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Discussions
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Interactive comment on "Solar forced diurnal regulation of cave drip rates via phreatophyte evapotranspiration" *by* K. Coleborn et al.

Anonymous Referee #1

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Summary

The manuscript presents data of drip counts in a cave in Australia. The data are analysed with a recent signal processing tool which allows to identify the strength and frequency of periodic signals in a time series. A specific feature of the method is that is allows to identify consecutive periods of the time series which show an periodic signal. This is important for this dataset of cave drip water because there are only a few days within almost two years of measurement which show periodic / diurnal signals. However, the signals are not consistent in space that means they are different at other locations in the cave and they are not consistent in time, that means they do no occur at similar periods. Furthermore the phase of the signals is also not consistent. These spurious occurrences of the period signal may render the finding of a period signal as less important. Still its diagnosis is one of the most important and direct results of this

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manuscript.

For the rest of the manuscript the authors try to argue about the origin of the periodic signal. They discuss several earlier proposed causes of the diurnal signal and argue that only a root water uptake could be a reasonable cause. However, there is no direct evidence being presented to undermine this discussion. Therefore I recommend to be much more careful in the wording, e.g. L536 “this is the first volumetric observation of tree water use in cave drip water”. I have found a number of other issues, see below, which need clarification. Nevertheless, I think that these issues can be resolved within a thorough revision of the manuscript.

Major remarks

- how representative is the drip measurement? The data shown in Fig. 2 seems to be rather variable and site dependent.

- In the methods section radiation data is being mentioned, but is not used!

- abstract L31: unclear what is meant with “trends in drip rate at different timescales”

- section 2.1: - Is the cave relevant for paleoclimatic proxies? - What is the approximate contributing area to the cave?

- Methods 2.2 - why do you estimate daily potential ET when the focus is set to diurnal variations?

- section 2.3 spectral analysis - clearly describe input and outputs - what is the form of the periodic signal, is it sinusoidal? - By which criteria did you determine the presence of a periodic signal?

Figure 2: - time resolution of drip rates - unit of drip rates

Figure 3: - Y-axis labels on left panels are hidden - for the SST panels it is unclear which time series is transformed? - how is the presence of a significant periodic cycle determined from these plots?

section 4.2.1: the p-value of the t-test is very low suggesting a very low probability of the Null hypothesis of no difference. Thus there is a significant difference of pressure in cave and outside. Anyway I doubt if a t-test on the central tendency is the right tool to assess the ventilation effect. Please check this and revise accordingly.

section 4.2.5: the authors mix up long wave radiative exchange processes and L403-413 need to be revised.

L433: To my understanding deep root water uptake is only required when the upper soil layers get too dry and have a lower potential than the soil water at deeper levels. See papers discussing hydraulic lift (e.g. Dawson, 1996 Tree Physiology, Zapater et al., 2011, Trees). Therefore I think that in the wetter periods no relevant deep root water uptake occurs.

Minor remarks:

- use SI units (L125-L132)

- L272 wrong reference - it should be Fig.3d

- L300f how are recession times being computed?

- L342: there is no Fig 4c

- L439: What is meant with negative hydraulic lift?

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