

Interactive Discussion: Author Response to Referee #1

Brief Communication: A new drought monitoring network in the state of Brandenburg (Germany) using cosmic-ray neutron sensing

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RC: *Reviewer Comment*, **AR:** *Author Response*, Manuscript text

Dear madam or sir,

thank you very much for your referee report, and for the time and effort you spent to examine the manuscript.

We understand your concerns, will try to address them in a revised version of the manuscript. At the same time, we hope that this response can contribute to a better understanding of the context and scope of the Brief Communication manuscript. Please find both your comments and our responses below in a point-by-point reply.

Thanks again for your feedback and your support of this process.

Kind regards,

Maik Heistermann (on behalf of the author team)

RC: *The Authors present a very relevant and interesting initiative to establish an operational ground-based long-term soil moisture monitoring based on cosmic-ray neutron sensors (CRNS). Nine locations and around six months of data are presented. Comparisons with the soil moisture simulated by the agro-hydrological model SWAP are also reported. The manuscript reads well and clear. The preliminary results are meaningful and the discussion fair. Personally, I believe that the main contribution of this initiative is (L39) to bring together a consortium of research institutions and state agencies for establishing a long-term monitoring. And I would congratulate with the Authors for such an effort in moving CRNS research activities towards long term operational monitoring.*

AR: Thank you so far...

RC: *But back to the manuscript, it reads like an internal report of current status of the initiative and I'm not convinced that is worth a publication. I admit that this bold statement starts from the wish to read novelty in scientific papers and to not consider pure tech-transfer project innovative. In questioning my self-position, I made two actions. First, I look at the description of Brief communications, as it could have provided me with the right angle for judging the manuscript. The description is reported below. In addition, I looked at other published papers with similar vision (to my knowledge). Some of the papers are listed below (Benninga et al., 2018; Cosh et al., 2021). As for the Brief Communications, I leave to the Handling Editor to decide. Anyway, I highlight how the number of pages of the manuscript is way too much. Moreover, its scope might be (c) even if information and data do not seem to be properly disseminated.*

Brief communications are timely, peer-reviewed, and short (2–4 journal pages). These may be used to (a) report new developments, significant advances, and novel aspects of experimental and theoretical methods and techniques which are relevant for scientific investigations within the journal scope; (b) report/discuss significant matters of policy and perspective related to the science of the journal, including "personal" commentary; (c) disseminate information and data on topical events of significant scientific and/or social interest within the scope of the journal. Brief communications have a maximum of three figures and/or tables, maximum 20 references, and an abstract length not exceeding 100 words. The manuscript title must start with "Brief communication:".

AR: We thank the referee for the critical appraisal of the manuscript. While we appreciate the positive feedback regarding relevance, readability, clarity, and meaningfulness, we also understand the concerns. Trying to rephrase these concerns in our own words, the referee essentially argues that, for a brief communication, the paper is too long and lacks a proper match to the typical use case of this article format; for a research article, in turn, the paper lacks novelty and depth.

We also appreciate the referee's efforts to reflect the requirements to a Brief Communication (as provided by NHESS), and to extend the view to other articles that introduced soil moisture monitoring networks (Benninga et al., 2018; Cosh et al., 2021).

However, we would like to use this opportunity to put our manuscript and the related efforts into context, and to justify the chosen publication forum and format – as it was a deliberate and well-founded decision to use the Brief Communication format the way we did.

To understand this decision, though, an important aspect is missing in the assessment of our manuscript. This missing aspect is the context of the special issue to which our manuscript was submitted, entitled "Current and future water-related risks in the Berlin–Brandenburg region" (see https://nhess.copernicus.org/articles/special_issue1295.html).

In our manuscript, we clearly elaborated how our soil moisture monitoring network relates to the topics of the special issue, i.e. by providing support to "making human-environment systems more resilient to water-related hazards", to create "forms of governance to cope with emerging challenges", and to raise "public awareness [...] and appropriate adaptation practices" (quotes are excerpts from the special issue's topics). As important as this topical match, however, is the explicit and distinct regional focus of the special issue on the federal state of Brandenburg – which is, as one of the driest states in Germany, increasingly challenged by issues of water scarcity.

We are convinced that a new initiative on soil moisture monitoring *in Brandenburg* which is rooted in both research and public administration is worth being reported in this very special issue of NHESS. We even think that it would be negligent *not* to report on this initiative in such a context.

At the same time, we couldn't agree more with the referee that putting together a monitoring network – time consuming and expensive as it may be – is *not* a scientific achievement in itself and does hence not qualify, in a scientific sense, as "novel" or "innovative". Then again, our initiative is certainly novel for the state of Brandenburg in the sense that it opens new opportunities for research and applications towards the aims outlined in the special issue (see above).

This context is exactly why we preferred the format of a Brief Communication over the format of a research article: our manuscript is "*timely [...] and short*", and it aims to "*report new developments [...] relevant for scientific investigations within the journal scope*" and to "*disseminate information and data on topical*

events of significant [...] interest within the scope of the journal". Here, the mentioned scope is specifically the scope of the special issue. In other words: We chose the Brief Communication format *intentionally* and exactly because we do not want to claim scientific novelty. Instead, our intention is to inform researchers and practitioners in various fields about a new perspective to improve the management of water-related risks in Brandenburg. The special issue is a unique opportunity to inform this specific audience, and we believe that we will reach it more efficiently with a *brief* communication without excessively reporting on scientific and technical details. We also believe that this is a good timing, as it gives interested institutions and people the opportunity to engage rather sooner than later.

