Review of HESS-2024-94

Characteristics of dew on leaves of typical plants in Loess Hill and Gully Region of China

General comments

The authors studied dew formation in three different leaf types in a semi-arid region of China for a year, using automatic meteorological measurements from a station and analyzing leaf samples weighted in the lab. Even though the authors intend to explain the differences in dew measurements using meteorological data, they must provide sufficient explanation of these differences beyond meteorological correlations, which are very low.

My main concerns of the papers are:

The authors base their measurements on a leaf wetness sensor (LWS) and leave samples that are weighed in the laboratory. The leaf wetness sensor does not differentiate between fog and dew nor the water collected by the leaves. The authors should clearly prove that what leaves or LWS is collecting is dew and not fog, which is a different atmospheric water non-rainfall input. My concern arises since the main explanation of the dew amount measured by the authors is based on the difference between air temperature and dew temperature < 2C, which would mean fog and not dew. The authors should prove that fog does not play any role in the water that is being collected.

Section 3.5 requires more than just simple descriptions of meteorological conditions, this mainly because authors make correlations, which are apparently very low and any statistical parameter is included (r^2, r, slope, etc). Authors such as Lobos-Roco et al., 2024 and de Roode et al., 2010, have shown that dew occurs under specific atmospheric conditions, including a stable boundary layer, low wind speed, and a negative specific humidity tendency (dq/dt) of around -1.5 g/kg/h. These more detailed variables could provide a better understanding of dew formation than simple descriptions of relative humidity, wind speed, and wind direction. Therefore, it is essential for the authors to include these detailed variables in their analysis to enhance the comprehensiveness of their study.

The introduction of the manuscript could benefit from being more extensive and detailed. It should include a comprehensive description of the study area, the origin of the moisture that produces dew, the synoptic atmospheric processes that provide moisture/rain to the region, and a clear definition of the processes involved in dew formation. This extended introduction would provide a clearer context for the study, helping the readers to better understand the significance and relevance of the research.

The English of the entire manuscript must be checked. The whole manuscript is written in past tense. For example, 'was shown in Figure ..' It should be 'is shown'.

Specific comments

Title:

Title must be revised, it is too much similar to https://doi.org/10.3390/w11010126, 2019.

Abstract:

Line 14: I suggest to use the term of “non-rainfall”, because dew is also a kind of precipitable water, water vapor downward flux.

Main body:

Line 31: Please add a more readable number, like % of arid-semi-arid compare to total China Area, 30%? 20%?

Line 53: what do you mean by “typical”?

Line 60: An international reader shouldn’t know where the experimental station is by the address. Please provide coordinates, altitude and other geographical characteristic to help the reader to understand the site.

Line 63: to refer to altitude (no height) you need to add the meters above sea level (m ASL).

Line 64: what is “d” after 157? please clarify.

Fig 1: Remove de minutes and seconds in the coordinate systems if they are not providing any additional information. Please attached a small map of China, to see where the place is located. I suggest to change the color of ‘DEM’ to a different palette color that the one of NDVI. Delete the word “county” fro the label in the maps, if it is clearly stated in the legend.

Line 100: What do you mean by “manual”? please elaborate more.

Line 111: introduce the equation

Line 122: Wd was already defined in equation 1

Line 137: I think that dew is not affected by meteorological ‘factors’ but by meteorological ‘conditions’.

Line 154: Why only three days if the total measurement period was higher than a year? Why don’t you use the entire data period showing means + standard deviations?

Line 177: Please use ‘present’ verb form. It is shown, not “was” shown.

Figure 5: Even though this spiral plot are a fancy way to show the monthly cycle, it is quite hard to read them. It is not clear the monthly cycle. I suggest to use monthly averages in a classic barplot. Color bar is not the same for every plant-type, please standarize. (d) Please indicate if green is frequency or dew amount, same for brown. It is not clear.

Line 190-195: Authors stated that significant differences in dew amount between the different leaves is because the microstructure and leave inclination. However, they do not provide any prove of that. Please if you state that inclination and mircostructure of leaves is the main characteristic that differentiate the dew amount, at least describe it.

Figure 6: the mean (black square) is hidden behind the dots. Please make it bigger. What are the dots?

Table 2: Explain what does it mean the columns name. For example: “Dm/mm”.

Line 216: I think they are not “factors” the are “atmospheric conditions”

Line 218-222: The paragraph seems to be contradictory. Dew frequency decreases with high wind speed but this wind speed increases the dew amount? How can be possible that dew frequency increases and dew amount decreases?

Figure 8: I do not see any correlation between wind speed and dew amount. It need more explanation of why correlated wind speed when it apparently does not play any direct role on dew. R2 and curve slope are not included. Authors should find another statistical parameters to relate wind speed and dew.

3.5.2 Wind direction: I think that analyzing wind direction does not make any sense since wind speed is extremely low. When wind speed is lower than 2 m/s, wind direction is random. Instead of wind

speed and direction, authors must include measurements of atmospheric turbulence, which are more related to dew formation (stable boundary layer)

Line 245: Here is main main issue of the paper. Dew is a surface processes resulted from the surface radiative loss. This radiative loss cool down the surface temperature close or below the dew point, condensing atmospheric water vapor over the surface. If air temperature is close the dew point, it does not mean that dew is present. It means that air is condensing, resulting in fog. Then, it is not possible to relate dew formation over different leaves surfaces using air temperature. The authors should use leave surface temperature instead of air temperature.

Line 295: water vapor from where?

Line 300 to 315: I think authors should include data of the leave roughness and inclination angle in the results section to after discuss here they hypothesis. Note that leave roughness also can be favourable to collect fog.

Line 400: Consider to change the title, which is very similar to the one in line 400.

Suggested literature to be checked:

- Ritter, F., Berkelhammer, M., & Beysens, D. (2019). Dew frequency across the US from a network of in situ radiometers. Hydrology and Earth System Sciences, 23(2), 1179-1197.

- de Roode, S. R., Bosveld, F. C., & Kroon, P. S. (2010). Dew formation, eddy-correlation latent heat fluxes, and the surface energy imbalance at Cabauw during stable conditions. Boundary-layer meteorology, 135, 369-383.

- Lobos-Roco, F., Suárez, F., Aguirre-Correa, F., Keim, K., Aguirre, I., Vargas, C., Abarca, F., Ramírez, C., Escobar, R., Osses, P., et al. (2024). Understanding inland fog and dew dynamics for assessing potential non-rainfall water use in the Atacama, Journal of Arid Environments, 221, 105 125, 2024.