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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical note: GUARD – An automated fluid sampler preventing sample alteration by contamination, evaporation and gas exchange, suitable for remote areas and harsh conditions" *by* Arno Hartmann et al.

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Hartmann et al. present an automatic battery-operated sampler that takes water samples at pre-programmed time intervals and seals them to prevent atmospheric contact. The suggested method, i.e., the injection of water with a double-cannula into septum-sealed vials (arranged in an X-Y-grid), is rather elegant. Additionally, the number of vials (currently 48, but up to 160) is substantial. Hence, I share the authors' view that the presented device has great potential in hydrology, which warrants publication in HESS.

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Nevertheless, there are a few minor points that I would like to mention:

The authors emphasize several times that available autosamplers do not seal collected samples (e.g., page 2, line 13-14; page 2, line 32-33) and selected one commercial device for comparison. Indeed, this sampler (ISCO 3700C Compact) does not prevent atmospheric contact. However, autosamplers that are capable of sealing samples after collection do exist. The following list might not be complete, but these are devices I have stumbled upon in the course of my own literature review (disclaimer: I am currently involved in the design and testing of an automatic rain collector):

1. OPEnSampler by OPEnS Lab (http://www.open-sensing.org/opensampler/; see review by Rolf Hut)

2. Lisa Liquidsampler by Lukas Neuhaus (https://www.liquidsampler.de/)

3. Sequential, time-integrating precipitation collector by Coplen et al. (2008; see Supporting Information)

The first two devices have apparently not been formally published and the second website is currently only available in German. Although it may be quite easy to miss these models in a literature review, they do exist and I would like to suggest that they be mentioned in the paper for the sake of completeness. Including them will not diminish the value of the authors' contribution. Although there are a few other devices (with somewhat different specifications), the sampler by Hartmann et al. is still a useful addition to those already in existence, particularly if presented in a way that enables reproduction (see review by Rolf Hut).

Additionally, the section on potential applications attracted my attention. I am a bit confused about the authors' idea to use their sampler in the Global Network of Isotopes in Precipitation (GNIP; see Section 5). Currently, it sounds as if they suggest replacing the current cumulative collectors with their automatic sampler. As far as I know, the main aim of GNIP is to collect integral samples, i.e., samples that represent the entire

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precipitation occurring during the collection period (usually a month). The samples are then routinely analyzed for δ18O, δ2H, and partly 3H. I am not sure how this could be achieved with the model described in the manuscript. In the current setup, one "collected sample represents the water under investigation at a given instant (integrated over 22 seconds)" (page 4, line 15-16). Maybe the authors could provide more details on the potential deployment as part of GNIP. Would they still use a peristaltic pump or would the rainwater flow into the vials by gravity? Would they use the same vial number (48) and size (12 mL)? How would they approach programming collection intervals, without knowing when it will rain? Could their sampler also be used at GNIP sites exhibiting harsh conditions (i.e., a warm and arid climate)? Alternatively, the authors could phrase their idea more carefully, for example by suggesting the addition of their device to the cumulative collectors at GNIP stations (instead of replacing them).

I hope these minor comments are helpful and perhaps contribute to further improvement of the manuscript, which is already a good contribution in presenting a useful automatic sampler.

Best regards,

Nils Michelsen

References: Coplen, T. B., Neiman, P. J., White, A. B., Landwehr, J. M., Ralph, M., and Dettinger, M. D.: Extreme changes in stable hydrogen isotopes and precipitation characteristics in a landfalling Pacific storm, Geophys. Res. Lett., 35, L21808, 2008.

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