This manuscript describes the development of an autonomous precipitation collector (excluding snow) that can be deployed off-grid in remote areas and is suitable for measuring pH, conductivity, and DOC (Dissolved Organic Carbon) in wet deposition with a monthly resolution. The collector was deployed and tested over a period of 2 years (2015-2016 on the NL-BELT network) for open fall and throughfall depositions.

General comments:

The subject is scientifically interesting and is well within the scope of the journal. But I think the presenting quality and arguments for validation of this system should be substantially improved before it can be accepted for publication in AMT:

The text is very dense, overly detailed, and often confusing, even off-topic, making it challenging to understand and preventing a clear presentation of the study's results. Moreover, certain parts of the text resemble a promotional brochure (e.g., in the "general design advantages" section) or a technical manual (e.g., 3.2.1) that does not appear suitable for a scientific article. I have the impression that this is a study report that has simply been slightly reformatted for submission to AMT (without even sorting through the relevant or irrelevant information for the purpose of this paper). A scientific article about a new method/system should demonstrate that the developed tool meets the expectations and requirements set to address scientific questions, rather than being a comparison with commercial tools or a series of technical information. For example, in 3.2.1, it doesn't matter that commercial samplers consume 100 times more; what is relevant here is the autonomy of your device.

The "Results" section mixes the points about the system validation and the scientific data analysis. The results/discussion section could be divided into two parts for clarity:

- A section titled "Validation": I believe there would be a significant benefit in simplifying the argument and presenting, point by point, the performance parameters. The article aims to demonstrate that the developed collectors are suitable for autonomously measuring conductive rain deposition in remote areas, so the key points of this demonstration could be highlighted:

    1. Autonomous off-grid operations: low power consumption + opening conditions for the collection of wet deposition (time taken to open or close...)
    2. Representativeness of the conductive rain collector for deposition measurement: Define what constitutes conductive rain compared to "common" rain.
    3. Validation of measured chemical parameters: Verify the preservation of chemical species even after a month, including pH, conductivity, and DOC.

- A section titled "Application": to demonstrate the usefulness of the collector in identifying canopy effects, through a comparison of the obtained data with the literature and between OF and TF for pH, conductivity, and DOC.

In addition to presenting quality, the developed arguments do not justify the scientific quality of the proposed measurements. The validation of the system's operation and measurement is somewhat fragmented and, as such, not very convincing. Specifically, three points are missing in the developed arguments :

1. This is a rain collection system where the opening/closing is controlled by a resistive sensor which is activated from the conductivity of the rain. However, the operational range of the sensor is not specified (it triggers at 1 mohm.cm, it is the only information). Thus, there is no definition of what is being truly measured.
2. The time it takes for the system to open is also not mentioned. We know that the first seconds of rain contain strong concentrations, so if the opening occurs 30 seconds after the start of the rain, a significant amount of information will be lost.
3. The system is dedicated to measuring monthly fluxes of chemical species, but no information is provided on the preservation of the tested parameters (pH, conductivity, and DOC) between each sample retrieval."

Specific comments

Introduction :

The introduction is very general and is organized into different paragraphs discussing the importance of monitoring atmospheric deposition of various chemical species (nitrates/sulfates (L83-91), POP (L119-129), ON (L157-165)) that are not subsequently addressed in the study, as only pH, conductivity, and DOC are studied here. If these species need to be detailed, it should be done in the conclusion to demonstrate that the developed system could also be used to study them. Please refocus the introduction on aspects related to your study.

L148-151: The justification for developing this new collector is based on comparisons with commercial devices, mentioning the cost and difficulty of making measurements in remote areas. It would be interesting to mention that precipitation collectors have already been developed to address specific questions about atmospheric fluxes. Here are a few examples:

- Laquer, F. C.: Sequential precipitation samplers: A literature review, Atmos. Environ. A.-Gen., 24, 2289–2297, https://doi.org/10.1016/0960-1686(90)90322-E, 1990.
- Germer, S., Neill, C., Krusche, A. V., Neto, S. C. G., and Elsenbeer, H.: Seasonal and within-event dynamics of rainfall and throughfall chemistry in an open tropical rainforest in Rondônia, Brazil, Biogeochemistry, 86, 155–174, https://doi.org/10.1007/s10533-007-9152-9, 2007.
- Laurent, B., Losno, R., Chevaillier, S., Vincent, J., Roullet, P., Bon Nguyen, E., Ouboulmane, N., Triquet, S., Fornier, M., Raimbault, P., and Bergametti, G.: An automatic collector to monitor insoluble atmospheric deposition: application for mineral dust deposition, Atmos. Meas. Tech., 8, 2801–2811, https://doi.org/10.5194/amt-8-2801-2015, 2015.
- Brahney, J., Wetherbee, G., Sexstone, G. A., Youngbull, C., Strong, P., and Heindel, R. C.: A new sampler for the collection and retrieval of dry dust deposition, Aeolian Research, 45, 100600, https://doi.org/10.1016/j.aeolia.2020.100600, 2020.
- Audoux, T., Laurent, B., Desboeufs, K., Noyalet, G., Maisonneuve, F., Lauret, O., and Chevaillier, S.: Intra-event evolution of elemental and ionic concentrations in wet deposition in an urban environment, Atmos. Chem. Phys., 23, 13485–13503, https://doi.org/10.5194/acp-23-13485-2023, 2023.

