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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Dew frequency across the US from a network of in situ radiometers" *by* François Ritter et al.

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Dear anonymous referee 2,

Thank you for reviewing our study and for raising legitimate critics based on the lack of experimental validation of our continental dew analysis. We would like to oppose several answers to this:

- As explained in the introduction, dew formation is not a homogeneous process that can be easily measured with either radiative passive condensers or leaf wetness sensors. The emissivity, the size and the structure of these surfaces are different from

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the canopy and they are not seasonally and annually evolving like the natural canopy. The only rigorous experimental validation of the dew yield in natural ecosystems is performed with lysimeters, which are expansive and provide local measurements. Jacobs et al. (2006) has validated the use of radiometric surface temperature to estimate dew formation with a direct comparison with micro lysimeters data.
- Our statistic is robust compared to previous work: the mean dew yield estimated with the Monin-Obukhov Theory in our study is 0.14+/-0.12 mm/night versus 0.13+/-0.10 mm/night from 25 previous dew studies (Tomaszkiewicz et al., 2015). Additionally, these dew yield estimations contain much more uncertainty than the dew frequency estimation because the leaf boundary layer needs to be modelized. Dew frequencies only require the dew point temperature of the air and the surface temperature, we therefore have a stronger confidence in these estimations.
- In anticipation of your comment, we have performed a Monte-Carlo simulation to quantify the sensitivity of dew frequency to a variability in the surface temperature. The result of the analysis shows a possible shift of 5% in the dew frequency for a sigma of 0.2 Celcius (see Sect. 3.4).

Based on these three points, we think that the term “gaping hole” you used in your review is in this context unjustified.

However, we do agree that the Method section was lacking details about Monin-Obukhov Similarity Theory. It has been updated with the explicit formula of the Bulk Richardson Number and the assumptions on the roughness lengths for vapor and momentum.

The dew formation models proposed by Richards 2009, Maestro-Valero et al 2012 or Gerlein-Safdi et al. 2018 are all based on an Energy balance, and they are now mentioned in the introduction.

The conclusion has also been modified. Now, a new section is present in the article that contains the discussion on the ecological significance of dew formation.

Please let us know if you have additional comments,

Best regards,

François Ritter

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