

## Reply on RC4

Bruce W. Forgan et al.

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Author comment on "New Absolute Cavity Pyrgeometer equation by application of Kirchhoff's law and adding a convection term" by Bruce W. Forgan et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-250-AC3>, 2023

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All typographical and grammar issues have been addressed. The excellent suggestion of a recommended list of work to be done is now highlighted in a clear and single paragraph in the Discussion section of the paper. It also enabled removing a small but significant amount of words in the revised manuscript. The recommendations were listed in my responses to Stefan prior to being incorporated in the revised draft.

Since the article was drafted more work has been done, and has emphasised the work suggested in the conclusions, but the key ways ahead as indicated in the paper's discussions and conclusions are:

- (a) a method for determining the convection coefficient - recent work has provided a method to give an approximation for a value dependent on temperature - but that is another paper work.
- (b) related to (a) a literature based approximation of the convection coefficient based on the Nusselt coefficient - also being investigated.
- (c) Determine if an ACP can be calibrated in a BB environment (also suggested in the current paper - if it isn't it needs to be so I will check). I believe the answer is yes regards BB calibrations but in conditions not normally used for a domed pyrgeometer or IRIS - am working on that now with Julian's help.
- (d) A solar cal (with the concentrator replaced by a normal pyrhelimeter tube) - in the paper - to provide an initial SI traceable estimate of C if the pyrhelimeter is also referenced to SI without the problem of the convection coefficient.
- (e) Using the heating cycle of the LSQ for calibration - also being done with the Davos data and in the draft paper. However, it does require continuous monitoring of the signal so some data collection methods need to be updated, but the Davos method is fine.
- (f) Higher frequency measurements to confirm the phase difference between the base of the instrument and the thermopile (i.e. moving to 5 or less second sampling). I will add that to the paper. With now over 4 years of ACP96 data I believe the phase difference is between 9 and 15 s.

Again many thanks for you very helpful and direct comments.