components V are error-free. But like f'_j_k (which are V values, but specifically relative to the calibration process, associated with \vec{B}_k calibration triplets. We can then use V instead of \hat{V} , like the f'_j_k and \hat{f}'_j_k .

8. Indeed, Figure 3 is a plot of the average and absolute errors $|V'-V|$ computed on each set of configurations ($\vec{B}'_k \times \vec{v}$) for each value of the 1441 calibration triplets \vec{B}_k . He is also right in which follows: in the line 21-22 page 346, ΔB is to be replaced by ΔV . This typo error was quite regrettable and confusing. We thank the referee for the deep reading of our manuscript.

11. This is a nice idea to plotting the results as cumulative distributions. However, in this manuscript we prefer to keep this representation which we have found more elegant.

C184

