CHAPTER 38

SWAT INPUT DATA: .SNO

Users can input snow variables by elevation band for each subbasin. If these values are not input, all variable default back to the snow related variables in the .bsn file (see Chapter 4)

The .sno file is an optional file

Variable name	Definition
SUB_SFTMP	Snowfall temperature (ºC).
	Mean air temperature at which precipitation is equally likely to be rain as snow/freezing rain. The snowfall temperature should be between –5 ºC and 5 ºC.
	A default recommended for this variable is SFTMP = 1.0.
	Required in watersheds where snowfall is significant.
SUB_SMTMP	Snow melt base temperature (ºC).
	The snow pack will not melt until the snow pack temperature exceeds a threshold value, T_{mlt}. The snow melt base temperature should be between –5 ºC and 5 ºC.
	A default recommended for this variable is SMTMP = 0.50.
	Required in watersheds where snowfall is significant.
SUB_SMFMX	Melt factor for snow on June 21 (mm H_2O/ºC-day).
	If the watershed is in the Northern Hemisphere, SMFMX will be the maximum melt factor. If the watershed is in the Southern Hemisphere, SMFMX will be the minimum melt factor. SMFMX and SMFMN allow the rate of snow melt to vary through the year. The variables account for the impact of snow pack density on snow melt.
	In rural areas, the melt factor will vary from 1.4 to 6.9 mm H_2O/day-°C (Huber and Dickinson, 1988). In urban areas, values will fall in the higher end of the range due to compression of the snow pack by vehicles, pedestrians, etc. Urban snow melt studies in Sweden (Bengston, 1981; Westerstrom, 1981) reported melt factors ranging from 3.0 to 8.0 mm H_2O/day-°C. Studies of snow melt on asphalt (Westerstrom, 1984) gave melt factors of 1.7 to 6.5 mm H_2O/day-°C.
	If no value for SMFMX is entered, the model will set SMFMX = 4.5.
	Required in watersheds where snowfall is significant.

Variable name	Definition
SUB_SMFMN	Melt factor for snow on December 21 (mm H_2O/ºC-day).
	If the watershed is in the Northern Hemisphere, SMFMN will be the minimum melt factor. If the watershed is in the Southern Hemisphere, SMFMN will be the maximum melt factor. SMFMX and SMFMN allow the rate of snow melt to vary through the year. The variables account for the impact of snow pack density on snow melt.
	In rural areas, the melt factor will vary from 1.4 to 6.9 mm H_2O/day-°C (Huber and Dickinson, 1988). In urban areas, values will fall in the higher end of the range due to compression of the snow pack by vehicles, pedestrians, etc. Urban snow melt studies in Sweden (Bengston, 1981; Westerstrom, 1981) reported melt factors ranging from 3.0 to 8.0 mm H_2O/day-°C. Studies of snow melt on asphalt (Westerstrom, 1984) gave melt factors of 1.7 to 6.5 mm H_2O/day-°C.
	If no value for SMFMN is entered, the model will set SMFMN = 4.5.
	Required in watersheds where snowfall is significant.
SUB_TIMP	Snow pack temperature lag factor.
	The influence of the previous day's snow pack temperature on the current day's snow pack temperature is controlled by a lagging factor, ℓ_{sno}. The lagging factor inherently accounts for snow pack density, snow pack depth, exposure and other factors affecting snow pack temperature. TIMP can vary between 0.01 and 1.0. As ℓ_{sno} approaches 1.0, the mean air temperature on the current day exerts an increasingly greater influence on the snow pack temperature and the snow pack temperature from the previous day exerts less and less influence. As TIMP goes to zero, the snow pack's temperature will be less influenced by the current day's air temperature.
	If no value for TIMP is entered, the model will set TIMP = 1.0.
	Required in watersheds where snowfall is significant.

The format of the snow update file is:

