TSTOOL – TIME SERIES TOOL

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Quick Start Manual for Regression Fill of Climate Data

March 2012

Introduction

This Quick Start Manual is a very shortened and step-by-step description of what the model can perform. Should you desire to learn how to develop further complex analysis, the TSTool Documentation manual is far more extensive than this manual.

For many climate stations within HydroBase, the data may only go back to around 1950, however, diversion records may go back to around 1900. Where a year-by-year analysis is to be conducted for the full period of record of the structure diversions, this tool will provide an avenue to back fill the data for precipitation, temperature, and frost date.

Users outside of the state system will need to obtain a copy of HydroBase from the Division of Water Resources Records Section and install that data on their system to use TSTool.

Getting Started

TSTools can be downloaded by going to http://cdss.state.co.us/Pages/CDSSHome.aspx The program will take a minute to open up. Once open, the table on the front page of this manual and an overlapping table should be shown.

Select HydroBase										
Connection: Use SQL Server Database 💌										
Database Hostname: WRAPPSDB\HYDROBASE										
Database Names: HydroBase_CDSS										
OK Cancel										
Select the HydroBase to open.										

Press OK.

Temperature and Precipitation Regression

On the main table, click the drop down menu and scroll to Climate – TempMean and highlight it. Climate - TempMean should now be within the Data Type box. It is best to use the TempMean to find a climate station that is statistically similar to the station you want to fill. It is best to find a fill from station that has a long period of record and is somewhat close in proximity; however, this is not always the case.



To find climate stations with long periods of records, it may be best to pull down all the climate stations in the Division. For this example, the first drop down for "Where", highlight Division, then to the right highlight Arkansas in that drop down. Press the "Get Time Series List" and the climate stations in Division 2 should show up under the Time Series List



You will want to scroll to the right on the "Time Series List" and find the start dates.

For this example, Pueblo Memorial will be the station to regression fill. Right click on the start date then click on Sort Ascending. This will put the stations in order of first date. There should be about 4 stations that have a period of record of 1893 - 2010. One of these stations will be used for a regression fill for Pueblo Memorial

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Input type: Hydrobase	1 1778		COLORADO SPRINGS MUNI AP	NOAA	TempMean	Month		1948	Sort Ascending	753 👗
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Data type: Cimate - TempMean	3 3063		FOUNTAIN	NOAA	TempMean	Month		1947	Original Order	2
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Where: 🛛 Matches 🗸	6 4/50 7 5730		LAKE MURAINE MONUMENT 2 WSW	NOAA	TempMean	Month		1094	1959	631
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Data type: Climate - TempMean	2 4834		LAS ANIMAS	NOAA	TempMean Mo	onth	1	1893	2010	
Time step: Month	3 /16/		ROCKY FORD 2 SE	NOAA	TempMean Mo	onth		1893	2010	_
Where: Division	5 4750		LAKE MORAINE	NOAA	TempMean Mo	onth		1894	1959	_
Where White White W	6 1660		CLIMAX	NOAA	TempMean Mo	onth /		1895	2010	
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It is easiest to set the input period up front, saving time by not having to input the data on following tables. Under Commands, click on Read Time Series, then on the right, click on SetInputPeriod.

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File Edit View	Commands Run Results Tools Help							
Input/Query Options	Create Time Series	Time Series List (107 time series, 0 selected)						
Input type: HydroB	Convert TS Identifier to Read Command 🕨	ID CO Abbrev. Name/Description Data Source	Data Type Tim	e Step	Units	Start	End	
Input name: 🖂	Read Time Series	SetIncludeMissingTS() <create data="" empty="" if="" no="" series="" time=""></create>	empMean Mon	th		1893	2010	^
Data type: Climate	Fill Time Series Missing Data	SetInputPeriod() <for data="" reading=""></for>	empMean Mon	th th		1893	2010	
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Where: Division	Manipulate Time Series	ReadDateValue() <read 1(+)="" a="" datevalue="" file="" from="" series="" time=""></read>	empMean Mon	th		1894	1959	
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Where:	Models - Routing	ReadHydroBase() <read 1(+)="" from="" hydrobase="" series="" time=""></read>	empMean Mon	th		1895	2010	Ň
	Output Time Series	ReadMODSIM() <read 1(+)="" a="" file="" from="" modsim="" output="" ries="" time=""></read>				-		
	ouput time series	ReadStateCU() <read 1(+)="" a="" file="" from="" series="" statecu="" time=""></read>				l	Copy All to Com	mands
Commands (0 comma	HydroBase 🕨	ReadStateCUB() <read 1(+)="" a="" binary="" file="" from="" output="" series="" statecu="" time=""></read>						
1	Frankla Provincia	ReadStateMod() <read 1(+)="" a="" file="" from="" series="" statemod="" time=""></read>						
2	Ensemble Processing	ReadStateModB() <read 1(+)="" a="" binary="" file="" from="" output="" series="" statemod="" time=""></read>						
3	Table Processing	ChateMedMay() connects 1(1) time caries as May() of TC in two ChateMed files)	_					
4		StateModMax() < generate 1(+) time series as Max() of 15 in two StateMod nies>	_					
5	i empiate Processing	TS Alias = ReadDateValue() <read 1="" a="" datevalue="" file="" from="" series="" time=""></read>						
6	View Processing	TS Alias = ReadHydroBase() <read 1="" from="" hydrobase="" series="" time=""></read>						
7		TS Alias = ReadMODSIM() <read 1="" a="" file="" from="" modsim="" output="" series="" time=""></read>						
8	General - Checking/Testing Results	TS Alias = ReadRiverWare() <read 1="" a="" file="" from="" riverware="" series="" time=""></read>						
9	General - Comments	TS Alias = ReadTimeSeries() <read 1="" a="" full="" given="" series="" time="" tsid=""></read>						
10	General - File Handling 🔹 🕨	TS Alias = Read I loss Nwis() < read 1 time series from a USGS NWIS file>						
11	General - Logging							
12	General - Running							
13	General - Test Processing							
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Open a command file or	add new commands.				0%	1	0%	Ready

Enter your period of record for the analysis and be sure to follow the format. You need to only enter the start and end date, the program will write the command for you in the command box. The period of record for this analysis is set for 1911 through 2010. StateCU will not run an analysis that is longer than 100 years.

• Edit Set	InputPeriod() Command 🛛 🛛 🔀										
Use this command only if a limited data period is necessary (e.g., to improve performance). Using a SetInputPeriod() command may result in incomplete data being available for data filling. Enter date/times to a precision appropriate for time series being read. For example: Year data: YYYY Month data: MM/YYYY or YYYY-MM Day data: MM/DD/YYYY or YYYY-MM-DD Hour data: MM/DD/YYYY HH or YYYY-MM-DD HH Minute data: MM/DD/YYYY HH:mm or YYYY-MM-DD HH:mm Special values are also recognized (for all precisions): CurrentToYear = the current date to year precision CurrentToMinute = the current date/time to minute precision CurrentToMinute + 7Day = current date/time plus 7 days Leave blank to read all available data (default if SetInputPeriod() command is not used).											
Input period start:	1911										
Input period end:	2010										
Command:	SetInputPeriod(InputStart="1911",InputEnd=" 2010")										
	Cancel OK										

Once you press OK, the command will show up as the first command in the main table.

Scroll down on the Time Series List till you find Pueblo Memorial. Highlight it and then press the Copy to Selected Commands. This will bring the Pueblo Memorial station down into your commands list. You always want the station to be filled listed first, then the station to fill from.

vpe: HydroBase	- Time Series List (107 time cories	1 selected)-							
type: HydroBase 🗸 🗸	Inte Series List (107 diffe Series)	, I selected)	u		In (T		lu-re-	latt	le a
		CO Abbrev.	Name/Description	Data Source	Data Type	Time Step	Units	Start	End
ame: 🗸	49 0434		SPRINGERED & S	NOAA	Templiean	Month		1940	1964
type: Climate - TempMean 🗸	51 5017		LIMON	NOAA	TempMean	Month		1948	1971
step: Month 🗸	52 8574		UTLEYVILLE	NOAA	TempMean	Month		1951	1956
Division V Equals V 2 - Arkansas V	53 0437		AYER RANCH	NOAA	TempMean	Month		1953	1953
Matchen W	54 6740		PUEBLO MEMORIAL AP	NOAA	TempMean	Month		1954	2011
	55 8157		TACONY 10 SE	NOAA	TempMean	Month		1955	2010
Matches V	<								
Get Time Series List	Copy Selected to Commands								Copy All to Com
Selected Commands Run All Commands									Clear Comn
bles Output Files Problems Tables Time Series Views									
series, 0 selected									

Next, back to the top of the Time Series List, highlight the stations with the long periods of record and copy them down to the commands list. Use your best judgment in deciding which stations to pick. For this example, Las Animas, Rocky Ford 2 SE, and Lamar were chosen. Copy the selected 4 stations down.

