

We would like to thank the reviewer for the helpful comments.

The paper by Matsushita et al, "The azimuth observation by GNSS: A case study at Kakioka" is an interesting read. The text is generally easy to follow, and the language is clear. I do not have a background in magnetic observatories, so I can not adequately comment on the novelty of the research. My recommendation is publication following a minor revision.

1. In the title, I suggest that the authors spell out GNSS, so it is immediately clear to all readers, including those outside the magnetic observatory community, what this paper is about by reading the title.

Response:

We agree and are considering the title, "The azimuth observation by Global Navigation Satellite Systems as an alternative to astronomical method: A case study at Kakioka"

2. The introduction is a bit short, and the manuscript contains a very limited number of references. As such, this is not an issue, but I suggest that the author consider expanding the introduction with one or two more paragraphs with background, e.g., the issues that led to this research must likely also be issues at other laboratories.

Response:

We agree with your suggestion and would like to add paragraphs introducing the sunshot method, which uses the sun instead of Polaris. While the sunshot method is also commonly used, it is difficult to apply in the environment of this study.

3. It's a minor issue, but the schematic diagram in figure 1 is not really matched to the actual layout in figure 1. Could the schematic diagram be "twisted" a bit to make the resemblance more intuitive?

Response:

We understood your comment to be pointing out "the schematic diagram in figure 2", not figure 1. We will modify the schematic diagram as follows at the next revision.

4. Figure 4 contains some clear outliers where the signal systematically jumps several arcseconds back and forth. It would be appropriate to include a discussion of the origin of these outliers and how they are handled, e.g., personally, I would be tempted to cull outliers.

Response:

We will include the discussion of these outliers in Section 2.2. Outliers are basically caused by changes in the number of satellites. These outliers are excluded from the calculations. Since they are few in number and not very large, however, they have little effect on the results.

5. The authors find a systematic difference between Polaris observations and GNSS observations. It is suggested that Deflection of the Vertical (DoV) is the main reason for this, and convincing arguments are made. However, it would be appropriate to include a short discussion of any other potential sources for a systematic difference.

Response:

Another potential source is misalignment of the GNSS installation. I would like to include a brief discussion of this topic in Section 3.

6. In the summary of the manuscript, it is not really clear, but still implicitly suggested that JMA is moving towards GNSS based azimuth observations. It would be interesting for the readers to learn a bit more here. Has a decision been made and if so, how will the systematic difference be handled?

Response:

Actually, the decision has not been made since we think the GNSS observation should be performed at also Kanoya and Memambetsu, where the different DoV is assumed. Now that we have gained insight to the azimuth observation by GNSS through this study, we believe we are at the next stage of applying it in Kanoya and Memambetsu.

However, we are glad to provide readers with information about our current situation if they find it helpful. Therefore, we will add an explanation of our future plans to the summary.