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Reply on RC1

Stephen Burt

Author comment on "Measurements of natural airflow within a Stevenson screen and its influence on air temperature and humidity records" by Stephen Burt, Geosci. Instrum. Method. Data Syst. Discuss., <https://doi.org/10.5194/gi-2021-31-AC1>, 2022

I thank Mike for his helpful comments on the draft, both in general and the two specific points made -

The first, regarding the lag of the wet bulb behind the dry bulb in rapidly changing temperatures, relates to my Figure 8, a hypothetical comparison of two sensors where the response time of one (the wet bulb) is much slower than the other (the dry bulb). For simplicity only response time differences were considered, deliberately disregarding latent heat changes and conduction through the wet bulb muslin. The effects suggested in my Figure 8 are not uncommon although they are of course transient, and tend only to be noticed in terms of $T_{wet} > T_{dry}$ when the humidity is high (T_{wet} close to T_{dry} even before the step change) and when the change is sufficiently rapid and of sufficient magnitude. Not surprisingly, close examination of short-period logger data (1 min or less) reveals more instances than are evident from, for example, daily or manual hourly observations by a human observer. Even where T_{wet} does not exceed T_{dry} , an increase in humidity (RH, where calculated from dry- and wet-bulb readings) relative to, say, an adjacent capacitance sensor can easily be ascribed to the drop in temperature. Careful comparisons of RH measurements from adjacent sensors (capacitance sensor against T_{dry}/T_{wet} RH) during abrupt changes in temperature often show a short-term relative increase in the latter, although of course capacitance sensors are inherently less responsive anyway at high RH. But such relative differences can be found in the observational record. In any case, it is easy to explain minor differences - say to ± 0.2 K - as being within instrumental calibration tolerance, and thereby disregarded.

With regard to Mike's second point, relative accuracy of low-speed airflow measurements, the comment is fair and I will happily include this in the revised paper if it is duly accepted for publication.

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