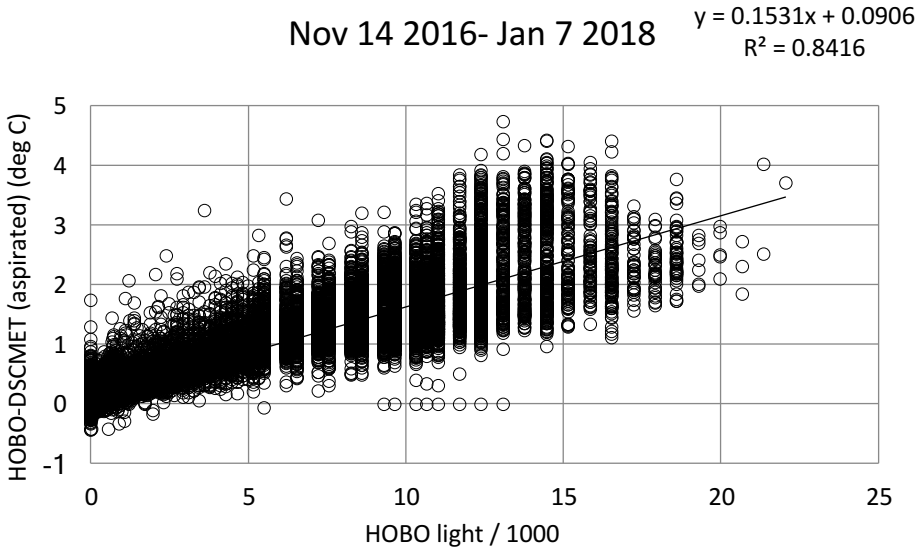
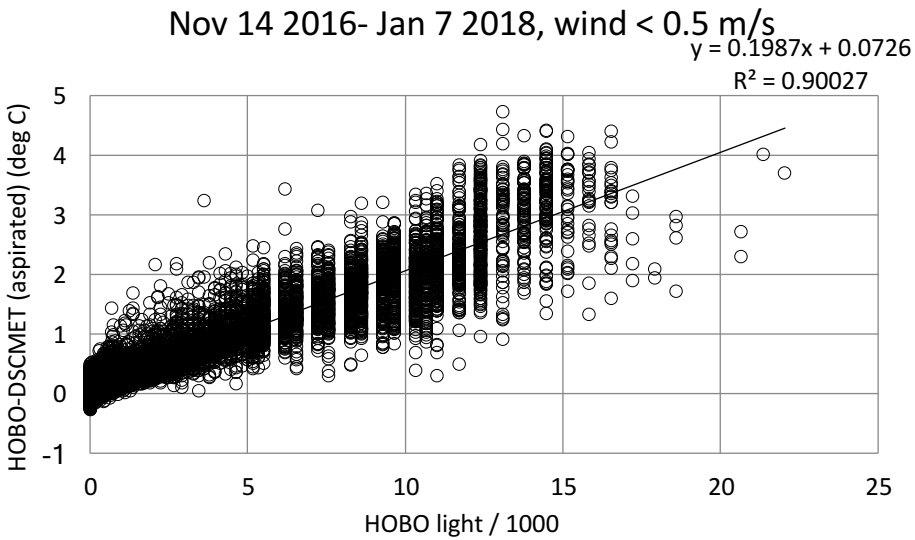
Possible correction equation for HOBO sensors in BIRD and TREE sensor networks

Based on data from paired aspirated and HOBO temperature sensors and light from the HOBO sensors at 50 m on the Discovery Tree, Nov 14, 2016 to January 7, 2018.