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File Edit View Commands Run Results Tools Help							
Input/Query Options	Time Series List (107 time serie	es, 3 selected)					
	ID	CO Abbrev. Name/Description	Data Source	Data Type	Time Step	Units	Start
	1 1294	CANON CITY	NOAA	TempMean	Month		1893 🔨
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Data type: Climate - Tempilean	3 7167	ROCKY FORD 2 SE	NOAA	TempMean	Month		1893
Time step: Month	4 4770	LAMAR	NOAA	TempMean	Month		1893
Where: Division V Equals V 2 - Arkansas V	5 4/50 6 1660		NOAA	TempMean	Month		1895
Where: Matches V	7 8931	WESTCLIFFE	NOAA	TempMean	Month		1895
Where: Matches	<				1		>
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Commands (8 commands, 0 selected, 0 with failures, 0 with warnings)							
1 177.8 COLORADO SPEJIOS MORL AP 1 177.8 NOAA. TempMean.Month-HydroBase 1 4834. NOAA. TempMean.Month-HydroBase 1 78. NOAA. TempMean.Month-HydroBase 1 716. NOAA. TempMean.Month-HydroBase 1 716. NOAA. TempMean.Month-HydroBase 1 74. A770. NOAA. TempMean.Month-HydroBase 1 74. A770. NOAA. TempMean.Month-HydroBase 10 10 110 10 10 10 10 10 110 10 111 Run Selected Commands Run Selected Commands Time Series 10 10 111 Run Selected Commands 112 Run Selected Commands 113 Run Selected Commands 114 Time Series 115 Selected 11 COLORADO SPRINGS MUNI AP - 1778.NOAA. TempMean.Month (1949-01 to 2010-12) 11 COLORADO SERINGS MUNI AP - 1778.NOAA. TempMean.Month (1893-01 to 2010-12) 12 LAS ANIMAS - 4834.NOAA. TempMean.Month (1893-01 to 2010-12) <t< td=""><td>2011-05)</td><td></td><td></td><td></td><td></td><td>Clear</td><td>Commands</td></t<>	2011-05)					Clear	Commands
Completed running commands. Use Results and Tools menus.				100	0%	100%	Ready

To determine which of the 3 stations should be used for the fill, see which station is statistically similar.

Press the Run All Commands button and 4 lines of results shows in the bottom window. Highlight the Pueblo Memorial line and the Las Animas line, right click on your mouse, and a pop up window will open, click on the Graph – XY Scatter and a graph will open up.



Right click your mouse on the table, then click Analysis Details.

On this table the R² value is 0.9910. The closer the value is to 1.0, the better.

🛇 TSTool - Analysis Details										
Independent time series (X, 1911-01 - 2010-01): 4834.NOAA.TempMean.Month (LAS ANIMAS) F Dependent time series (Y, 1911-01 - 2010-01): 1778.NOAA.TempMean.Month (COLORADO SPRINGS MUNI AP, fill OLSRegression using 4834.N Analysis period: 1911-01 to 2010-01 Analysis method: Ordinary Least Squares Regression Data transformation: None Number of equations: 1										
Independent (X) I Mon N1 MeanX1 SX1 N2 MeanX2 SX2 MeanX SX SX										
A11 1152 53.95 17.46 0 0.00 0.00 53.95 17.46										
Dependent (Y) Line Fit Results Mon MeanY1 SY1 MeanY SY A B R R^2 RMSE										
A11 48.52 15.23 0.00 0.00 1.66 0.87 0.9955 0.9910 6.08										
N1 indicates analysis period where X and Y are non-missing. N2 indicates analysis period where only X is non-missing. The N2 and full period values are provided as information but are not considered in the regression analysis. MeanX and SX are for the dependent available period (may be different than the analysis period). RMSE = sqrt(sum((Y1 - X1)^2)/N1), where Y1 is dependent and X1 is independent. Independent time series (X, 1911-01 - 2010-01): 4834.NOAA.TempMean.Month (LAS ANIMAS) F Dependent time series (Y, 1911-01 - 2010-01): 1778.NOAA.TempMean.Month (COLORADO SPRINGS MUNI AP, fill OLSRegression using 4834.N Analysis period: 1911-01 to 2010-01 Analysis method: Ordinary Least Squares Regression										
Number of equations: 1										
Search Print Save Close										
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Repeat this analysis for the other 2 stations. For this analysis, it appears that Rocky Ford is the best climate station to use.

Return back to the main table and highlight the commands for the 2 stations that are not going to be used, you can either right click and cut them out or "comment" them out, so it could be shown what stations were originally reviewed but not used.)

Under Commands, highlight the Fill Time Series Missing Data, and then click on the FillRegression

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File Edit View	Commands Run Results Tools Help												
Input/Query Options	Create Time Series	•-	Time Series List (10	07 time series, 3	selected) —								
Input type: HydroP	Convert TS Identifier to Read Comman	id 🕨	ID		CO Abbrev.	Name/Description	Data Source	Data Type	Time Step	Units	Start	End	
Input type. Hydrob	Road Time Series	Ĩ.	1 1294			CANON CITY	NOAA	TempMean	Month		1893	2010	~
Input name: 💟	rill Time Genes		FillConstant()	fill TC with co	notant>			TempMean	Month		1893	2010	, - -
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7 7167.NOA	View Processing	<u> </u>	FillRepeat() <fill< td=""><td>I TS by repeat</td><td>ting values></td><td>></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></fill<>	I TS by repeat	ting values>	>							
8 # 4770 -	view indeessing	_	FillUsingDiversion	Comments()	. <use dive<="" td=""><td>rsion comments as data -</td><td>HydroBase ONLY></td><td></td><td></td><td></td><td></td><td></td><td></td></use>	rsion comments as data -	HydroBase ONLY>						
9 4770. NOA/	General - Checking/Testing Results												
11	General - Comments		SetAutoExtendPeri	iod() <for d<="" td=""><td>lata filling a</td><td>nd manipulation></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></for>	lata filling a	nd manipulation>							
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	General - File Handling	1	SetIgnoreLEZero()) <ignore td="" va<=""><td>alues <= 0</td><td>in historical averages></td><td></td><td></td><td colspan="4"></td><td></td></ignore>	alues <= 0	in historical averages>							
Results-	General - Logging					, i i i i i i i i i i i i i i i i i i i							
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Open a command file or	r add new commands.								0	%	γ	0%	Readv
		_									· · · · ·		

This table will open up and show the time series to be filled and the independent time series to be filled from. The drop down for the independent will show the other stations to be filled from. For the Number of equations, choose OneEquation.

• Edit FillReg	res	sion() command		X						
Fill missing data using ord	inary le	east squares (OLS) regression.								
The analysis period is use	d to de	etermine relationships used for fil	ling.							
Use a SetOutputPeriod()	comma	and before reading to extend the	dependent time series, if necessary.							
Specify dates with precisi	on app	propriate for the data, use blank	for all available data, OutputStart, or OutputEnd.							
Time series to fill (depend	ent):	6740.NOAA.TempMean.Month		*						
Independent time se	eries:	7167.NOAA.TempMean.Month		~						
Number of equat	ions:	OneEquation 🖌	Optional - number of equations (default=OneEquation).							
Analysis m	onth:	~	Optional - use with monthly equations (default=process all months).							
Transforma	ation:	×	Optional - how to transform data before analysis (blank=None).							
Inter	cept:		Optional - blank or 0.0 are allowed with no transformation.							
Analysis pe	eriod:		to							
Fill Pe	eriod:		to							
Fill	flag:		Optional - 1-character flag to indicate fill.							
		FillRegression(TSID	="6740.NOAA.TempMean.Month",IndependentTSID	="						
		7167.NOAA.TempMean.M	NumberOfEquations=OneEquation)							
Comm	nand:									
		Ca								

If the SetInputPeriod is not set up as the first command in the beginning, then the analysis period will need to be filled in for remaining tables.

Press OK and the following command above should be written in the command box of the main table.

Now that you have your command files for a regression fill from the Rocky Ford Station, you can either fill any additional missing data with another climate station or write an additional command to fill any missing data with average historic monthly data.

