

Interactive comment on “Quantifying energy and water fluxes in dry dune ecosystems of the Netherlands” by B. R. Voortman et al.

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Reviewer 2

In this manuscript the author has conducted a comprehensive study on hydrometeorological processes at coastal dunes in the Netherlands by comparing different surface covers. This topic fits well into the scope of Hydrology and Earth System Sciences. As hydro- meteorological processes under vegetation common in dune ecosystem is not well understood, it is worth publishing. Although it is in general well written and I do not see any major flaws, there are a few minor issues that, I think, need to be addressed.

When considering hydro-meteorological processes, water vapor in soils may play a significant role as it is coupled with heat transport as well especially under dry condition.

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In this manuscript, water vapor transport is completely ignored. For example, the authors found that the modeled ET_a did not agree well with the observed ET_a during the drying period. Inclusion of water vapor process in the model may be necessary. Any comments, discussions, or some additional analysis should be included. Reply 9. We added a discussion section on this topic in lines 588 to 605.

I do not know much about plant physiology but I am wondering if moss shows any water repellency during the dry periods. That also may be one of the factors affecting the evapotranspiration rate. Reply 10. Evolutionary it would be very “unwise” to become fully water repellent during dry periods, since mosses need water for their photosynthesis. The moss species we studied in coastal and inland dunes do all very quickly respond to additions of water: they open their leaves and take up as much water as they can.

My last comment is about the heat flux measurement. Heat flux and storage at 8-cm depth was used to represent surface heat flux and storage following the instruction by Campbell Scientific Inc. I am wondering if this underestimates heat flux at least as soil temperature may be significantly lower at 8-cm. It may be worth looking some sensitivity. Reply 11. We accidentally forgot to mention the measurement depth of the thermocouples and the soil moisture probes. The heat flux was measured at 8 cm depth and the change in heat storage above the plates was calculated based on soil temperature measurements at 2 and 6 cm depth and moisture measurements at 4 cm depth. These locations should be sufficient to estimate the heat storage above the heat flux plates. We added the information in lines 187 to 189.

I have some specific comments as well. 1. P4555, L20: 2013 not 2043 Reply 12. We corrected this mistake.

2. Eq. 12: There is no \bar{x} (mean of the observations) in the equation. Reply 13. We corrected this mistake.

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Please also note the supplement to this comment:
<http://www.hydrol-earth-syst-sci-discuss.net/12/C3090/2015/hessd-12-C3090-2015-supplement.pdf>

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