Variable name	Line #	Position	Format	F90 Format
SUB_SFTMP(1)	1	space 1-8	Decimal (xxxx.xxx)	f8.3
SUB_SFTMP(2)	1	space 9-16	Decimal (xxxx.xxx)	f8.3
SUB_SFTMP(3)	1	space 17-24	Decimal (xxxx.xxx)	f8.3
SUB_SFTMP(4)	1	space 25-32	Decimal (xxxx.xxx)	f8.3
SUB_SFTMP(5)	1	space 33-40	Decimal (xxxx.xxx)	f8.3
SUB_SFTMP(6)	1	space 41-48	Decimal (xxxx.xxx)	f8.3
SUB_SFTMP(7)	1	space 49-56	Decimal (xxxx.xxx)	f8.3
SUB_SFTMP(8)	1	space 57-64	Decimal (xxxx.xxx)	f8.3
SUB_SFTMP(9)	1	space 65-72	Decimal (xxxx.xxx)	f8.3
SUB_SFTMP(10)	1	space 73-80	Decimal (xxxx.xxx)	f8.3
SUB_SMTMP(1)	2	space 1-8	Decimal (xxxx.xxx)	f8.3
SUB_SMTMP(2)	2	space 9-16	Decimal (xxxx.xxx)	f8.3
SUB_SMTMP(3)	2	space 17-24	Decimal (xxxx.xxx)	f8.3
SUB_SMTMP(4)	2	space 25-32	Decimal (xxxx.xxx)	f8.3
SUB_SMTMP(5)	2	space 33-40	Decimal (xxxx.xxx)	f8.3
SUB_SMTMP(6)	2	space 41-48	Decimal (xxxx.xxx)	f8.3
SUB_SMTMP(7)	2	space 49-56	Decimal (xxxx.xxx)	f8.3
SUB_SMTMP(8)	2	space 57-64	Decimal (xxxx.xxx)	f8.3
SUB_SMTMP(9)	2	space 65-72	Decimal (xxxx.xxx)	f8.3
SUB_SMTMP(10)	2	space 73-80	Decimal (xxxx.xxx)	f8.3
SUB_SMFMX(1)	3	space 1-8	Decimal (xxxx.xxx)	f8.3
SUB_SMFMX(2)	3	space 9-16	Decimal (xxxx.xxx)	f8.3
SUB_SMFMX(3)	3	space 17-24	Decimal (xxxx.xxx)	f8.3
SUB_SMFMX(4)	3	space 25-32	Decimal (xxxx.xxx)	f8.3
SUB_SMFMX(5)	3	space 33-40	Decimal (xxxx.xxx)	f8.3
SUB_SMFMX(6)	3	space 41-48	Decimal (xxxx.xxx)	f8.3
SUB_SMFMX(7)	3	space 49-56	Decimal (xxxx.xxx)	f8.3
SUB_SMFMX(8)	3	space 57-64	Decimal (xxxx.xxx)	f8.3
SUB_SMFMX(9)	3	space 65-72	Decimal (xxxx.xxx)	f8.3
SUB_SMFMX(10)	3	space 73-80	Decimal (xxxx.xxx)	f8.3

Variable name	Line #	Position	Format	F90 Format
SUB_SMFMN(1)	4	space 1-8	Decimal (xxxx.xxx)	f8.3
SUB_SMFMN(2)	4	space 9-16	Decimal (xxxx.xxx)	f8.3
SUB_SMFMN(3)	4	space 17-24	Decimal (xxxx.xxx)	f8.3
SUB_SMFMN(4)	4	space 25-32	Decimal (xxxx.xxx)	f8.3
SUB_SMFMN(5)	4	space 33-40	Decimal (xxxx.xxx)	f8.3
SUB_SMFMN(6)	4	space 41-48	Decimal (xxxx.xxx)	f8.3
SUB_SMFMN(7)	4	space 49-56	Decimal (xxxx.xxx)	f8.3
SUB_SMFMN(8)	4	space 57-64	Decimal (xxxx.xxx)	f8.3
SUB_SMFMN(9)	4	space 65-72	Decimal (xxxx.xxx)	f8.3
SUB_SMFMN(10)	4	space 73-80	Decimal (xxxx.xxx)	f8.3
SUB_TIMP(1)	3	space 1-8	Decimal (xxxx.xxx)	f8.3
SUB_TIMP(2)	3	space 9-16	Decimal (xxxx.xxx)	f8.3
SUB_TIMP(3)	3	space 17-24	Decimal (xxxx.xxx)	f8.3
SUB_TIMP(4)	3	space 25-32	Decimal (xxxx.xxx)	f8.3
SUB_TIMP(5)	3	space 33-40	Decimal (xxxx.xxx)	f8.3
SUB_TIMP(6)	3	space 41-48	Decimal (xxxx.xxx)	f8.3
SUB_TIMP(7)	3	space 49-56	Decimal (xxxx.xxx)	f8.3
SUB_TIMP(8)	3	space 57-64	Decimal (xxxx.xxx)	f8.3
SUB_TIMP(9)	3	space 65-72	Decimal (xxxx.xxx)	f8.3
SUB_TIMP(10)	3	space 73-80	Decimal (xxxx.xxx)	f8.3