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Atmospheric Measurement Techniques Discussions

Interactive comment on "A low-cost mobile multidisciplinary measurement platform for monitoring geophysical parameters" *by* Olivier F. C. den Ouden et al.

Anonymous Referee #1

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Summary:

This paper describes the design, calibration results, and initial testing of a small instrument that has the capability to measure multiple variables, with an emphasis on infrasound. Overall, the manuscript was well-written and easy to read, though there are a few typos throughout (some are pointed out below). The subject matter is generally appropriate for the AMT journal and the topic is practical and interesting. Since this work is being presented to an atmospheric-leaning audience, I have a few suggestions in the "General Comments" below which I think should be addressed prior to publication of this work. It seems like some of the measurements are not quite as high-

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quality as one would like (especially the wind sensor, see comments below); however, I appreciate the honest assessment of the measurements by the authors.

General Comments:

1. In the title, the words "geophysical parameters" are vague. Since the centerpiece of the instrument package is the infrasound portion, it seems like it would be appropriate to have "infrasound" included in the title. Something like:

"A low-cost mobile multidisciplinary measurement platform for monitoring infrasound"

2. Since you have submitted this to a journal which emphasizes atmospheric measurements, it seems appropriate to have some discussion about the inlet port used to obtain the (static) pressure. Though the wind/turbulence in this study is considered “wind-noise” (i.e., p.3, l.80; p.15, l.345-346; p.16, l.363-365), there has been quite a bit of work on static-pressure inlet ports which are not mentioned or considered. Perhaps this is a case where "one’s persons noise, is another persons signal"; however, I think that the so-called noise is primarily due to dynamic-pressure effects on the port where the pressure is sensed. In the atmospheric community this has typically been dealt with by using a port which reduces the effect of dynamic pressure on the sensed static pressure. such as the Nishiyama-Bedard quad-disk. For examples, see work by Nishayama, 1991; Wilczak, 2004; and Zhang 2011. There is also a paper in review by Burns 2021 (which may not yet be available), but has related information. For example, the inlet port would be an important consideration, when the sensor is deployed on a tower. I would appreciate some comment and/or insight into whether the inlet port is considered important (or not) for the infrasound-logger.

3. In the atmospheric flux community, 3D wind is usually measured with sonic anemometers. Some of these have become quite small, e.g., the TriSonica:

https://www.apptech.com/products/ultrasonic-anemometers/trisonica-mini/

Was this type of technology ever considered for measuring wind with the infra-

sound logger? This could eliminate the need to generate heat to measure the wind. Also, to deploy the wind sensor on the infrasound-logger means the entire instrument/enclosure needs to be mounted outside at the location where the wind is measured—is that correct? If so, does the box itself present an issue due to distortion of the wind? The ability to displace the wind sensing element away from the infrasound logger box has some practical advantages (and it's unclear if this is possible with the current setup). To convince me that the wind sensor is actually useful, I think a data comparison between the infrasound logger wind speed and direction with a standard wind sensor (in the real atmosphere, outside of a wind tunnel) should be included in the manuscript.

4. The infrasound logger has 64 mb flash memory for data storage (p.5, l.115). What is the typical sample rate used to collect data (based on Fig. 4, looks to be around 100 samples/sec)?....how long can it run unattended without filling up the 64 mb flash memory? Are there communication capabilities (e.g., WIFI, network port, etc)? How do you get data off of it? Is there any custom software (which language) used to make everything work? Can some of these details be described?

Specific Comments:

* was the EGU journal, "Geoscientific Instrumentation, Methods and Data Systems" considered as a publication option?

* p.2, l.54, "...short-term and now-casting weather forecasts." include a reference?

* p.5, l.108, "...either be done..." fix typo.

* p.5, l.113, "build-in" should be built-in. "bite" should be either "byte" or "bit"?

* p.15, l.329, what is a "high-frequency shroud"? Is there a reason you need an acronym (HF?) for it? Is it only on the Hyperion sensor inlet and not the mini-MB inlet?

* p.15, l.337-338, why does a bias +/- deviations in dB convert to something that has

only +/- deviations in Pa?

* p.16, l.366, the -5/3 slope is not really "noise", it is related the cascade of turbulent energy (see George, 1984; Zhang, 2011 for details).

* p.14, l.321, p.15, l.341; I don't quite follow what the 12-bit dynamic range effects on the high-freq spectra are....comparing Fig 4a and 4b, the peaks in the Hyperion spectra for f >10 Hz) are due to the limits of the 14-bit ADC on the mini-MB? If a 24-bit ADC was used with the mini-MB would it fix this issue? What is the cause of the high-freq peaks in the Hyperion spectra? Are these real infrasound phenomena that the mini-MB is missing?

* p.16, l.348, it was mentioned a few times that (air) temperature is important, but the sensor does not measure this (or humidity). These seem like important atmospheric variables that are missing from the sensor package...

* p.18, l.297, define ANSYS?

* p.18, l.400, The atmosphere is turbulent. It sounds like this is an issue.

* p.18, l.417, "..different angles with respect to the air flow." Does this mean the yaw angle was varied? What about the pitch angle?

* p.21, l.480, "..phase (Figure 4." missing closing parenthesis.

* p.22, l.516, "adjust" should be "adjusted".

* Fig. 4, the caption states, "dotted lines", but do you mean dashed lines? Also, in panel (a), the horizontal gray dashed lines should be explained.

* Many words in the references need capital letters (needs to be fixed)

Related References:

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