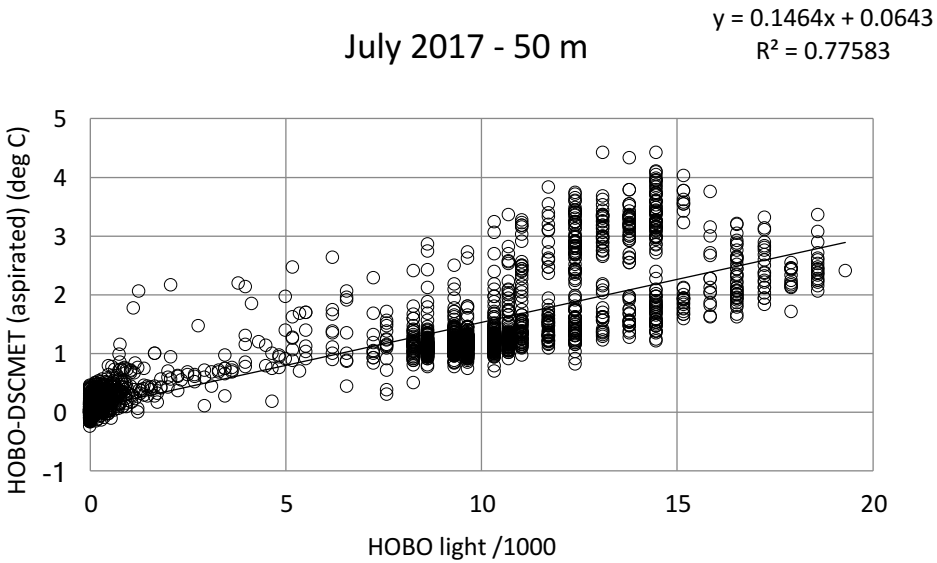


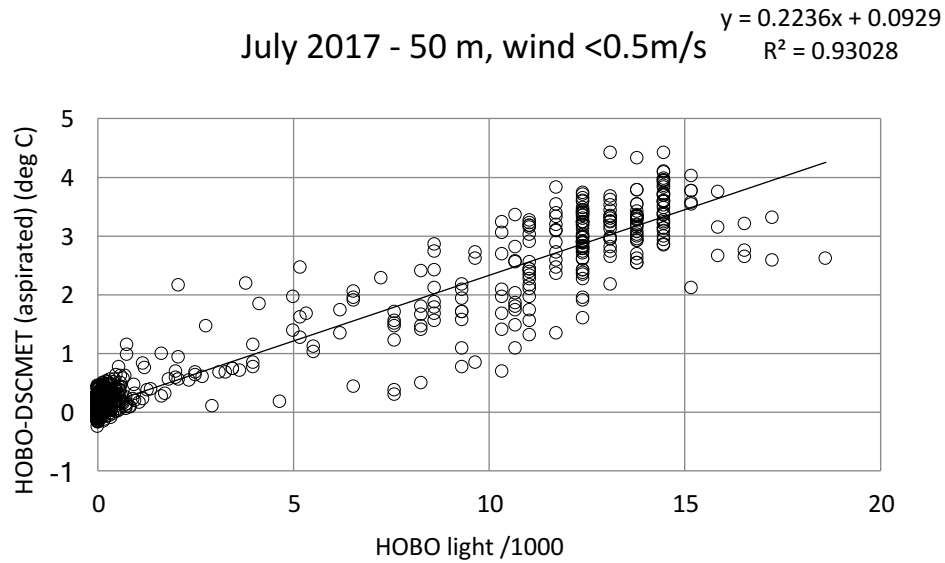


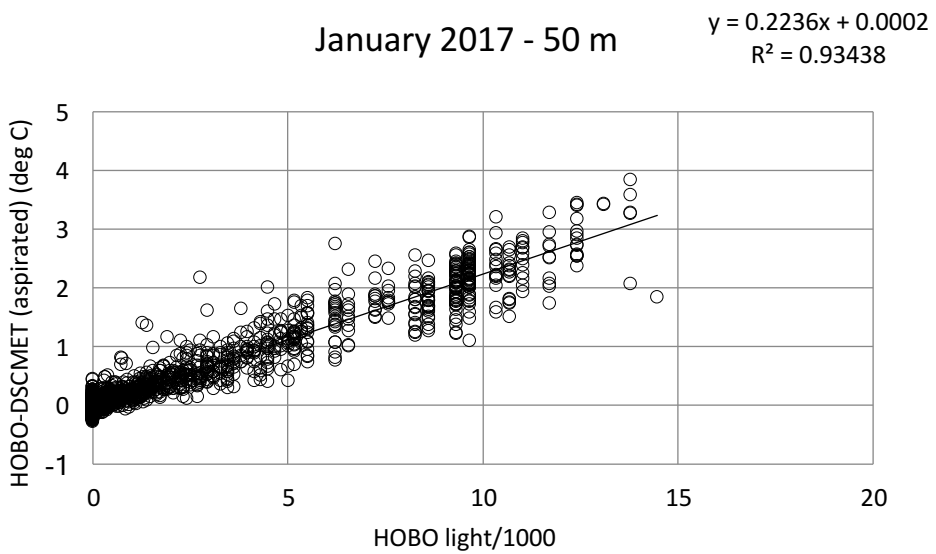
Step 1. Using the Discovery Tree data at 50 m for the full period, I calculated the difference between the Hobo sensor reading and the reading from the sensor with the aspirated shield and plotted this as a function of Hobo light (left plot).

