ohd.hseb.dhm.specs.ModSpecifications

DHM Precipitation Mods

A DHM precipitation (DPRECIP) mod is a multiplier used to edit the hourly accumulated precipitation for each grid cell in a basin. DPRECIP mods are applied over a time interval within the observed data period. DPRECIP mods contain the following information

precip mod contents	`.DPRECIP 1201200612z 1202200612z 1205200612z 2.0`

mod file description	
value in mod file	meaning
.DPRECIP	keyword denoting a DHM precip modification
1201200612z	star date and time (when the modified observed precipitation starts (inclusive))
1202200612z	end date and time (when the modified observed precipitation ends (non-inclusive))
1205200612z	valid date and time (when the mod expires)
2.0	the multiplier used to adjust the observed precip (i.e. values less than 1.0 are reductions in precip and vice-versa)

Has the mod expired?

DHM determines if the precip mod has expired by comparing the mod's valid date and time (i.e. when the mod was created) to the model run's date and time;
For example if the model is run at 12/02/2006 12z, then:

test valid date and time		
mod valid date and time	model run date and time	has the mod expired

12/01/2006 12z	12/02/2006 12Z	yes
12/02/2006 12z	12/02/2006 12Z	no
12/02/2006 13z	12/02/2006 12Z	no
12/03/2006 12z	12/02/2006 12Z	no

Expired Mods

When a precip mod has expired, the mod's end date and time may automatically change to the valid date and time. For example if a precip mod with a valid date and time of 12/02/2006 12z has expired, then the following should be true:

test expired mod		
mod valid date and time	mod end date and time	mod end date and time for expired mod
12/02/2006 12z	12/01/2006 12z	12/01/2006 12z
12/02/2006 12z	12/02/2006 12z	12/02/2006 12z
12/02/2006 12z	12/03/2006 12z	12/02/2006 12z

When to Apply Mods

DPRECIP mods are only applied for model time steps within the mod's start and end date window. For example, if the model is run for the one-day period of 12/02/2006 to 12/03/2006. Then:

test mod application			
mod start date and time	mod end date and time	model time step date and time	is mod applied
12/02/2006 12z	12/03/2006 12z	12/02/2006 18z	yes
12/02/2006 12z	12/03/2006 12z	12/05/2006 18z	no
12/02/2006 12z	12/03/2006 12z	12/02/2006 12z	yes

12/02/2006 12z	12/03/2006 12z	12/03/2006 12z	no
12/01/2006 12z	12/03/2006 12z	12/02/2006 18z	yes

Rules for Modifying Values

A DPRECIP mod decreases or increases the observed hourly accumulated precipitation in each cell by multiplying the mod value and the original cell value

apply precip mod with start date and time	12/02/2002 12z	end date and time	12/04/2002 12z	and value	1.2
original value	model time step date and time	new precip value()			
1	12/03/2002 12z	1.2			
0.1	12/03/2002 12z	0.12			
0	12/03/2002 12z	0.0			
2.0	12/05/2002 12z	2.0			

Valid Precipitation Mods

Valid precip mods have a mod start date and time must be before the mod end date and time

test valid mod		
mod start date and time	mod end date and time	are dates valid()
12/01/2006 12z	12/02/2006 12z	yes
12/02/2006 12z	12/01/2006 12z	error
12/01/2006 12z	12/01/2006 12z	error

Valid precip mods have values greater than or equal to zero

test valid mod	
mod value	is mod value valid()
1.2	yes
0.0	yes
-1.2	error

Multiple Precipitation Mods

Multiple DPRECIP mods is also supported. Any overlapping periods result in a cumulative effect. For example, if the following mods are defined, the following should be true.

precip mod contents	`.DPRECIP 1201200312z 1203200312z 1205200312z 2.0` `.DPRECIP 1202200312z 1204200312z 1205200312z 2.0`

check modified precip values		
original value	model time step date and time	new precip value()
1	12/02/2003 06z	2.0
1	12/02/2003 12z	4.0
0.1	12/03/2003 11z	0.4
0.0	12/03/2003 11z	0.0
1.1	12/03/2003 12z	2.2
1.1	12/03/2003 18z	2.2
2.0	12/04/2003 12z	2.0

