Response to referee comments and suggestions on bg-2018-521 by N. Löbs et al.: "Microclimatic and ecophysiological conditions experienced by epiphytic bryophytes in an Amazonian rain forest"

Manuscript format description:
Black text shows the original referee comment, and blue text shows the response of the authors and the explicit change in the text. The figure and table numbers refer to the revised manuscript.

Maaike Bader as referee submitted the comments RC1 and RC3

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Maaike Bader RC3:

Referee comment 1:

An additional consideration: an alternative way to use the electrical resistance measurements

Dear authors,

After some more thought and discussion with some colleagues, with whom we will be installing a similar system to measure moss wetness, I would like to suggest using more caution in the translation of the electrical resistance to moss water content and to propose an alternative way of interpreting the measurements. This is giving away the method we intend to use ourselves, which I think may be a good alternative for your study also. You are welcome to cite me for the idea if you think it appropriate.

It is clear that there is a very wide range of moss water-content (WC) values that may be indicated by any electrical resistance value measured. The values are more constrained for the cushion species (Leucobryum), which makes sense seeing that such a life form is denser and more homogenous than the other species, which are prostrate or consist of loosely scattered turf, if I am not mistaken. With such inhomogenous substrates, with different amounts of air and tissue between the probes for each sample, it is no wonder that the measured conductance is widely scattered within species. I think you should reconsider whether you should really try to deduct an absolute value of WC from these measurements. It looks like this is not really possible for most species.

It seems that the points within each calibration curves are nicely ordered, however. Therefore an alternative approach would be to only look at the changes in electrical conductivity, which should reliably indicate changes in water content. With this, you can deduct for any time period whether the samples were drying out or being wetted. When stable at low conductivity, this indicates that the samples are dry (in equilibrium with air humidity), when stable at high conductivity they must be completely wet during rain or fog events. If you have good data about the maximum water content of the species, you might even be able to interpolate between the stable low and the stable high, considering that drying tends to follow relatively smooth extinction curves, as you will see when plotting your calibration curves against time.

I hope this suggestion is of use.

Author comment 1:

Thank you very much for this good and helpful comment. After an intense re-analysis of our field and calibration data we decided to indeed use a calibration approach very similar to the suggested one. We explain this in our response to RC1 in comment 13: We performed a new approach for the calibration of the water content, based on the maximum and minimum values of electrical conductivity reached in the field and the amplitude of the water content reached during the laboratory measurements. With the new approach we assume that the maximum electrical conductivity achieved in the field corresponds to the maximum water content, which could be reached by the organism (and which had been determined during the laboratory experiments). The measurements of the electrical conductivity in the laboratory are used to evaluate their variability. For that, the entire calibration process and the subsequent results were re-calculated again.