o TSTool - r	o commands saved														
File Edit View	Commands Run Results Tools Help														
-Input/Query Options	Create Time Series	•	Time Series List (107 time series,	3 selected)-											
Input type: HydroB	Convert TS Identifier to Read Comman	d)	ID	CO Abbrev	Name/Description	Data Source	Data Type	Time Step	Units	Start	End				
Input name: 🔍	Read Time Series	•	1 1294		CANON CITY	NOAA	TempMean	Month		1893	2010				
Data type: Climate	Fill Time Series Missing Data	•	FillConstant() <fill o<="" th="" ts="" with=""><td>:onstant></td><td></td><td></td><td>TempMean</td><td>Month</td><td></td><td>1893</td><td>2010</td></fill>	:onstant>			TempMean	Month		1893	2010				
Time step: Month	Set Time Series Contents	•	FillDayTSFrom2MonthTSAnd1	DayTS() <	fill daily time series using l	D1 = D2*M1/M2>	TempMean	Month		1893	2010				
Where: Division	Manipulate Time Series	•	FillFromTS() <fill serie<="" th="" time=""><td>s with value</td><td>s from another time series</td><td>></td><td>TempMean</td><td>Month</td><td></td><td>1894</td><td>1959</td></fill>	s with value	s from another time series	>	TempMean	Month		1894	1959				
Where:	Analyze Time Series	•	FillHistMonthAverage() <fill< th=""><td>monthly TS</td><td>using historic average></td><td>TempMean</td><td>Month</td><td></td><td>1895</td><td>2010</td></fill<>	monthly TS	using historic average>	TempMean	Month		1895	2010					
Where:	Models - Routing	,	FillHistYearAverage() <fill th="" ye<=""><td>early TS usir</td><td>ng historic average></td><td>TempMean</td><td>Month</td><td>1</td><td>1895</td><td>2010</td></fill>	early TS usir	ng historic average>	TempMean	Month	1	1895	2010					
	Output Time Series	,	FillInterpolate() <fill th="" ts="" usir<=""><td colspan="11">erpolate() < fill TS using interpolation></td></fill>	erpolate() < fill TS using interpolation>											
·		-	FillMixedStation() < fill TS us	dStation() < fill TS using mixed stations (under development)>											
Commands (6 comma	Commands (6 comma HydroBase FillMOVE2() < fill TS using MOVE2 method>														
<pre>1 SetInputP(2 # 1778 - ()</pre>	Ensemble Processing	•	FillPattern() <fill th="" ts="" using="" v<=""><td colspan="12">rez() <imi 5="" i="" internov="" muvez="" using=""> em() <fill avg="" dry="" pattern="" ts="" using="" wet=""></fill></imi></td></fill>	rez() <imi 5="" i="" internov="" muvez="" using=""> em() <fill avg="" dry="" pattern="" ts="" using="" wet=""></fill></imi>											
3 1778.NOAA.	Table Drasasing		ReadPatternFile() < for use	with FillPat	tern() >										
4 # 7167 - 1	Table Processing	<u>'</u>	FillProrate() <fill by="" pror<="" th="" ts=""><td>ating anothe</td><td>er time series></td><td></td><td></td><td></td><td></td><td></td><td></td></fill>	ating anothe	er time series>										
6 FillReares	Template Processing	•	FillRegression() <fill th="" ts="" usir<=""><td>ng regressio</td><td>n></td><td></td><td></td><td></td><td></td><td></td><td></td></fill>	ng regressio	n>										
7	View Processina	,	FillRepeat() <fill by="" repe<="" th="" ts=""><td>ating values</td><td>></td><td></td><td></td><td></td><td></td><td></td><td></td></fill>	ating values	>										
9 .		- 1	FillUsingDiversionComments()	<use dive<="" td=""><td>ersion comments as data -</td><td>HydroBase ONLY></td><td></td><td></td><td></td><td></td><td></td></use>	ersion comments as data -	HydroBase ONLY>									
10	General - Checking/Testing Results	•	SetAutoExtendPeriod() <for< th=""><td>data filling ;</td><td>and manipulation></td><td></td><td></td><td></td><td></td><td></td><td></td></for<>	data filling ;	and manipulation>										
	General - Comments)	SetAveragePeriod() <for da<="" th=""><td>ta filling></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></for>	ta filling>											
Run Selected Con	General - File Handling	•	SetTanorel EZero()	values <= 0	in historical averages>						Clear Commands				
Results	General - Logging		ocugnorozzero()ni signoro		in notoriour arenages.										
Ensembles Output	General - Running	•													
O time series, O sele	General - Test Processing)													
Completed running con	mands. Use Results and Tools menus.							10	0%	1	100% Ready				

Under Commands, highlight the Fill Time Series and then click on FillHistMonthAverage. Set the TS list to AllMatchingTSID, then for the Identifier highlight the station to fill, which here is the Pueblo Memorial station. Press OK.

🚫 Edit FillHistMonthAve	erage() Command
Fill monthly time series with I	historical monthly averages.
Historical averages are com	puted immediately after reading the data and therefore do not consider filled values
Only monthly time series can	n be processed.
The time series to process a	are indicated using the TS list.
If TS list is "AllMatchingTSID"	", pick a single time series, or enter a wildcard time series identifier pattern.
TS list: 🔼	IIMatchingTSID How to get the time series to fill.
Identifier (TSID) to match: 67	740.NOAA.TempMean.Month
Fill period:	to
Fill flag:	1-character flag to indicate fill.
Command: A	illHistMonthAverage(TSList=AllMatchingTSID,TSID="6740.NOA .TempMean.Month")
	Cancel OK

Back under Commands, highlight Manipulate Time Series and then click on Free.

0 TSTool - n	o commands saved													
File Edit View	Commands Run Results Tools Help													
-Input/Query Options	Create Time Series	•	Time Series List (10)	7 time series, 3 s	selected)									
Input type: HudroP	Convert TS Identifier to Read Command	d)	ID	lc	CO Abbrev.	Name/Descri	ption	Data Source	Data Type	Time Step	Units	Start	End	
Input type. Hydrob	Read Time Series	- •	1 1294		0	CANON CITY		NOAA	TempMean	Month		1893	2010	~
Data tanan Cimata	Fill Time Series Missing Data		2 4834		L	LAS ANIMAS		NOAA	TempMean	Month		1893	2010	
Data type: Cimate	Phil Time Series Missing Data		3 7167			ROCKY FORD 2	2 SE	NOAA	TempMean	Month		1893	2010	_
Time step: Month	Set Time Series Contents		4//0	or more TC to	a anothera	LAMAR		NOAA NOAA	TempMean	Month		1893	2010	- 1
Where: Division	Manipulate Time Series		Add() <add i<="" one="" td=""><td>or more 15 to</td><td>o another></td><td></td><td></td><td>NOAA</td><td>TempMean</td><td>Month</td><td></td><td>1895</td><td>2010</td><td>-11</td></add>	or more 15 to	o another>			NOAA	TempMean	Month		1895	2010	-11
Where:	Analyze Time Series	•	AddConstant() <	add a constan	nt value to a	15>		NOAA	TempMean	Month		1895	2010	~
Where:	Models - Routing		AdjustExtremes()	. <adjust extr<="" td=""><td>reme values:</td><td>></td><td>Ш</td><td></td><td></td><td></td><td></td><td></td><td></td><td>></td></adjust>	reme values:	>	Ш							>
	Output Time Series	•	ARMA() <lag atte<="" td=""><td>enuate a time</td><td>e series using</td><td>g ARMA></td><td></td><td></td><td></td><td></td><td></td><td>[</td><td>Copy All to Comma</td><td>ands</td></lag>	enuate a time	e series using	g ARMA>						[Copy All to Comma	ands
Commands (6 comma	HydroBase	•	Blend() ChangeBoried()	ne TS with an	nother>	-								
<pre>1 SetInputPe 2 # 1778</pre>	Ensemble Processing	•	ConvertDataUnits()	<convert d<="" td=""><td>data units></td><td>20102</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></convert>	data units>	20102								
3 1778. NOAA		_	Cumulate() <cun< td=""><td>nulate values</td><td>over time></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></cun<>	nulate values	over time>									
4 # 7167 - F	Table Processing)	Divide() <divide (<="" td=""><td>one TS by and</td><td>other TS></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></divide>	one TS by and	other TS>									
δ FillRegres	Template Processing	•	Free() <free td="" time<=""><td>e series></td><td></td><td></td><td>OfEquations=</td><td>OneEquation)</td><td></td><td></td><td></td><td></td><td></td><td></td></free>	e series>			OfEquations=	OneEquation)						
7	View Processing	•	Multiply() <multip< td=""><td>ply one TS by</td><td>another TS</td><td>></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></multip<>	ply one TS by	another TS	>								
9		-	RunningAverage().	< convert TS	S to running	average>								
10	General - Checking/Testing Results		Scale() <scale t<="" td=""><td>S by a consta</td><td>int></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></scale>	S by a consta	int>									
11	General - Comments	•	ShiftTimeByInterva	ll() <shift td="" ts<=""><td>S by an ever</td><td>n interval></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></shift>	S by an ever	n interval>								
Run Selected Con	General - File Handling	•	Subtract() <subt< td=""><td>ract one or m</td><td>nore TS from</td><td>n another></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Clear Comma</td><td>ands</td></subt<>	ract one or m	nore TS from	n another>							Clear Comma	ands
Results	General - Logging													
Ensembles Output	General - Running	•												
r0 time series, 0 sele	General - Test Processing	•												
	mands I ise Results and Tools menus	_								10	0%	1	100%	Ready
completed fulfilling con	internets our recourts and 1005 menus.											1		recody

You now want to write a command to free the Rocky Ford station from further analysis. The Free() command frees (removes) the selected time series from memory. The time series will therefore not be available for use after that line in the command file. This command is useful for discarding temporary time series needed for data manipulation (e.g., so that they are not written in output and are not available for interactive plots). Freed time series are also removed from any ensembles that reference the time series.

Sedit Free() Command		×
This command frees (removes) time series, whic	h is useful to remove unneeded or temporary time series.	
The list of time series to be removed can be indi	cated in several ways.	
Time series identifiers follow the pattern:		
Location.Source.DataType.Interval.Scenario		
Examples of wildcard use when TSList=AllMatch	ingTSID are shown below:	
* - matches all time series		
ABC* - matches locations starting with ABC		
ABC*.*.Type.Month - matches locations starting	g with ABC, with data type Type and interval Month.	
Time series that are in an ensemble will be remo	ved from the ensemble.	
TS list:	AllMatchingTSID 🛛 V Optional - indicates the time series to process (default=AllTS).	
TSID (for TSList=matching TSID):	7167.NOAA.TempMean.Month	~
EnsembleID (for TSList=EnsembleID);		
Time series position(s) (for TSI ist-TSPosition);	1778.NOAA.TempMean.Month	
Time series position(s) (for Tablat-Tarosidon);	*	
Free ensemble if empty?		
	Free(TSList=AllMatchingTSID,TSID="7167.NOAA.TempMean.Month")	
Comment		
Command:		
	Cancel	

To write the commands to a file, click on Commands, scroll down to Output Time Series, then click on WriteStateMod. There are also other types of ouput formats available that may suit your purposes.

