

**Description of the
PRISM SNOTEL Single-Station QC System**

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Single-station QC (SSQC) is the first component in the SNOTEL QC system, and is invoked before station observations are ingested into the prismdb database. SNOTEL data also undergo some processing before ingestion into the prismdb database; the data are stored in the database at a daily time step, and sometimes require manipulation before doing so. This is especially true for parameters that are running accumulations, such as precipitation, snow water equivalent, and snow depth.

Abbreviations and Constants

Abbreviations

IP, AP: Daily incremental and accumulated precipitation

ISWE, ASWE: Daily incremental and accumulated snow water equivalent

ISNWD, ASNWD: Daily incremental and accumulated snow depth

TMAX, TMIN, TMEAN: Daily maximum, minimum, and mean temperature

Constants

State-wide record maximum daily IP (MAX_24HR_PPT): Varies by state; threshold may be higher to accommodate SNOTEL than other networks, because SNOTEL data are not usually included in the official statewide records

State-wide record maximum daily TMIN (MIN_TEMP): Varies by state

State-wide record maximum daily TMAX (MAX_TEMP): Varies by state

Maximum daily SWE loss (MAXSWELOSS): 152.4 mm (6")

Maximum daily snowfall (MAXSNOWGAIN): 970 mm (38.2")

Maximum daily snow depth loss (MAXSNOWLOSS): 1524 mm (60")

Number of days of consecutive quasi-equal temperatures (FLTHRESH): 10 days

Number of missing days allowed between non-missing days (FLMISS): 2

Quasi-equal temperature difference (FLDELTEMP): 0.4 degC

Data Processing

Missing data

When an observation is unavailable or untrustworthy for certain dates or parameters, it is often left blank or represented by a missing value determined by the data provider. Missing data in SNOTEL files are represented by the value -99.9 or as a blank. These are replaced with the value -9999 in keeping with established PRISM protocols. Negative precipitation and SWE accumulations are also replaced with -9999.

Malformed date

Skip entire record if date is not YYYY-MM-DD format

Missing data for all elements

If observation is -99.9 or blank, set to -9999

If accumulated AP, ASWE, or ASNWD < 0, set to -9999

Non-missing precipitation

1. Negative incremental precipitation
 - a. If previous day's IP > 0
 - i. Reset previous day's AP to the max of current day's AP or previous second day's AP
 - ii. Recalculate previous day's IP
 - iii. Recalculate current day's IP
 - b. If previous day's IP <= 0
 - i. Set current day's AP to previous day's AP
 - ii. Recalculate current day's IP
 - iii.

Temporal interval between AP, ASWE, and ASNWD observations

1. The span of days between successive, non-missing observations is calculated
 - a. If span = 0, then span is set to 1 (for first observation of Water Year)

- b. If span > 1, observation will be flagged as multiday accumulation in SSQC

SSQC Single-Element Checks

1. Missing check: if any daily ob = -9999
 - a. SSQC flag is set to FALSE
 - b. Minor flag is set to MISSING
 - c. Observation will not be entered into database
2. Accumulation check: if span for IP, ISWE, or ISNWD is > 1 day
 - a. If precip ob = 0, no accumulation is recorded so:
 - i. Span reset to 1 day
 - ii. SSQC is set to TRUE
 - b. If precip ob != 0, multiday accumulation is recorded so:
 - i. SSQC is set to FALSE
 - ii. Minor flag is set to ACCUMULATION
 - c. If element is ISWE or ISNWD, multiday accumulation and/or melt may have occurred so
 - i. SSQC is set to FALSE
 - ii. Minor flag is set to ACCUMULATION
3. Range check: IP, TMAX, TMIN, ISWE, ISNWD
 - a. If IP < 0 or IP > MAX_24HR_PPT, or
 - b. If (TMAX|TMIN) < MIN_TEMP, or
 - c. If (TMAX|TMIN) > MAX_TEMP
 - i. SSQC is set to FALSE
 - ii. Minor flag is set to RANGE
 - d. If ISWE > MAX_24HR_PPT or ISWE < MAXSWELOSS
 - i. SSQC is set to FALSE
 - ii. Minor flag is set to RANGE
 - e. If ISNWD > MAXSNOWGAIN or ISNWD < MAXSNOWLOSS
 - i. SSQC is set to FALSE
 - ii. Minor flag is set to RANGE
4. Consistency check: TMAX and TMIN
 - a. If TMAX <= TMIN, then both TMAX and TMIN have
 - i. SSQC is set to FALSE
 - ii. Minor flag is set to TMAX<=TMIN
 - iii. TMAX<=TMIN is used instead of TMAX<TMIN because sensors are electronic and have relatively high precision
5. Flatline check: TMAX and TMIN
 - a. If TMAX(day) is within FLDELTEMP of TMAX(day+1) for more than FLTHRESH days, and the number of intervening missing days is less than FLMISS
 - i. SSQC is set to FALSE
 - ii. Minor flag is set to FLATLINE

- b. If $TMIN(day)$ is within $FLDELTEMP$ of $TMIN(day+1)$ for more than $FLTHRESH$ days, and the number of intervening missing days is less than $FLMISS$
 - i. $SSQC$ is set to $FALSE$
 - ii. Minor flag is set to $FLATLINE$