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Geoscientific Instrumentation Methods and Data Systems
Discussions

Interactive comment on "A new high-precision and low-power GNSS receiver for long-term installations in remote areas" *by* D. H. Jones et al.

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The authors discuss a helpful development toward improved reliability of long-term GNSS measurements in polar regions. Their hardware developments offer some benefits over and above existing receiver systems, although there are some disadvantages. it is really important the community can access more reliable polar instruments - upgradable, low power, ability to use with satellite communications, including data download. It is important we make some progress and the authors authors make some important gains on some of these fronts.

The key weakness of the developed hardware is that firmware upgrades cannot be done remotely. This is in contrast to network enabled receivers from the major manu-

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facturers like Trimble and Leica. This weakness needs to be discussed especially as the authors already note that changes in constellations in the past have caused receivers to stop tracking and need firmware upgrades. Likewise, I don't think the MB100 can take, for example, a meteolrogical data feed, a common feature of GPS stations as met data is important for some GPS data analysis (particularly of troposphere water vapour). So the proposed instrument is marked down in those regards, while being marked up on power (noting the points below).

The receiver power consumption comparison is based on manufacturer specifications. This is problematic since the power depends on the antenna the receiver is connected to. I think this should be replaced with actual measured power with the same antenna. It may require a different set of receivers. See various UNAVCO receiver test reports.

The positioning tests are, to me, problematic. Comparing baseline time series between identical receivers vs non-identical is the key here. The authors note this, but I think the tests are sufficiently suspect to not add anything but confusion. Differencing data treated identically (by identical receivers) will produce smaller baseline noise. That does not mean that the positioning is more accurate. That can only be established by comparing to a truth. Likewise precision improvements cannot be established without doing the same tests for other pairs of instruments.

The positioning tests are not actually a test of the Ubi, but of the GPS receiver in the Ubi. That should be made clear by changing the terminology to Ashtech MB100.

Different receivers do different things with the pseudorange, including using the carrier phase to smooth the pseudoranges, including between observation correlations and temporal correlations in the pseudorange. As such, positioning solutions will generate different residuals depending on how this smoothing was done and how the relative weighting of range and phase are done in the PPP solutions. This makes comparison of residuals between receivers quite challenging. Double differenced phase residuals, in which pseudoranges are not used, are a better measure in this regard as pseudo-

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ranges are not used in the positioning (only the integer ambiguity fixing). That would require using a different software, but any commercial software or Bernese would allow these residuals to be generated.

L5: I think the authors mean precise rather than accurate, but I question the tests below

L7: *of* those L8: to *be* L10: "long-term monitoring ... is a powerful tool" does not make sense L13: *m*ovements

P287L7: It may be helpful to quantify the scale/weight of the "not insignificant" hardware. L11: and Greenland (Bevis et al 2014 PNAS - and other GPS papers from Greenland) P288L8: "accurate" L10: the remote firmware upgrade is a requirement but is not met. P289L8: accuracy -> precision

P290L10: it would be helpful to say whay you may track at 300s sampling (I think this would be a very bad idea; 60s at worst)

P291L1: Ashtec*h* L3: it is worth noting that many of the ANET sites have had maintenance visits simply because teh Iridium failed. UNAVCO could provide a pers. comm. on the frequency of such failures. L16: were these values actually measured? which antenna make and model was connected? please add the power for the controller, LED, the iridium (when standby and operating)

P293L8: GIPSY does not use double differences. It is an undifferenced solution, as are all PPP solutions L12 "the uncertainty of a position calculation" - English - but the meaning is not right either - it's a measure of the noise of the observations. L19: GIPSY not GYPSY L25: malfunctioning

P294L1: "with various"

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