👌 TSTool - n	o commands saved											
File Edit View	Commands Run Results Tools Help											
Input/Query Options	Create Time Series	, –	Time Series List (107 time series,	3 selected)								
Input type: HydroB	Convert TS Identifier to Read Command	•	ID	CO Abbrev.	Name/Description	Data Source	Data Type	Time Step	Units	Start	End	
Input coper Tryal ob	Read Time Series		1 1294		CANON CITY	NOAA	TempMean	Month		1893	2010	~
Data turan Chusta	Fill Time Series Missing Data		2 4834		LAS ANIMAS	NOAA	TempMean	Month		1893	2010	
Data type: Cimate	Fill Time Series Missing Data		3 7167		ROCKY FORD 2 SE	NOAA	TempMean	Month		1893	2010	_
Time step: Month	Set Time Series Contents	•	4 4770		LAMAR	NOAA	TempMean	Month		1893	2010	_
Where: Division	Manipulate Time Series	•	5 4/50		LAKE MORAINE	NOAA	TempMean	Month		1894	1959	
Where:	Analyze Time Series	•	6 1000		ULMAX WERTOLIEEE	NUAA	TempMean	Month		1895	2010	
Where:	Models - Routing	•	1 0931	1	WESTGLIFFE	INDAA	Tempirean	Imonu		1090	2010	
	Output Time Series) I	DeselectTimeSeries() <dese< td=""><td>elect time sei</td><td>ries for output/processing></td><td></td><td></td><td></td><td></td><td></td><td>0.111.0</td><td>4</td></dese<>	elect time sei	ries for output/processing>						0.111.0	4
			SelectTimeSeries() <select< td=""><td>time series f</td><td>or output/processing></td><td></td><td></td><td></td><td></td><td>l</td><td>Copy All to Comm</td><td>ands</td></select<>	time series f	or output/processing>					l	Copy All to Comm	ands
Commands (7 comma	HydroBase	•	SetOutnutDetailedHeaders()	<in summa<="" td=""><td>v renorts></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></in>	v renorts>							
1 SetInputPe	Encomble Processing		FotOutputPeriod() <for outp<="" td=""><td></td><td>y reporta-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></for>		y reporta-							
2 # 1778 - (Ensemble Processing		SelOutputrenou() <tor outp<="" td=""><td></td><td>d ath and</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tor>		d ath and							
J 1//8.NOAA.	Table Processing	•	SetOutputYearType() <e.g.,< td=""><td>Calendar an</td><td>id others></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></e.g.,<>	Calendar an	id others>							
5 7167 NOAA		- ,	SortTimeSeries() <sort td="" time<=""><td>series></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></sort>	series>								
6 FillRegres	Template Processing	<u>ا</u>				DneEquation)						
7 Free(TSLis	View Processing	<u>،</u> ۱	WriteDateValue() <write td="" tin<=""><td>ne series to D</td><td>)ateValue file></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></write>	ne series to D)ateValue file>							
8	view Processing	<u> </u>	WriteRiverWare() <write td="" tir<=""><td>ne series to I</td><td>RiverWare file></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></write>	ne series to I	RiverWare file>							
10	General - Checking/Testing Results	> 1	WriteStateCU() <write td="" time<=""><td>series to Sta</td><td>iteCU file></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></write>	series to Sta	iteCU file>							
11	General - Comments	• V	WriteStateMod() <write td="" tim<=""><td>e series to S</td><td>tateMod file></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></write>	e series to S	tateMod file>							
Run Selected Con	General - File Handling	• \	WriteSummary() <write td="" tim<=""><td>e series to S</td><td>ummary file></td><td></td><td></td><td></td><td></td><td></td><td>Clear Comm</td><td>ands</td></write>	e series to S	ummary file>						Clear Comm	ands
-Results	General - Logging	•	ProcessTSProduct() <proce< td=""><td>ee a timo cor</td><td>ies product file></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td>=</td></proce<>	ee a timo cor	ies product file>	-						=
Ensembles Output	General - Running	•	Todessi Si Toduci() sproce	as a anne ser	les product lite>							
P0 time series, 0 sele	General - Test Processing	•										
		_										
		_						V				
Completed running com	mands. Use Results and Tools menus.							10	0%		100%	Ready

On this table you will write to the directory that you wish to file to go. The Browse button makes this easier.

Edit WriteSt	ateMod() Command	J						
Write time series to a State	Mod format file.							
It is recommended that the	file name be relative to the working	g directory.						
The working directory is: P:\cdss\TSTool\bin								
The Browse button can be used to select an existing file to overwrite (or edit the file name after selection).								
For the precision, a negativ	e integer allows auto-adjustment t	o prevent overflow.						
A precision of -2001 will def	ault to 2 digits, adjusted for overfl	ow, and also use no decimal (special precision optio	n).					
The time series to process a	are indicated using the TS list.							
If TS list is "AllMatchingTSID	", pick a single time series, or ente	r a wildcard time series identifier pattern.						
TS list:	AllTS 💌	How to get the time series to write.	/					
Identifier (TSID) to match:		/	~					
StateMod file to write:	C:\CDSS\DATA\STATECUWIZARD	PubloMemorialClimate.stm	Browse					
Output start:		Overrides the global output start.						
Output end:		Overrides the global output end.						
Missing value:		Value to write for missing data (default=-999).						
Output precision:		Digits after decimal (default=-2).						
Commande	WriteStateMod(TSList= CUWIZARD\PubloMemoria	=AllTS,OutputFile="C:\CDSS\DATA alClimate.stm")	\STATE					
command.								
	Remove Working Director	ry Cancel OK						

Press OK and this command should have been added to your list.

Press Run All Commands. You should now have written a command file to your directory. To see the results, click on the Report Summary under the Results tab.

You may also want to save the command file for later use or modification in a Command File. Under file, click on save, then Commands As.

e Edit View Comman	nmands saved nds Run Results Tools Help									
New	>	Time Series List (107 time	series, 3 selected)							
Open	•	ID	CO Abbrev. Nam	e/Description	Data Source	Data Type	Time Step	Units	Start	End
Sava	Commands	1 1294	CAN	ON CITY	NOAA	TempMean	Month		1893	2010
Dave	Commands As	2 4834	LAS	ANMAS	NOAA	TempMean	Month		1893	2010
rint	Time Contractor	3 7167	ROCH	CY FORD 2 SE	NOAA	TempMean	Month		1893	2010
roperties	Time Series As	4 4770	LAM	AR	NOAA	TempMean	Month		1893	2010
	iquals 💙 2 - Arkansas 💙	5 4/50	LAKE	MORAINE	NOAA	Templiean	Month		1894	1959
et Working Directory	Matches 🔽	7 0931	WEST	TOLIEFE	NOAA	Templiean	Month		1895	2010
	Matches 💙	<	i inco	CONTE	proces.	Trempmean	Invitor		1000	12010
xit	Get Time Series List	Copy Selected to Com	mands							Copy All to Comm
nande /9 commande -0 colo	sted 0 with fail res. 0 with warpings)									
<pre># 7167 - ROCKY F0 7167.NOAA.TempMea FillRegression(TS</pre>	RD 2 SE n. Month-HydroBase ID="1778.NOAA.TempMean.Month",1	IndependentTSID="7167.	NOAA.TempMean.Month	, NumberOfEquations	=OneEquation)					
# 7167 - ROCKY F0 7167.NDAA.TempNea FillRegression(TS Free(TSList=AllMa WriteStateMod(TSL un Selected Commands At- embles Output Files Prof	80 2 50 7 0 0000 0 0 0 0 0 0 0 0 0 0 0 0 0 0	IndependentTSID="7167 Mean.Month") DATA\STATECUWIZARD\Pul	NDAA.TempMean.Month'	',NumberOfEquations :m")	=OneEquation)					Clear Comme
# 7167 - ROCKY F0 7167, NOAA, TempRea FillRegression(TS Free(TSList+A11Ma WriteStateMod(TSL unselected Commands to mibles Output Files Prof reserves, 1 selected	NO STOC VIEW DUBLE CONTROL OF STOCE OF	Independent TSID="7167. Mean. Month") DATA\STATECUWIZARD\Pul	NDAA. TempMean.Month'	', NumberOfEquations	=OneEquation)					Clear Comm
# 7167 - ROCKY F0 7167. NOAA. TempMean FillRegression(TSL Prec(TSListaAlIMA WriteStateMod(TSL in Selected Commands to mobile Output Files Prov e sense, 1 selected OLORADO SPRENDS Multi	n. Monthing of Dodace N. Nonth-HydroBase Lin "2778. NAA. TempHean. Month", J tchingTSID, TSID="7167. NDAA. Temp ist=AllITS, OutputFile="C:\CDSS\C Run All Commands Dems Tables Time Series Views (AP, III CLSRegression using 7167.NICMA.Tem	Independent TSID="7167. Mean. Month") DATA\STATECUWIZARD\Pul	NOAA. TempMean. Month' oldMemorialClimate.s1	', NumberOfEquations :m") 0 2010-01)	=OneEquation)					Clear Comm
# TIG7 - ROCKY F0 7167. NOAN. TempNea FillRegression(TSL Prec(TSListAllNM WriteStateMod(TSL WriteStateMod(TSL WriteStateMod(TSL WriteStateMod(TSL Maximum Recordstructure) Recordstructure Rec	80 2 50 7 JUDGE C 80 2 50 7 JUDGE C JUD "17/9 KOAA. TengKean, Month", JUD "17/9 KOAA. TengKean, Month", Lin "17/9 KOAA. Teng ist-AllTS, OutputFile="C:\CDSS\f Run All Commands Dems Tables Time Series Views I Cables Time Series Views AP, III Cablegression using 7157ADAA.Te	Independent TSID="7267. plean, Month") MTA\STATECUMIZARD\Pul	NOAA. TempHean. Month' JoMemorialClimate.st	", NumberOfEquations m") 2010-01)	=OneEquation)					[Clear Comm

The data for precipitation can be filled the same way or averages for your station can be used. Your engineering judgment should determine which method is appropriate for your situation. Now that you know which climate station to work your regression from, many of the steps presented can be deleted. If you find a precipitation station that is closer and complete, use that station for the regression. Here again you can save your command files for future use or modification.