2.1.2 Heated Precipitation Sensor

Could you add information about time and delay between resistivity sensor activation and opening of the tip?

3.0 Results and Discussion

The paragraph begins with a summary of the strategies used for validation. Wouldn't it be better to place these points at the beginning of each section to avoid redundancy?

3.1.General design advantage

L518-543: This entire section mentions the advantages of the system without any results validating these claims. For example, regarding sample preservation, have you conducted tests on the preservation of reactive, volatile, or biologically transformed species (L538)? Similarly, you argue the possibility of detecting ultra-traces through the resistivity sensor systems (collection even at low conductivity and avoidance of dilution) and the types of materials used. I have no doubt that low-conductivity rains are collected, but what about the quality of the samples in the container? Could you provide information on field blanks, for example?

I believe that if you have a 'Validation' section, this part should be supported by your data.

3.3.Comparison of Sample Collection Volumes

L647: It is announced that the automatic collectors and total deposition collectors are colocated, but if I understand correctly, the values discussed in this paragraph only concern the volumes obtained with the total deposition collectors in OF?

L653 - 705: I don't understand your strategy. Why validate total deposition and then wet deposition, since the idea is to validate rain collectors? I question the need for an entire paragraph on the comparison of total deposition in the text with ECCC and DAYMET data. Comparing with model data at a km2 scale is interesting to show the representativity of measured fluxes at a single point on a larger scale (e.g., watershed scale), but it does not demonstrate that your collectors effectively capture the totality of precipitation. This study does not seem relevant to the paper's topic. I believe it could be included as supplementary material.

In my opinion, the comparison between total deposition and collector values (and their differences) is the best argument to show that the automatic collectors effectively capture all rainfall. The question is what is the representativity of the “conductive” rains collected here compared to the conventional rainfall collection?

L733-753: The RSD obtained on the triplicates of the rain collectors of 10 samples out of 33, or 1/3 of the samples, have an RSD greater than 40%. This indicates a very high variability in the collected volumes. It would be interesting to discuss the reasons for this variability, which is crucial to estimate the performance/artifacts of your device (it's unfortunate that the data are in supplementary material). No analysis is done on these high RSD values. Is it for the same period of the year, e.g., when the winds are strongest? Is it at a specific site? Did the replicates use the same sensor, or is each system independent of the other? Could the observed variability in the replicates be due to different closing or opening times? Has simultaneity been tested?

The comparison between total volumes and precipitation volumes shows a clear difference. The explanations given for these differences are not quantified, while they could provide information on the quality of the collection and, therefore, on the definition of conductive rains (and provide information on the dilution parameter). For example, is there a link between the total collected volume and the difference between total/conductive deposition? Is it related to the site? This type of analysis could be done with scatterplots between total volume and rain, with different colors for each site to highlight if biases are site-related, then with colors by season.

Could you discuss these differences considering technical aspects? For example, the closing/opening of the collector lids is conditioned by the conductivity of the rainwater, assuming that concentrations in the rains decrease as the rain progresses. However, it has already been demonstrated that this is not necessarily the case (e.g. Audoux et al., 2023 see before). There can be refeeding of the lower layers with aerosols or mixtures of air masses that induce increases in conductivity during rain. The question is, what will be the behavior of the collector in this case? Is there a risk that the lid closes and reopens, or not? Are these phenomena that you observe from the datalogging?

It is known that the conductivity of a solution depends on temperature, and here the temperatures can vary greatly between seasons. The sensor is one of the key elements in the autonomy of your system. Have you tested how temperature affects the sensor's response? Could this have an influence on the differences observed between sites or with total depositions?

L718: The authors rely on acquired data that are not collected simultaneously with their samples and justify the discrepancies due to the heterogeneity of precipitation. However, this heterogeneity is known. Why choose to use ECCC measurement sites that are not collocated with NL-BELT sites to do this validation work for the collectors since it is certain that there will be a discrepancy between the two?

L733-776: This part pertains to the application of the collectors and no longer their validation; I think it should appear in a different section.

3.4.Characterizing Chemical Parameters from NL-BELT

I think the validation part of the chemical measurement should be in a separate section and thoroughly discuss:

Could you present sample preservation tests for pH, conductivity, and DOC? How can you ensure that concentrations are maintained over time despite all precautions taken? For example, have you taken a sample after rain and observed it after a month outdoors, considering temperature and sunlight variations (the choice of black color may lead to high temperatures inside the units during summer)? Could this have an impact on chemical parameters, such as the desorption of organic species from the surface of particles in the rain? The system is designed to limit evaporation, but is this really the case? Have you tested volumes pre- and post-sampling?

L995: This paragraph should be positioned earlier (in the validation section) to show the agreement between the values measured here with this new system and the values expected from the literature.

A significant portion of these results is applicable and pertains to the study of canopy effects on deposition fluxes and should be placed in a separate section and discussed accordingly