

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

Anonymous Referee #2

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In the submitted manuscript Coleborn et al. present a study that deals with the identification and characterization of daily fluctuations of cave drip rates in a karstic cave in New South Wales, Australia. They installed drip counters at 12 locations within the cave and use a method called Synchrosqueezing to identify periods with stable signals of 1 and 2 drip rate cycles per day (cpds). Such periods could be identified for a subset of the 12 drips, with varying length and signal type (1 or 2 cpds). Comparing the daily signal of those drips with explanatory variables such as air pressure differences between the cave and the atmosphere, the barometric loading due to the daily heating and cooling of air masses, earth tides due to the gravitational influence of the moon, temperature's influence on water viscosity, and solar driven cycles of evapotranspiration activity of the plant cover, they show that evapotranspiration is the most likely reason for daily fluctuations in drip rates. Based on this finding they develop a

C1

conceptual model of the impact of vegetation on drip rates under different climatic and structural setups.

Generally this is a very valuable study. It reveals understanding of processes that have not been investigated before. The manuscript is well written and the results are plausible and of high relevance. However, there are some important revisions to be done before publication. My major point of criticism is the lack of quantification of the relations between diurnal fluctuations of drip rates and their explanatory variables. Some few r^2 s and p-values are provided but the most important part of the discussion (4.2.5. Solar driven daily cycles of vegetative (phreatophytic) evapotranspiration) could definitely use some more quantification of the identified relationships and their significance.

Some specific comments:

1. The introduction needs some information of the relevance of this type of research.
2. The spectral analysis explained in too little detail (schematic figure could be helpful)
3. It is not clear whether the selection of periods of stable cycle per days was based on a threshold procedure or done manually and subjectively.
4. Implications for karst recharge assessment are missing in the discussion.

Please see the attached commented version of the manuscript for further details.

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/hess-2016-11/hess-2016-11-RC2-supplement.pdf>

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C2