Database Codes: MS045, MV008
ENTITY: 6

Table of flags used in GCE Toolbox workflow for QA/QC of MS045 and MV008 pendant temperature and intensity sensors at the Andrews Forest. QA/QC workflow developed by Adam Kennedy, OSU Forest Ecosystem and Society, Nov 2022, using GCE Toolbox for MATLAB code base created by Wade Sheldon, University of GA, Athens. QC framework designed to follow methods as described previously in MS045 and MV008 for entity 5.

HOBO pre-processor used: im_hobo_0.2A.
Metadata templates used: MV008 = FSDB_MV008; MS045 = FSDB_MS045;
Process files used: process_mv045_edi.m, process_mv045.m, process_mv008.m, process_mv008_edi.m
Harvester files used: MV008 = MV008_harvester.m; MS045 = MS045_harvester.m;

Data Removal	Flag Name	Flag	Flag Syntax, where x is the value being checked	Description	Value Check	Prop Flags
N	Time Zone Check	**NA**	See: https://bitbucket.org/hjandrews/im_hobo	Set time zone to GMT -0800	Date	
Y	DB Code Check	**'I'**	flag_notinlist(x,[MV008|MS045]) Only one dbcode will be used on production	Flag all values if db_code is not in processing array	dbcode	Temp, Intensity
Y	Entity Check	**'I'**	flag_ notinlist (x,[6] Defined for each database	Flag all values if entity is not in processing array	entity	Temp, Intensity
Y	Site Code Check	**'I'**	flag_ notinlist (x,[*SEE SITECODE LIST*]. List data located in: im_gcetoolbox\userdata\inList	Flag all values if site_code is not in processing array	sitecode	Temp, Intensity
Y	Site Type Check	**'I'**	flag_ notinlist (x,[PA,PB,PC]) Defined specifically for each dbcode. In this case, these site types are included in both MS045 and MV008	Flag all values if site_type is no in processing array	sitetype	Temp, Intensity
N	QC Level	**'Q'**	flag_ notinlist (x,[1A]). Defined as: Data is published and unlikely to change - automated range checking and manual review has been conducted.	Flag all values if qc_level is not in processing array	qclevel	Temp, Intensity
Y	Missing data	**'M'**	isnan(x)	If value is missing	Temp, Intensity	

N	Time Check	**'M'**	Fill_date_gaps() Adds timestamp when time gap between record is larger than expected. This process runs on files that have been parsed by sitecode and occurs inside the harvest workflow, not the import template.	Fill missing date/time records in a time-series dataset to create uniform time interval	Date	Adds NaN to each data field
N	Estimate (linear fill)	**'E'**	Linearly interpolated process occurs in the harvester workflow.	If <=3 records are missing	Temp	
Y	RecNum	**'I'**	x<1 Checks for record numbers less than 1.	If RecNum is less than 1	RecNum	Temp, Intensity
Y	Initial Launch Check	**'I'**	col_RecNum>=1 & col_RecNum<=3='I' Note: Because of sensor handling, the first 3 obs after launch are removed and flagged as 'M'. This executes when there is a Record Number field.	If RecNum is between 1 and 3	RecNum	Temp, Intensity
N	Check Time Components	**'Q'**	x<1 OR x>12 %month x<1 OR x>31 %day x<0 OR x>24 %hour x<0 OR x>60 %minute	Check for valid time components	Month, Day, Hour, Minute	Temp, Intensity
N	Check Time Step	**'Q'**	flag_notinarray(x,[0,20,40,15,30,45]) Checks for out of sync timesteps.	Check for valid minute values	Minute	Temp, Intensity

N	Radiation Bias Intensity	**'B'**	x>=7000 & x<=17999	If value is greater than 7000 and less than 17999,	Intensity	Temp
N	High Intensity	**'H'**	x>=18000 & x<=39000	If value is greater than 18000 and less than 39000	Intensity	Temp
Y	Extreme Intensity	**'I'**	x>40000	If value is greater than 40000	Intensity	Temp
N	Low Daylight Intensity	**'D'**	If Intensity < 5 between 0900 and 1700, flag as 'D'	Flag if lower than expected Intensity during daylight period	Intensity	Temp
N	Nighttime Intensity	**'N'**	If Intensity > 500 between 2000 and 0600, flag as 'N'	Flag if higher than expected Intensity during nighttime period	Intensity	Temp

N	High Temperature Warning	**'Q'**	x>=42 x<=44	If temperature is between 42 and 44 deg c	Temp	
Y	Extreme Temperature	**'I'**	x<=-20 x>44 (sensor range: -20 – 70 deg c)	If value is less than -20 or greater than 44	Temp	Intensity
N	Long-term Mean Reference	**'O'** **'U'**	x>col_FOURHI='O' x<col_FOURLO ='U' Note: Fudge factor (FOURHI+5deg c) applied to reduce over-flagging	If value is greater than FOURHI or less than FOURLO	Temp	
N	Temp difference (spike) from 7pt center-running window	**'S'**	abs(col_Temp-col_Temp_med_2)>=6.5='S'	If Temp value is <> 6.5 deg c than 7pt center-running window	Temp	
N	Covered Sensor (Snow)	**'C'**	** Experimental ** col_Temp_med<=0.3 & col_Temp_med>=-0.3 & col_Temp_diff <0.01 & flag_novaluechange(col_Temp_mv,0,0,7,1)='C'	** see desc below	Temp	
Y	Flag manual date ranges	**[ ]**	Eg. flag_inlist(col_SITECODE,'PA029')&flag_daterange(col_Date,{'7/11/2011 12:00:00','9/12/2011 12:00:00'})='[flag]'	Flag by sitecode and date range	[ ]	

***No flag string summaries are performed. Full flag strings remain in the dataset. Only values flagged with 'I' are removed.**

**** If the 7-pt trailing median temperature is between 0.3 and -0.3 and the one-step absolute temperature difference is less than 0.01 and the 7pt running variance on temperature difference is zero, flag as 'C'overed.**