The commands are as follows:

```
# SetInputPeriod(InputStart="1911",InputEnd="2008")
## 6740 - PUEBLO MEMORIAL AP
# 6740.NOAA.Precip.Month~HydroBase
## 7167 - ROCKY FORD 2 SE
# 7167.NOAA.Precip.Month~HydroBase
#FillRegression(TSID="6740.NOAA.Precip.Month",IndependentTSID="7167.NOAA.Precip.Month",NumberOfEquations=OneEquation)
# FillHistMonthAverage(TSList=AllMatchingTSID,TSID="6740.NOAA.Precip.Month")
# Free(TSList=AllMatchingTSID,TSID="7167.NOAA.Precip.Month")
# Free(TSList=AllMatchingTSID,TSID="7167.NOAA.Precip.Month")
# WriteStateMod(TSList=AllTS,OutputFile="C:\cdss\data\STATECUWIZARD\PuebloMemorialClimate\PuebloMem.ppt")
```

Frost Dates

Determining Frost Dates is a little more complex. Here you will begin by using the <u>TempMin.Day</u> from the HydroBase drop down.

🗼 TSTool - no commands saved			
File Edit View Commands Run Results Tools Help			
	e series, 0 selected)		
Input Type: HydroBase 🔻	CO Abbrev, Nan	ne/Description	Data S
Data Tuna Otraam Straamfau			
Agriculture/GIS - CropAreaPurrow			
Where: Agriculture/NSS - CropAreasprinkler			
Where: Climate - EvanPan			
Where: Climate - FrostDateF28F			Þ
Climate - FrostDateF32F	ommands	Copy Allto C	ommands
Climate - FrostDateL28S	ommunus	Copy Millio C	
Commands Climate - FrostDateL32S with warnings)			
1 Climate - Precip			
Z Climate - Snow			
Glimate - SnowCourseDepth			
Climate - SnowCourseSWE			
Climate - Solar			
Run SeldClimate - Temp		Clear C	ommands
Results Climate - TempMax			
Climate - TempMean			
EnsemblesClimate - TempMeanMax			
O time seriClimate - TempMeanMin			
Climate - TempMin			
Climate - VaporPressure			
Open a command file or add new commands.	0%	0%	Ready

Once again, set your input period.

Edit Set	InputPeriod() Command 🛛 🛛 🔀
The input period cor Use this command o Using a SetInputPer Enter date/times to Year data: YYYY Month data: MM Day data: MM/ Hour data: MM/ Minute data: MM Special values are a CurrentToYear = CurrentToMinute CurrentToMinute Leave blank to read	nstrains the period when reading data from files and databases. Inly if a limited data period is necessary (e.g., to improve performance). Inid() command may result in incomplete data being available for data filling. a precision appropriate for time series being read. For example: (YYYYY or YYYY-MM DD/YYYY or YYYY-MM DD/YYYY HH or YYYY-MM-DD (DD/YYYY HH or YYYY-MM-DD HH (JDD/YYYY HH:mm or YYYY-MM-DD HH:mm Iso recognized (for all precisions): the current date to year precision = the current date/time to minute precision - 7Day = current date/time minus 7 days + 7Day = current date.
Input period start:	1911
Input period end:	2010
Command:	SetInputPeriod(InputStart="1911",InputEnd=" 2010")
	Cancel OK

Under "Where" put in Division, then Arkansas and press the Get Time Series List. Copy down Pueblo Memorial and then Rocky Ford.

TSTool - "C:\cdss\data\STATECUWIZARD\PuebloMemorialClima	ate\CommandsPuebloTmp"	(modified)				. 8 ×
File Edit View Commands Run Results Tools Help						
Input/Query Options	Time Series List (106 time serie	s,1 selected)-				
Input Type: HydroBase 💌	ID	CO Abbrev.	Name/Description	Data Source	Data Type	
Input Name:	74 7167		ROCKY FORD 2 SE	NOAA	TempMin	
Data Tyne: Climate - TemnMin	75 7287		RUSH 1 N	NOAA	TempMin	
Two Ohm Day 2	76 7309		RUXTON PARK	NOAA	TempMin	
Time step: Day	77 7315		RYE DVE 4 CM	NOAA	TempMin	
Where: Division Equals 2 - Arkansas 1	78 7317 70 7370		SALIDA	NOAA	TempMin	
Where: Matches	80 7371		SALIDA 3 W	NOAA	TempMin	
Where: Matches	•					
Get Time Series List	Copy Selected to Commands	8			Copy All to Comma	nds
Commands (5 commands, 0 selected, 0 with failures, 0 with warnings)						
4 SetInputPeriod(InputStart="1911" InputEnd="2008"	<u>۲</u>					_
2 # 6740 - PUEBLO MEMORIAL AP	/					
3 6740.NOAA.TempMin.Day~HydroBase						
4 • # 7167 - ROCKY FORD 2 SE						
5 7167.NOAA.TempMin.Day~HydroBase						
6						
7						
8						
9						
Run All Commands Run All Commands					Clear Comma	ands
Ensembles Output Files Tables Time Series						
O time series, 0 selected						
				1		
Completed running commands. Use Results and Tools menus.			10	D%	100%	Ready

Under Commands pull down the FillRegression.

0 TSTool - n	o commands saved								
File Edit View	Commands Run Results Tools Help								
Input/Query Options	Create Time Series	Time Series List (122 time series,	, 1 selected)						
Input type: Hydro8-	Convert TS Identifier to Read Command	ID ID	CO Abbrev. Name/Description	Data Source	Data Type	Time Step	Units	Start	End
Input name: 🖂	Read Time Series	64 6136	ORDWAY 21 N	NOAA	TempMin	Day		1980	2010
Data type: Climate	Fill Time Series Missing Data	 FillConstant() <fill (<="" li="" ts="" with=""> </fill>	constant>		TempMin	Day		1958	2010
Time step: Day 💙	Set Time Series Contents	 FillDayTSFrom2MonthTSAnd1 	DayTS() < fill daily time series using D	01 = D2*M1/M2>	TempMin	Day		1927	1935
Where: Division	Manipulate Time Series	 FillFromTS() <fill li="" serie<="" time=""> </fill>	s with values from another time series	•	TempMin	Day		1983	1993
Where:	Analyze Time Series	 FillHistMonthAverage() <fill< li=""> </fill<>	monthly TS using historic average>		TempMin	Day		1992	2011
Where:	Models - Routing	 FillHistYearAverage() <fill li="" y<=""> </fill>	early TS using historic average>		rengann	Day		1222	2000
	Output Time Series	FillInterpolate() <fill td="" ts="" usin<=""><td>ng interpolation></td><td></td><td></td><td></td><td></td><td></td><td>Copy All to Commands</td></fill>	ng interpolation>						Copy All to Commands
Commands (5 comma	HydroBase •	FillMixedStation() <fill td="" ts="" u<=""><td>sing mixed stations (under development</td><td>:)></td><td></td><td></td><td></td><td></td><td></td></fill>	sing mixed stations (under development	:)>					
1 SetInputPe	Ensemble Processing	 FillPattern() <fill li="" ts="" using="" v<=""> </fill>	VET/DRY/AVG pattern>						
3 1778. NOAA.	Table Processing	ReadPatternFile() < for use	e with FillPattern() >						
9 # 7167 - F 5 7167 NOAA	ruste rrocessing .	FillProrate() <fill by="" pror<="" td="" ts=""><td>ating another time series></td><td></td><td></td><td></td><td></td><td></td><td></td></fill>	ating another time series>						
6	Template Processing	 FillRegression() <fill li="" ts="" usi<=""> </fill>	ng regression>						
7 8	View Processing	FillRepeat() <fill by="" repe<br="" ts="">FillUsingDiversionComments()</fill>	eating values>	HydroBase ONLY>					
9 10 11 Run Selected Con	General - Checking/Testing Results General - Comments General - File Handling	SetAutoExtendPeriod() <for SetAveragePeriod() <for SetIgnoreLEZero() <ignore< td=""><td>data filling and manipulation> ta filling> values <= 0 in historical averages></td><td>.,</td><td></td><td></td><td></td><td></td><td>Clear Commands</td></ignore<></for </for 	data filling and manipulation> ta filling> values <= 0 in historical averages>	.,					Clear Commands
Results	General - Logging								
Ensembles Output	General - Test Processing								
	Union regrituesang								
Completed running com	mands. Use Results and Tools menus.					10	0%	1	100% Ready

Fill this table in much the same way as was done for the mean temp.