1.1	12/04/2003 18z	1.1

DHM Sac-State Mods

A DHM Sac-State (DSACST) mod is one or more multipliers used to edit the sacramento model state variables for each grid cell in a basin.
The mod is applied for a single time step within the observed data period. DSACST mods contain the following information

sac state mod contents	`.DSACST 1201200612z UZTWC 2.0 UZFWC 2.0 LZTWC 2.0 LZFSC 2.0 LZFPC 2.0 ADIMPC 2.0`

mod file description	
value in mod file	meaning
.DSACST	keyword denoting a DHM sac-state modification
1201200612z	date and time (when the sac-state modification is applied)
UZTWC 2.0, UZFWC 2.0, LZTWC 2.0, LZFPC 2.0, LZFSC 2.0, and/or ADIMC 2.0	sac-state keyword and multiplier pair (one or more values are specified on the same line)

Rules for Modifying Values

A DSACST mod decreases or increases the model computed sac state in each cell by multiplying the mod value and the original cell value.
In cases where applying the mod causes the new value to be greater than the corresponding maximum parameter value, the sac state is set to the maximum parameter value. For example

apply sac state mod with date and time	12/02/2002 12z	and value	2.0
sac state identifier	original value	maximum parameter value	new sac state value()

additional impervious area water contents	5	10	10
lower zone tension water contents	10.0	100	20.0
lower zone free primary water contents	50.0	70	70.0

Specifying Mod Values

DSACST mods are specified using {state name, mod value} pairs. Each DSACST mod can specify 1 - 6 pairs. For example if the following mod is defined,

sac state mod contents	`.DSACST 1201200612z UZTWC 2.0 UZFWC 2.0 LZTWC 2.0 LZFSC 2.0 LZFPC 2.0 ADIMPC 2.0`

then the following must be true:

test if sac state mod is defined		
date and time	sac state identifier	is sac state mod defined
12/01/2006 12z	upper zone tension water contents	yes
12/01/2006 12z	upper zone free water contents	yes
12/01/2006 12z	lower zone tension water contents	yes
12/01/2006 12z	lower zone free primary water contents	yes
12/01/2006 12z	lower zone free secondary water contents	yes
12/01/2006 12z	additional impervious area water contents	yes

and if another mod is defined:

sac state mod contents	`.DSACST 1201200612z UZTWC 2.0 UZFWC 2.0`

then the following must be true:

test if sac state mod is defined		
date and time	sac state identifier	is sac state mod defined
12/01/2006 12z	upper zone tension water contents	yes
12/01/2006 12z	upper zone free water contents	yes
12/01/2006 12z	lower zone tension water contents	no
12/01/2006 12z	lower zone free primary water contents	no
12/01/2006 12z	lower zone free secondary water contents	no
12/01/2006 12z	additional impervious area water contents	no

Multiple Sac State Mods

Multiple sac state mods is also supported. Any mods specified for the same date cause a cumulative effect. For example, if the following mods are defined, the following should be true.

sac state mod contents	`.DSACST 1201200612z UZTWC 2.0 LZFSC 2.0 ADIMPC 2.0` `.DSACST 1201200612z UZTWC 2.0`

check modified sac state values on	12/01/2006 12z		
sac state identifier	original value	maximum parameter value	new sac state value()
additional impervious area water contents	5	10	10
upper zone tension water contents	10.0	100	40.0
lower zone free secondary water contents	50.0	70	70.0

lower zone free primary water contents	20.0	70	20.0

Defining Multiple Mod Types

combining DPRECIP and DSACST mods is also supported

For example, if the following mods are defined, the following should be true.

combined mod contents	`.DSACST 1201200612z UZTWC 2.0 LZFSC 2.0 ADIMPC 2.0` `.DPRECIP 1201200612z 1203200612z 1205200612z 2.0`

test if sac state mod is defined		
date and time	sac state identifier	is sac state mod defined
12/01/2006 12z	upper zone tension water contents	yes
12/01/2006 12z	lower zone tension water contents	no

test if precip mod is defined	
date and time	is precip mod defined
12/01/2006 12z	yes
12/05/2006 12z	no

and for combined multiple mods the following should be true

combined mod contents	`.DSACST 1201200612z UZTWC 2.0 LZFSC 2.0 ADIMPC 2.0`
	`.DSACST 1201200612z UZTWC 2.0`
	`.DPRECIP 1201200312z 1203200312z 1205200312z 2.0`
	`.DPRECIP 1202200312z 1204200312z 1205200312z 2.0`

check modified sac state values on	12/01/2006 12z		
sac state identifier	original value	maximum parameter value	new sac state value()
upper zone tension water contents	10.0	100	40.0

check modified precip values		
original value	model time step date and time	new precip value()
1	12/02/2003 12z	4.0