We hope that our (admittedly verbose) explanation provides the required context to assess the relevance of our manuscript and the adequacy of our choice of the article format. On that basis, we would like to address some of the more specific issues raised by the referee:

RC: *I highlight how the number of pages of the manuscript is way too much.*

AR: We would like to clarify that the length requirement for Brief Communications applies to the final, typeset version, which is significantly shorter than the preprint in terms of number of pages. Our preprint currently spans 10.5 pages, which is even slightly below the average length of preprints for Brief Communications that were accepted for publication in NHESS over the past two years.

We hope this explanation addresses the referee's concern, and demonstrates how our manuscript aligns with the journal's requirements. Still, we will try, in a potential revision, to shorten the manuscript further, without compromising the clarity and completeness of our argument. Specifically, we could shorten the description of the criteria for site selection (ll. 54-71) and the presentation of the case study (section 4).

RC: *Moreover, its scope might be (c) even if information and data do not seem to be properly disseminated.*

AR: As elaborated in our above response, we think that the scope of our paper relates to items (a) and (c) in the description of Brief Communications. Furthermore, we emphasized above why we think that the dissemination of information exactly serves the desired purpose: to provide a brief, timely and comprehensible synopsis of our initiative in order to invite interested institutions and users *now*, and to use the channel of the special issue to reach exactly the audience that is involved with the research and applications related to the management of water-related risks in Brandenburg.

RC: *By looking at other published papers on similar topic (examples above), I have seen much more information in describing the issues and the effort, e.g., to establish such a network, to standardize the observations, to integrate the new data in current platforms, in defining accessibility to end users.*

AR: We outlined the motivation of our paper above, and would like to reiterate that it is *not* the aim of our manuscript to systematically share experiences with the establishment and maintenance of a sensor network, to push forward efforts for standardizing data and data processing, or to define novel channels and formats for data dissemination. And while we appreciate the reference to Benninga et al. (2018) and Cosh et al. (2021), we would like to maintain that these are different types of papers with different motivations. Benninga et al. (2018) is a data paper, the purpose of which is to comprehensively document a defined dataset. The dataset reported in Benninga et al. (2018) does not refer to a continuous monitoring effort, but to a fixed period (April 2016 to April 2017), and was, afterwards, only updated once in 2018 and discontinued afterwards. Cosh et al. (2021), in turn, reported on a massive strategic effort at the national scale of the US which aims at integrating all kinds of data, with substantial infrastructural support. We do not consider it helpful to compare that kind of paper to our comparatively light-weight approach that is tailored to the requirements of the federal state of Brandenburg. Having said all that, we will, in our response to the next comment, elaborate how we could include some of our experiences in a concise way in the present manuscript format.

RC: *Overall, while I'm currently not in favour of the publication of the present manuscript, by considering previous published papers, it might be considered if the Authors put much more effort and they succeed in improving the manuscript, e.g., by sharing their experiences in establishing, maintaining, and managing a fixed environmental sensor network that could be of utility to the community for avoiding mistakes and reproducing good practices.*

AR: We appreciate the suggestions for improving the manuscript, and we agree that the referee raises several issues that are of interest specifically on a technical level for similar initiatives aiming to establish such networks. However, we are not convinced that including such aspects would improve the present manuscript, for the following reasons: we have shown above that our manuscript meets the requirements of a Brief Communication. However, by adding the requested details, the paper will not be a Brief Communication anymore. But for serving the desired purpose – which we comprehensively elaborated above –, the Brief Communication format is ideal and should hence not be inflated with excessive detail.

But while it appears difficult to resolve the trade-off between length and depth in the framework of a Brief Communication, we agree that it could be helpful and manageable to outline some important "lessons learned" in the bullet point "network extension" after l. 151 of the preprint – since this paragraph in fact aims to build a bridge to similar ongoing efforts in neighboring federal states in Germany. We will slightly extend the paragraph accordingly in a revised version.

RC: *Improving metadata (e.g., how was the calibration performed?), transparency (how data have been processed) and data accessibility (e.g., by API-type) should also justify the publication.*

AR: As pointed out before, we think that it will not serve the manuscript well to add much more technical detail with regard to data processing and analysis. However, we agree it would be helpful to clarify some details with regard to the estimation of soil water content from the neutron counts. While the preprint has already referred to a publication (Heistermann et al., 2024) which outlines the applied concept of a general CRNS calibration (in order to avoid uncertainties from the strategy of a local calibration), we agree that, in a revised version, this could be stated more clearly. In order to enhance transparency, we will also publish the code repository containing the data processing scripts upon final publication of the manuscript. It should, however, be very clear that our estimates of soil water content are only one possible way to obtain a product, and that other users might prefer to apply other procedures.

For this reason we established, at the very beginning, a public directory to download both, raw observations *and* our soil moisture product. The link to that directory is provided on the website that we already referred to in the preprint, and it allows to access and view that directory via a browser interface. It also allows to obtain static https-links to each of the data files which can be directly used in any automatic data processing environment and correspond, in our view, to what the referee refers to as "API-type" access. The directory also contains station metadata in a dedicated table.

The open accessibility of data and metadata under that link was clearly stated in the preprint under the section "data availability". Please note, however, that we are currently revising the data management after a major DoS attack on the entire university end of 2024, so that the updating of the website and the data directory have been put on a hold for a few weeks (as also announced on the website).

References

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