Edit FillRegression() cor	nmand		×
Fill missing data using ordinary	least squares (OLS) regression		
The analysis period will be use	d to determine relationships use	d for filling.	
Use a setOutputPeriod() comma	and before reading to extend the	edependent time series, if necessary.	
Specify dates with precision ap	opropriate for the data, use blan	k for all available data, OutputStart, or OutputEnd.	
Time series to fill (dependent):	6740.NOAA.TempMin.Day		-
Independent time series:	7167.NOAA.TempMin.Day		-
Number of equations:	OneEquation 📃	Number of equations to use (blank=one equation).	
Analysis month:	_	Can be used with monthly equations (blank=all months).	
Transformation:	T	How to transform data before analysis (blank=None).	
Intercept:		Blank or 0.0 are allowed with no transformation.	
Analysis period:		to	
Fill Period:		to	
Fill flag:		1-character flag to indicate fill.	
Command:	FillRegression(TSID="6 .NOAA.TempMin.Day",Num	740.NOAA.TempMin.Day",IndependentTSID="71 berOfEquations=OneEquation)	67
	Cancel	ок	

Free up the station that was filled from.

🌢 TSTool - n	o commands saved										
File Edit View	Commands Run Results Tools Help)									
Input/Query Options	Create Time Series	•	Time Series List (122 time s	eries, 1 selected)							
Input type: HydroB	Convert TS Identifier to Read Comma	nd 🕨	ID	CO Abbrev. Name/Descri	ption	Data Source	Data Type	Time Step	Units	Start	End
Input name: 💟	Read Time Series	•	85 6765	PUEBLO RESER	RVOIR	NOAA NOAA	TempMin	Day		1975	2010
Data type: Climate	Fill Time Series Missing Data	•	87 6977	RED WING 1 W	SW	NOAA	TempMin	Day		1982	1995
Time step: Day ⊻	Set Time Series Contents		88 7167	ROCKY FORD 2	2 SE	NOAA	TempMin	Day		1893	2010
Where: Division	Manipulate Time Series	•	Add() <add mo<="" one="" or="" td=""><td>re TS to another></td><td></td><td>NOAA NOAA</td><td>TempMin</td><td>Day</td><td></td><td>1958</td><td>2010</td></add>	re TS to another>		NOAA NOAA	TempMin	Day		1958	2010
Where:	Analyze Time Series	•	AddConstant() <add a<="" td=""><td>constant value to a TS></td><td></td><td>NOAA</td><td>TempMin</td><td>Day</td><td></td><td>1944</td><td>1992</td></add>	constant value to a TS>		NOAA	TempMin	Day		1944	1992
Where:	Models - Routing	•	AdjustExtremes() <adj< td=""><td>ust extreme values></td><td></td><td></td><td></td><td></td><td></td><td></td><td>></td></adj<>	ust extreme values>							>
	Output Time Series		ARMA() <lag attenuate<="" td=""><td>a time series using ARMA></td><td></td><td></td><td></td><td></td><td></td><td></td><td>opy All to Commands</td></lag>	a time series using ARMA>							opy All to Commands
Commands (6 comma	HydroBase	•	Blend() <blend one="" td="" ts<=""><td>with another></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></blend>	with another>							
1 SetInputPe	-		ChangePeriod() < chan	ge the period of record>							
2 # 6740 - F	Ensemble Processing	_	ConvertDataUnits() < c	units>							
4 # 7167 - F	Table Processing	•	Cumulate() < Cumulate	Values over ume>							
5 7167.NOAA.	Tomplato Processing		Eroo() <froo cori<="" td="" timo=""><td>s by another 152</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></froo>	s by another 152							
6 FillRegres	remplace Processing	-	Multiply() < multiply on	n TS by another TS \	tions=OneEqua	ation)					
8	View Processing	•	RunningAverage() <co< td=""><td>nvert TS to running average></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></co<>	nvert TS to running average>							
9	General - Checking/Testing Results	•	Scale() <scale a<="" by="" td="" ts=""><td>constant></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></scale>	constant>							
10	General - Comments		ShiftTimeByInterval()	shift TS by an even intervals							
Run Selected Con	General - File Handling		Subtract() <subtract o<="" td=""><td>ne or more TS from another></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Clear Commands</td></subtract>	ne or more TS from another>							Clear Commands
-Results	General - Logging		Suburdet O								
Encembles Output	General - Running	•									
r0 time series, 0 sele	General - Test Processing	•									
								1 100	107	1	
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You will now be developing 4 individual long strings of commands The fist string will be for a spring frost date of 28°, then one for 32°, then for a fall frost date of 32° and one for 28°.

\delta TSTool - n	o commands saved						
File Edit View	Commands Run Results Tools Help						
Input/Query Options	Create Time Series	CreateFromList() <read 1(+)="" a="" from="" identifiers="" list="" of="" series="" time=""></read>					
Input type: HydroB	Convert TS Identifier to Read Command 🕨	Delta() <create as="" between="" delta="" new="" series="" time="" values=""></create>	Time Step	Units	Start	End	
Input name:	Read Time Series	ResequenceTimeSeriesData() <resequence create="" new="" scenarios="" to="" years=""></resequence>	Day		1975	2010	^
Data type: Cimate	Fill Time Series Missing Data		Day		1948	1954	_
Time step: Day	Set Time Series Contents	I S Alias = ChangeInterval() <convert a="" different="" interval="" one="" series="" time="" to="" with=""></convert>	Day		1893	2010	-
Where: Division	Manipulate Time Series	TS Alias = Copy() <copy a="" series="" time=""></copy>	Day		1958	2010	
Where:	Analyze Time Series	TS Alias = Disaggregate() <disaggregate interval="" longer="" shorter="" to=""></disaggregate>	Day		1959	2010	
Where:	Models - Routing	TS Alias = NewDayTSFromMonthAndDayTS() <create and="" daily="" from="" monthly="" pattern="" series="" time="" total=""></create>	Day		1944	1992	× *
	Output Time Series	TS Alias = NewEndOfMonthTSFromDayTS() <convert daily="" data="" end="" month="" of="" series="" time="" to=""></convert>					
-	output time series	TS Alias = NewPatternTimeSeries() < create and initialize a new pattern time series>				Copy All to Com	mands
Commands (7 comma	HydroBase 🕨	TS Alias = NewStatisticTimeSeries() <create a="" another="" as="" from="" repeating="" series="" statistic="" time=""></create>					
2 SetInputPe	Encomble Descosing	TS Alias = NewStatisticYearTS() <create a="" another="" from="" series="" statistic="" time="" using="" year=""></create>					
2 # 6740 - F	Ensemble Processing	TS Alias = NewTimeSeries() < create and initialize a new time series>					
4 # 7167 - F	Table Processing	TS Alias = Normalize() <normalize series="" time="" to="" unitless="" values=""></normalize>					
5 7167.NOAA		TS Alias = RelativeDiff() <relative difference="" of="" series="" time=""></relative>					
6 FillRegres	I emplate Processing	ependentTSID="7167.NOAA.TempMin.Day",NumberOfEquations=OneEquation)					
7 Free(TSLis	View Processing	pMin. Day")					
9	-	-					
10	General - Checking/Testing Results						
	General - Comments					Class Carry	
Run Selected Con	General - File Handling					Clear Comr	nanos
-Results	General - Logging						
Ensembles Output	General - Running						
C ⁰ time series, 0 sele	General - Test Processing						
Completed running con	mands. Use Results and Tools menus.		100)%	í .	100%	Ready

Click on the Commands tab, then the Create Time Series tab, and finally on the NewStatisticYearTS to begin. This is the table that will open up. The TS Alias = NewStatisticYearTS() command processes a time series and creates a new yearly time series, assigning the result an alias so that it can be more easily manipulated. This command operates on the raw time series data.

The areas that require information are marked by the arrows.

Edit TS Alias = NewStatistic	YearTS() Command		×				
Create a year time series as a statis	Create a year time series as a statistic extracted from another time series, giving the result an alias.						
A statistic is a yearly quantity comp	A statistic is a yearly quantity computed from a sample, where in this case the sample is values in the time series.						
Optionally, specify a new time serie	s identifier (TSID) information for the	output time series.					
This is highly recommended if there	is any chance that the new time seri	es will be <u>mistaken</u> for the	e original.				
Time series alias:	Alias	Often the location from t	he TSID, or a short string.				
Time series to analyze (TSID):	6740.NOAA.TempMin.Day						
New time series ID:		Specify to avoid confusi	on with TSID from original TS.				
		► Edit Clear					
Statistic:	CountGE	Statistic to generate.					
Test value:		Test value (needed for s	come statistics).				
Allow missing count:		Number of missing value	s allowed in analysis interval.				
Analysis period:		to					
Analysis window (in a year):	Analysis Window Start Month: Day: Hour:	to	Analysis Window End Month: Day: Hour:				
Search start:		Search start (needed fo	r some statistics).				
	TS Alias = NewStatisticYe	arTS(TSID="6740.NG	DAA.TempMin.Day",Statistic=CountGE)				
Command:							
	Can	cel OK					

The alias of the new time series, which can be used instead of the TSID in other commands, must be specified.

