

***Interactive comment on* “Technical note: A microcontroller-based automatic rain sampler for stable isotope studies” by N. Michelsen et al.**

N. Michelsen et al.

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Dear Dr. Hut,

Thank you very much for your thoughtful comments on our manuscript. Please find below your reproduced comments, followed by our responses.

COMMENT: I've read the paper “Technical note: A microcontroller-based automatic rain sampler for stable isotope studies” with great interest. I think it is highly relevant for the readership of HESS and recommend publishing it. I only have a minor suggestion that could (hopefully) make the article even more useful to the hydrological community.

RESPONSE: Thank you for this positive and motivating evaluation. We are confident that your suggestions indeed improved our manuscript.

COMMENT: On reproducibility: I applaud that the authors make their design completely open so the community can reproduce it for their own work. However, I have two issues with the way the material is presented. Firstly, providing a Bill of Materials, technical drawings, software and even an operation manual might not be enough for hydrologist to be able to re-produce the work of the authors. I would strongly recommend to add a “build guide” document to the (impressive) list of documents that the authors already provide. This build guide would detail, step by step, how to construct the sampler. For example, currently it is unclear what fabrication techniques to use in construction of the sampler. I recommend using a site like instructables.com for their comprehensive format and exporting the resulting instructable as a pdf.

RESPONSE: We agree that the assembly of the collector parts is not fully self-explanatory and that a build guide is a useful addition to the material included in our initial submission. Hence, we have compiled such a build guide (see attached file) and hope that it will facilitate the construction for others.

COMMENT: On archiving: Given the target of the authors “to enable reproduction” and the general nature of institute website designs (and corresponding URLs) to change every season, I would not advice to use an institute website as the main repository for the results of this work. I strongly urge the authors to make all material currently available on <https://www.ufz.de/index.php?en=44048> (and the requested build guide, see above) available - as supplementary material to this publication - or publish it on Github and create a DOI through Zenodo

RESPONSE: We now include all mentioned material in the supplement of the paper (instead of using github) to ensure that interested readers can obtain the paper and all related data from a single source. That said, we will maintain the initially mentioned website (<https://www.ufz.de/index.php?en=44048>) – not as an exclusive primary data source, but to announce updates, new developments, etc. As we have been contacted and asked for 3D files (for 3D printing of selected parts), we now also provide .stl files in the supplement.

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Discussion paper



COMMENT: on code, power consumption and re-usability: I understand the choice for C as a language to program the microcontroller, given the need for low power consumption. I've briefly scanned the code and it is well documented. I particularly like that the section on event based sampling instead of time based sampling is already present, but commented out for now. The C language however has a steep learning curve. Many hydrologist that work in making sensor systems use the Arduino ecosystem for that reason. Since controlling a stepper-motor is the main action on the sampler, I believe that this could be achieved in the Arduino eco-system, at the cost of greater power consumption. Since there is ample room for a solar panel on top of the sampler, low power might not always be the main concern. I would like to ask the authors to add a sentence or two that the functionality of the sampler could be achieved with parts from the Arduino eco-system as well, although at the cost of greater power consumption. Concluding, I really like the work presented, recommend it for publication in HESS with only a few minor changes suggested.

RESPONSE: We also have the impression that Arduino microcontrollers are rather popular in the community. Hence, we followed your suggestion and added the following sentence in section 5 (Potential modifications): "Although we used a Texas Instruments microcontroller, we can imagine that the functionality of the sampler could also be achieved with parts from the popular Arduino ecosystem, though probably at the cost of greater power consumption."

Best regards, Nils Michelsen (on behalf of the author team)

Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2019-93/hess-2019-93-AC2-supplement.pdf>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-93>, 2019.