Table of flags used in Python code for QA/QC of Hobo temperature and light sensors in the Andrews Forest. Python code developed by Matt Gregory, OSU Forest Ecosystems and Society, December 2017, using an initial version of the code created by Christina Murphy.

	Flag name	Meaning	Values*	Cleaned-Remove*	Fill? If so, how?
	Temperature flags				
1	TIME_GAP	Interval between measurements > threshold	15 or 20 min	No	n/a
2	EXTREME_TEMP	Temperature outside possible range[‡]	>42 or ≤-20°C	Yes	Yes, using regression with best fit sensor
3	JUMP	Temperature change relative to prior reading	>5°C	No	n/a
5	TEMP_SPIKE	Temperature deviates more than the threshold from a 7-record (centered) median	7°C	Yes	Yes, using regression with best fit sensor
6	SNOW	Temperature within +/- X°C for Y days	X=0.7°C Y=2 days	Yes	Yes, using regression with best fit sensor
	Light flags				
7	RADIATION_BIAS_INTENSITY	Light intensity value likely associated with ≥1.5°C bias relative to aspirated sensor	>7,000 lux	No	n/a
8	HIGH_INTENSITY	Light intensity value likely associated with ≥3°C bias relative to aspirated sensor	>18,000 lux	No	n/a
9	EXTREME_INTENSITY	Impossible value	>40,000 lux	Yes	Yes, using regression with best fit sensor
10	LOW_DAYLIGHT_INTENSITY	Light intensity reading ≤0 during daylight hours	See table	Yes	Yes, using regression with best fit sensor
11	NIGHTTIME_INTENSITY	Light intensity reading >0.1 lux during nighttime hours (defined as outside of daylight)	See table	Yes	Yes, using regression with best fit sensor
12	DAYLIGHT	Not a flag, indication of day vs night, daylight hour based on sunrise/sunset table	See table	n/a	n/a

* These can be adjusted in the 'yaml' file.
[‡] Initially this was set as the possible range that the sensor can measure which is -20 to 70°C

Additional notes and information on the flags that I found in email conversations:

LOW_DAYLIGHT_INTENSITY

We can either define as the number of records after sunrise / before sunset or time after sunrise / before sunset. For example, if sunset was 6:00 pm and the sensor got shaded at 5:50, LOW_DAYLIGHT would get flagged. So, we can either say 30 minutes before sunset or 1 or 2 records before sunset. Vice versa for NIGHTTIME_INTENSITY (This is a comment from Matt G, I am not sure how it was resolved)

TEMP_SPIKE

This flag finds temperature measurements that deviate from a rolling median of a set window. For example, right now I use 7 measurements (3 on either side of the focal measurement) to determine the median value for this window and flag the measurement if it deviates absolutely more than 7 degrees.

SNOW

At one point this was discussed as how to deal with when the sensor is under snow, but I am under the impression that the light component never got added:

For every observation:
1)   Calculate median temperature based on 7-point window (centered – so it considers three previous and three next data points). This is strictly to remove data spikes.
2)   Calculate mean temperature based on 80 previous (median-smoothed) points
3)   Calculate mean light intensity based on 80 previous (unsmoothed) points
4)   If mean temperature is between -0.5 and 0.5C and mean intensity is less than 30.0, flag as snow