The TSID is the time series identifier of the time series to analyze.

The NewTSID is the time series identifier to be assigned to the new time series, which is useful to avoid confusion with the original time series.

The statistics used for determining the frost dates are:

- DayOfFirstLE is the Julian day of the year (1 366) for the first data value for values < = TestValue.
- DayOfLastLE is the Julian day of the year (1 366) for the last data value for values < = TestValue.

The TestValue is a value used when analyzing the statistic.

The Allow Missing Count is the number of missing values allowed in the source interval(s) in order to produce a result. This capability should be used with care because it may result in data that are not representative of actual conditions.

Search Start is the date/time to begin a data search when processing the statistic.

The next table shows how this table should be filled in. The alias provided is just an example.

🚫 Edit TS Alias = NewStatistic	YearTS() Command		x
Create a year time series as a stati:	stic extracted from another time serie	s, giving the result an alia:	3.
A statistic is a yearly quantity comp	uted from a sample, where in this ca	se the sample is values in	the time series.
Optionally, specify a new time serie	es identifier (TSID) information for the	output time series.	
This is highly recommended if there	is any chance that the new time seri	es will be mistaken for the	e original.
Time series alias:	6740L28S	Often the location from t	he TSID, or a short string.
Time series to analyze (TSID):	6740.NOAA.TempMin.Day		
New time series ID:	6740.NOAA.FrostDateL285.Y	Specify to avoid confusi	on with TSID from original TS.
	ear	Edit Clear	
Statistic:	DayOfLastLE 💌	Statistic to generate.	
Test value:	28	Test value (needed for s	ome statistics).
Allow missing count:	0	Number of missing value	s allowed in analysis interval.
Analysis period:		to	
Analysis window (in a year):	Analysis Window Start Month: Day: Hour:	to	Analysis Window End Month: Day: Hour:
Search start:	06/30	Search start (needed for	r some statistics).
Command:	TS 6740L28S = NewStatisticYearTS(TSID=" Year",Statistic=DayOfLast	6740.NOAA.TempMin. LE,TestValue=28,Al	Day",NewTSID="6740.NOAA.FrostDateL28S. lowMissingCount=0,SearchStart="06/30")
	Can	cel OK	

In pressing the Edit button, the following table will open and the data should be entered to describe the new time series.

Second	Series Id	entifier (TSID)				
The time series identifier (TSID) uniquely identifies a time series, and conforms to the standard: Location.DataSource.DataType.Interval.Scenario						
For example: XYZ.USGS.Streamflow.24H	our					
123.NOAA.MeanTemp.Mor	ith					
The input type and name indi	ate the format ar	nd storage location of data.				
Specify ISID parts below and	the full ISID will a	automatically be created.				
Location:	6740	For example, a station or sensor identifier.				
Data source:	NOAA	Optional. The source of the data (e.g., agency abbreviation).				
Data type:	FrostDateL28S	Optional. A data type abbreviation.				
Data interval:	Year 💙	Data interval.				
Scenario:		Optional string (e.g., "Hist", "Test1").				
Input type:		Optional input type (e.g., database, file format).				
Input name:		Optional file or database name, for input type.				
	6740.NOAA.	FrostDateL28S.Year				
Time series identified (TSID):						
		OK Cancel				

Run the same command again and adjust the alias and test value to 32.

🛇 Edit TS Alias = NewStatisticYearTS() Command 🛛 🛛 🔀								
Create a time series where eac	Create a time series where each value is a statistic calculated from a year of data from the input time series. The output time series has an interval of year.							
It is recommended that new tin	ne series identifier (TSID) information be specified for the	output time series to avoid confusing the output with the original.						
Time series alias:	6740L32S	Required - for output, typically the location from the TSID, or a short string.						
Time series to analyze (TSID):	6740.NOAA.TempMin.Day	×						
New time series ID:	6740.NOAA.FrostDateL32S.Year	Recommended - to avoid confusion with TSID from original time series.						
		Edit Clear						
Statistic:	DayOfLastLE 💙	Required - statistic to calculate.						
Test value:	32	Optional - test value (required for comparison statistics).						
Allow missing count:	0	Optional - number of missing values allowed in analysis interval (default=allow missing).						
Minimum sample size:		Optional - minimum required sample size (default=determined by statistic).						
Output year type:	~	Optional - to define year span (default=Calendar).						
Analysis start:		Optional - analysis start date/time (default=full time series period).						
Analysis end:		Optional - analysis end date/time (default=full time series period).						
Analysis window:	Start Find Month: Day: Hour: Month: Day: Hour: Image: Start of the start of	Optional - analysis window within input year (default=full year).						
Search start:	06/30	Optional - search start (needed for some statistics, default=full year).						
Command:	TS 6740L32S = NewStatisticYearTS(TSID="6740.NOAA.TempMin.Day",NewTSID="6740.NOAA.FrostDateL32S.Year ",Statistic=DayOfLastLE,TestValue=32,AllowMissingCount=0,SearchStart="06/30")							
Cancel OK								

Run the same command for the fall frost date of 32. The statistic will need to be changed to DayOfFirstLE.

Edit TS Alias =	NewStatisticYearTS() Comma	nd 🛛 🛛						
Create a time series where eac	h value is a statistic calculated from a year of data from	the input time series. The output time series has an interval of year.						
It is recommended that new tin	is recommended that new time series identifier (TSID) information be specified for the output time series to avoid confusing the output with the original.							
Time series alias:	6740F32F	Required - for output, typically the location from the TSID, or a short string.						
Time series to analyze (TSID):	6740.NOAA.TempMin.Day	▼						
New time series ID:	6740.NOAA.FrostDateF32F.Year	Recommended - to avoid confusion with TSID from original time series.						
		Edit Clear						
Statistic:	DayOfFirstLE 😽	Required - statistic to calculate.						
Test value:	32	Optional - test value (required for comparison statistics).						
Allow missing count:	0	Optional - number of missing values allowed in analysis interval (default=allow missing).						
Minimum sample size:		Optional - minimum required sample size (default=determined by statistic).						
Output year type:	v	Optional - to define year span (default=Calendar).						
Analysis start:		Optional - analysis start date/time (default=full time series period).						
Analysis end:		Optional - analysis end date/time (default=full time series period).						
Analysis window:	Start- Month: Day: Hour: Month: Day: Hour:	Optional - analysis window within input year (default=full year).						
Search start:	07/01	Optional - search start (needed for some statistics, default=full year).						
Command:	Command: TS 6740F32F = NewStatisticYearTS(TSID="6740.NOAA.TempMin.Day",NewTSID="6740.NOAA.FrostDateF32F.Year ",Statistic=DayOfFirstLE,TestValue=32,AllowMissingCount=0,SearchStart="07/01")							
Cancel OK								

Run the same command for the fall frost date of 28.

• Edit TS Alias =	NewStatisticYearTS() Comma	nd 🛛 🔀						
Create a time series where eac	ch value is a statistic calculated from a year of data from	the input time series. The output time series has an interval of year.						
It is recommended that new tin	eries identifier (TSID) information be specified for the output time series to avoid confusing the output with the original.							
Time series alias:	6740F28F	Required - for output, typically the location from the TSID, or a short string.						
Time series to analyze (TSID):	6740.NOAA.TempMin.Day	✓						
New time series ID:	6740.NOAA.FrostDateF28F.Year	Recommended - to avoid confusion with TSID from original time series.						
		Edit Clear						
Statistic:	DayOfFirstLE 💙	Required - statistic to calculate.						
Test value:	28	Optional - test value (required for comparison statistics).						
Allow missing count:	0	Optional - number of missing values allowed in analysis interval (default=allow missing).						
Minimum sample size:		Optional - minimum required sample size (default=determined by statistic).						
Output year type:	~	Optional - to define year span (default=Calendar).						
Analysis start:		Optional - analysis start date/time (default=full time series period).						
Analysis end:		Optional - analysis end date/time (default=full time series period).						
Analysis window:	Start End Month: Day: Hour: Month: Day: Hour:	Optional - analysis window within input year (default=full year).						
Search start:	07/01	Optional - search start (needed for some statistics, default=full year).						
Command:	TS 6740F28F = NewStatisticYearTS(TSID="6740.NOAJ llowMissingCount=0,SearchStart="0	A.TempMin.Day",Statistic=DayOfFirstLE,TestValue=28,A 7/01")						
	Cancel	ОК						

The table has been scrolled all the way to the right to see the meat of the command.