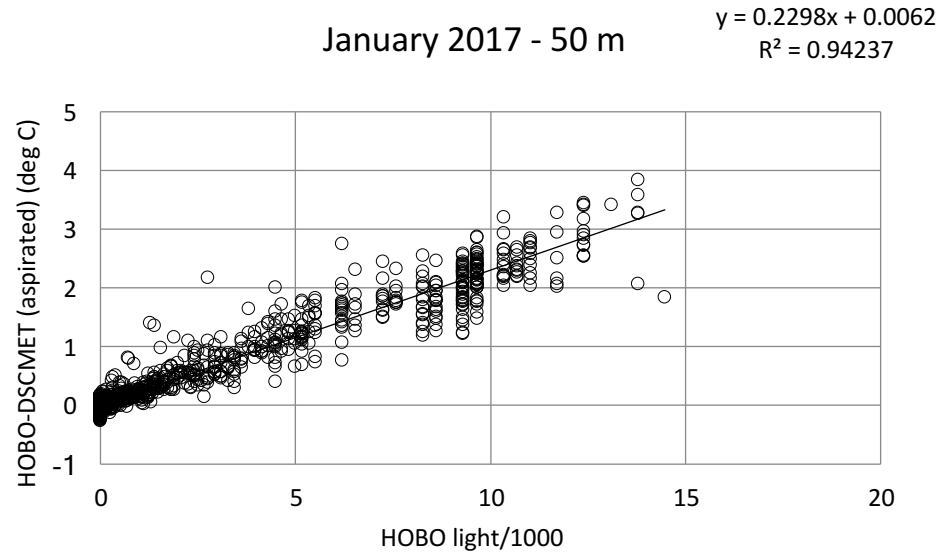
Then I filtered the data to remove observations with wind speed > 0.5 m/s, and replotted.

Removing the high wind speed observations improves the fit and steepens the relationship (right plot).

