

Dear reviewer,

I am really grateful for your numerous hints to unclear or mistakable wordings, verbal errors, typos and errors in equations! I tried to follow all your hints and advise. I hope this led to a substantial improvement of the paper.

I added a section, explaining how error bars are calculated and I corrected and completed the section about base line determination.

The abstract has been reduced.

Your major concerns were:

- 1) The instrument model is too simple and should include other parameters than misalignment errors and sensor offset.

Replay: Of course, implementing the instrument model suggests including more than the three mentioned parameters. But that is not the scope of our paper. In the first place we wanted to generalize the set of used theodolite orientations. But yes, extending the data set to more orientations, distributed denser on the horizontal scale allows revealing effects of imperfectness not accounted for in the model. The most obvious one is certainly an instrument which is not leveled properly.

- 2) The advantage of the conventional scheme is, that the value of D is deduced from a set of 4 equations, while I is deduced from another set of 4 (virtually) independent equations.

Replay: Is it really an advantage to separately solve two systems of four equations each? All information to be drawn out off differing results of both evaluations (D or instrument parameters) can also be seen investigating the residues of a common inversion. The result is even firmer determined, because only five instead of seven unknowns have to be calculated (seven because, I and δ are calculated twice). Accordingly, also the residues contain more

information. The first test we made, was of course applying the method to conventionally measured data. We got the same results as from the conventional scheme, but slightly firmer determined.

- 3) We mentioned now in the Introduction, that we do not aim to extend the simulated physics of a DI-theodolite. We only want to allow for the generalization using orientations off the traditional ones.

All your other hints to typos and errors were taken into concern. They have been corrected or led to a hopefully better formulation.

I hope I covered all your other concerns and apologize for the long time needed. Your contribution is really appreciated! It would be great if you could also contribute to the open discussion.

With best regards,

Heinz-Peter Brunke