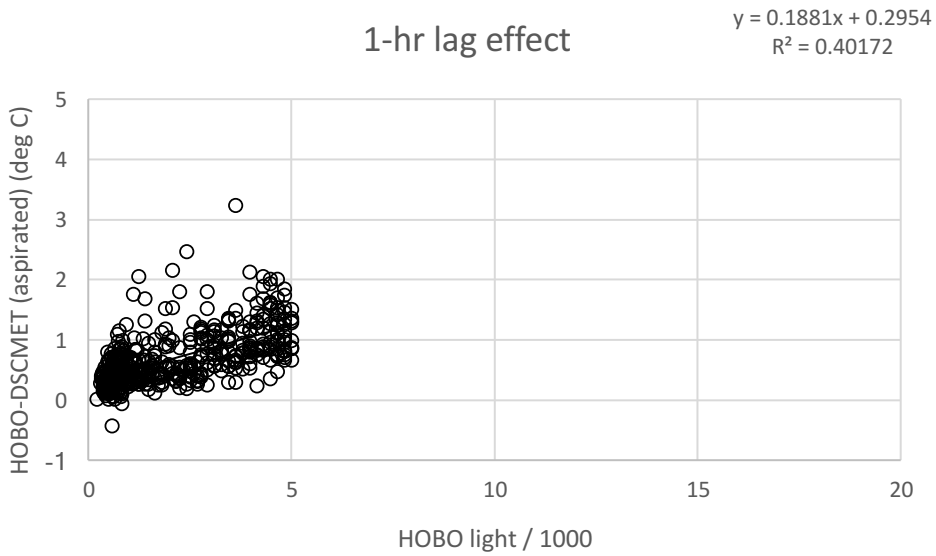




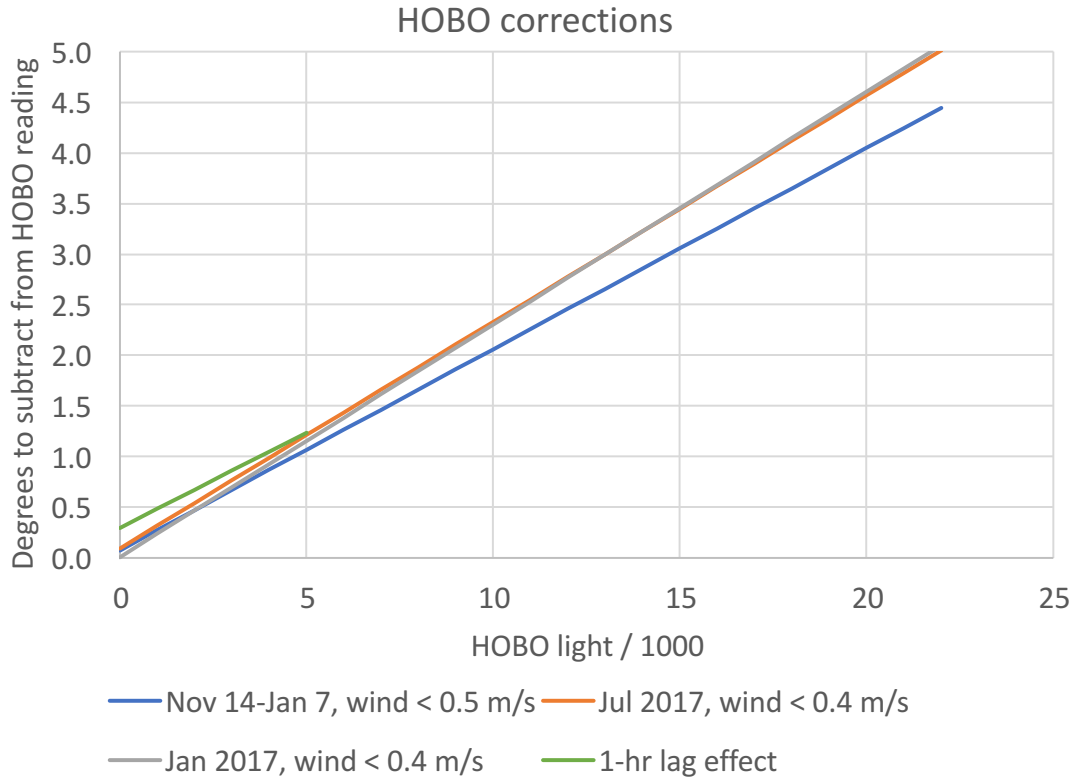
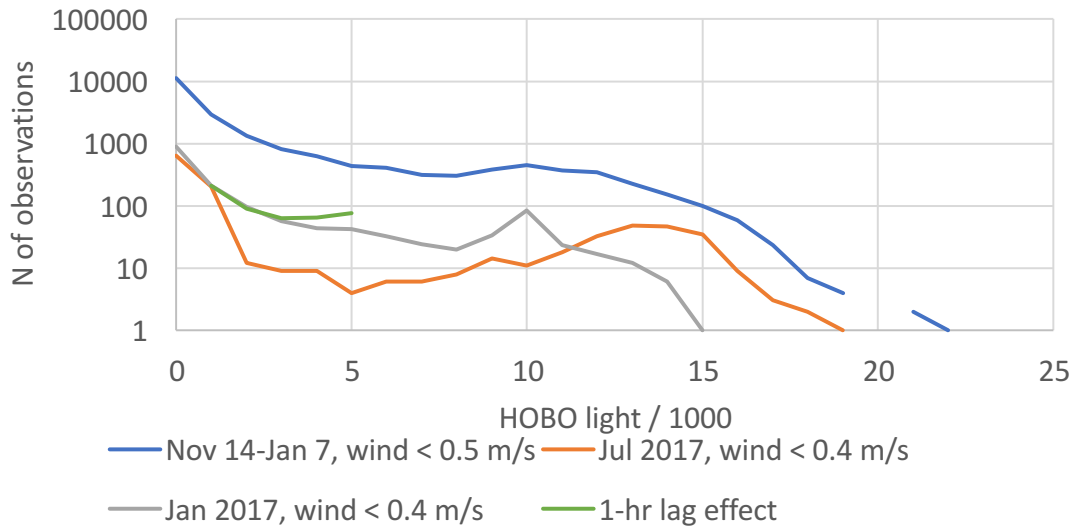




Then I tested whether the correction differed by month, comparing January 2017 (low sun angle) with July 2017 (high sun angle). The relationships are different (left plots). However, when the data are filtered to remove observations with wind speeds > 0.5 m/s, the relationships are very similar for both months (right plots).



Then I tested for a lagged effect of heating of the Hobo shield on later temperatures. This involved filtering the data from the entire year to include only those 15-minute observations in which the light was > 10,000 units one hour earlier, and < 5000 in the present period. If there is a lagged effect, I would expect this relationship to have a steeper slope than the previous relationships, because the temperature difference would be larger than predicted by the current light level. However, this relationship (n = 503 observations) was not steeper than the other relationships, although it has a higher y-intercept, suggesting that there may be a small effect when light goes from > 10,000 units to only 1000 or so units in an hour.



Here I have plotted the potential correction relationships. They differ by at most 0.5 °C and only ~150 of the >40,000 15-minute observations at the top of the Discovery Tree fell within this range