TSTool - "C:\cdss\data\STATECUWIZARD\PuebloMemorialClima	ite\PuebloMemFD.tstool"			_ 🗗 🗵
File Edit View Commands Run Results Tools Help	The Order Link (100 Key and 1			
-Input/Guery Options	Time Series List (106 time series, 1	selected)		
Input Type: HydroBase	ID	CO Abbrev. Name/Des	cription Data	Source Data Type
Input Name:	1 7167	ROCKY FOR	D 2 SE NOAA	TempMin 🔺
Data Type: Climate - TempMin	2 2446	EADS	NOAA	TempMin
	3 4076	HOLLY	NOAA	TempMin
Time Step: Day	4 4770	LAMAR	NOAA	TempMin
Where: Division 💌 Equals 💌 2 - Arkansas 💌	<u>5</u> 5015	LIMON 10 SS	SVV NOAA	TempMin
Where: Matches	<u>6</u> 8510	TWO BUTTE	S NOAA	TempMin
Mittahaa	7 4834	LAS ANIMA:	S INOAA	TempMin
Where, Matches		1		
Get Time Series List	Copy Selected to Commands			Copy All to Commands
Commands (13 commands, 0 selected, 0 with failures, 0 with warnings)				
4				
5				
δ IndependentTSTD="7167 NOAA TempMin Day" Number	OfFquations-OneFquation)			
Z TownMin Day")	orequactoris-oricequactory			
8 NORR TempMin Day" NewTSID="6740 NORR ExactDate	1385 Yoop" Statistic-Davo	floct(E_Tect)(cluer)	28 AllowMiccingCount-/	SoonchStont="06(20")
 NOAR, TEMPMIN.Day , NEWTSID- 6740, NOAR, Frostbace NOAR, TempMin Day, NewTSID- 6740, NOAR, Frostbace 	1205. Tear , Statistic-Dayo	flastlE, Testvalue	28, Allow MissingCount-4	Completent "oc/oo")
10 NOAA.TEMPMIN.Day ,NEWISID= 6740.NOAA.FrostDate	coos y an statistic=Dayo	rlastle, restvarue=.	sz, AllowinssingCounce	, searchstart= 06/50)
11 NDAA. TempMin.Day", NewISID="6/40.NDAA. ProstDate	F32F.Year ,Statistic=Dayu	TFIRSTLE, LESTVALUE	=32,AllowMissingCount:	=0,SearchStart= 0//01)
.NOAA.TempMin.Day",NewTSID="6740.NOAA.FrostDate	FZ8F.Year",Statistic=Day0	fFirstLE,TestValue	=28,AllowMissingCount	=0,SearchStart="07/01")
				►
Run Selected Commands Run All Commands				Clear Commands
-Nesults				
Ensembles Output Files Tables Time Series				
C time series, 0 selected				
P				
use the Run menu/outtons to run the commands.			0%	0% Ready
Je se			- /*	

You will need to write a new Free command.

🌰 TSTool - "C:\ce	dss\data\STATECUWIZARD\PuebloMen	norialClima	te\Pueblo	oMemFD.tstool"						_ 8 ×
File Edit View	Commands Run Results Tools Help									
Finput/Query Optior	Create Time Series	• — ¬	Time Serie	es List (106 time serie	s, 1 selected)-					
Input Type: Hydro	Convert TS Identifier to Read Command	>		ID	CO Abbrev.	Name/Descr	iption Da	ta Source	Data Type	
Input Name:	Read Time Series	•	1	7167		ROCKY FORD	2 SE NO	AA	TempMin	
Doto Tuno: Climat	Fill Time Series Missing Data	•	2	2446		EADS	NO	AA	TempMin	
Data Type. Climat	Set Time Series Contents		3	4076		HOLLY	NO	AA	TempMin	
Time Step: Day	Manipulate Time Series	Add().		e or more TS to anoth	er>	MAR	NO	AA	TempMin	
Where: Division	Analyze Time Series	AddCo	nstant()	<add a="" constant="" td="" value<=""><td>e to a TS></td><td>ON 10 SSV</td><td>V NO</td><td>AA AA</td><td>TempMin</td><td></td></add>	e to a TS>	ON 10 SSV	V NO	AA AA	TempMin	
Where:	Models - Routing	Adjucti	Evtremer			O BUTTES	NO	AA 	TempMin	_
Where:	Output Time Series) dog/o	ttopusto s timo corior	ucipa ABMA >	5 ANIMAS	INO	AA	Tempivin	
	HudroPage	Blend()) <idy a<br="">i <blend< td=""><td>l ope TS with another:</td><td></td><td></td><td></td><td></td><td>Conv. Allto Cov</td><td></td></blend<></idy>	l ope TS with another:					Conv. Allto Cov	
		Change	=Period()	<pre>change the period</pre>	of record >				Copy Air to Cor	mmanus
Commands (13 co	Ensemble Processing	Conver	tDatal Inits	:() <convert data="" i<="" td=""><td>nits></td><td></td><td></td><td></td><td></td><td></td></convert>	nits>					
5 FillPer	Table Processing	Cumula	ten	umulate values over ti	me>	NumberrOf	Fountions-OneFour	tion		
7 Eree(TS	General - Checking/Testing Results	Divide() <divide< td=""><td>e ope TS by another 1</td><td>192</td><td>Numberoi</td><td>requacions=oneequa</td><td>(cron)</td><td></td><td></td></divide<>	e ope TS by another 1	192	Numberoi	requacions=oneequa	(cron)		
8 TS 6740	General - Comments	Erec()	Zfroo tir	mo corioc >	57	stDatel 2	285 Year" Statisti	c=Dav0fLa	stIE TestVal	ue=2
9 TS 6740	General - File Handling	Multich	A streetu	lite series >	TC >	stDatel 3	325.vear".Statisti	c=DayOfLa	sti E. TestVal	ue=3
10 TS 6740	General - Logging		/() <mui< td=""><td>icipiy one 15 by anoth</td><td>er 152</td><td>stDateF</td><td>32F.Year".Statisti</td><td>c=DayOfFi</td><td>rstLE.TestVa</td><td>lue=</td></mui<>	icipiy one 15 by anoth	er 152	stDateF	32F.Year".Statisti	c=DayOfFi	rstLE.TestVa	lue=
11 TS 6740	General - Running	Runnin	gAverage()) <convert 15="" ru<="" td="" to=""><td>inning average></td><td>stDateF2</td><td>28F.Year".Statisti</td><td>c=DayOfFi</td><td>rstLE.TestVa</td><td>lue=</td></convert>	inning average>	stDateF2	28F.Year".Statisti	c=DayOfFi	rstLE.TestVa	lue=
12 Free(TS	General - Test Processing	Scale()	<scale< td=""><td>TS by a constant></td><td></td><td></td><td>· · · · · ·</td><td></td><td>·</td><td></td></scale<>	TS by a constant>			· · · · · ·		·	
13 WriteSt	ateCU(OutputFile="C:\cdss\data\:	ShiftTir	neByInterv	al() <shift a<="" by="" td="" ts=""><td>n even interval></td><td>fd")</td><td></td><td></td><td></td><td>-</td></shift>	n even interval>	fd")				-
•		Subtra	ct() <su< td=""><td>btract one or more TS</td><td>from another></td><td></td><td></td><td></td><td></td><td></td></su<>	btract one or more TS	from another>					
Run Selected G	ommands Run All Commands								Clear Co	mmands
r.Results										
	and I also Thus Coulor I									
Ensembles Outp	ut Files Tables Time Series									
U time series, U se	elected]
Use the Run menu/b	outtons to run the commands.						0%		0%	Ready

This is under the Commands drop down, highlight Manipulate Time Series and then click on the Free.

🗼 Edit Free() Command	×					
his command frees (removes) time series, which is useful to remove unneeded or temporary time series.						
The list of time series to be removed can be indic	cated in several ways.					
Time series identifiers follow the pattern:						
Location.Source.DataType.Interval.Scenario						
Examples of wildcard use when TSList=AllMatcl	hingTSID are shown below:					
* - matches all time series						
ABC* - matches locations starting with ABC						
ABC*.*.Type.Month - matches locations starting	with ABC, with data type Type and interval Month.					
Time series that are in an ensemble will be remo	ved from the ensemble.					
TS list:	AllMatchingTSID 🔽 Indicates the time series to process (default=AllTS).					
TSID (for TSList=matching TSID):	***DAY					
EnsembleID (for TSList=EnsembleID):	V					
Time series position(s) (for TSList=TSPosition):	For example, 1,2,7-8 (positions are 1+).					
Free ensemble if empty?	▼ Default (blank) = True.					
	Free(TSList=AllMatchingTSID,TSID="*.*.*.DAY")					
Command:						
	Cancel OK					

On this table the *.*.*.Day will need to be typed in.

You will now need to write your commands to a file.

🌰 TSTool - "C:\ca	iss\data\STATECUWIZARD\PuebloMen	orialClimat	:e\Commands	PuebloTmp" (modified)				_	8 ×
File Edit View	Commands Run Results Tools Help								
Input/Query Optior	Create Time Series	· —	Time Series List	t (106 time series, 1 selected)					_
Input Type: Hydro	Convert TS Identifier to Read Command	·	ID	CO Abbrev.	Name/Descri	ption Data	Source	Data Type	
Input Name: 🔽	Read Time Series	·	74 7167	7	ROCKY FORD 2	2 SE NOAA	`	TempMin	
Data Type Climat	Fill Time Series Missing Data	·	75 7287	7	RUSH 1 N	NOAA	•	TempMin	
Time Sten: Day 3	Set Time Series Contents	·	76 7309	3	RUXTON PARK	NOAA	`	TempMin	_
nine Step. Day	Manipulate Time Series		70 7315	7	RYE RVE1 SW	NOAA	\	TempMin	
vvnere: Division	Analyze Time Series	. – – – – – – – – –	70 7370	3	SALIDA	NOAA	``````````````````````````````````````	TempMin	-
Where:	Models - Routing	·	80 7371	1	SALIDA 3 W	NOAA	· \	TempMin	-
Where:	Output Time Series	Deselect	tTimeSeries()	<deselect for="" output<="" series="" th="" time=""><th>/processing></th><th></th><th></th><th>1</th><th></th></deselect>	/processing>			1	
	HydroBase I	SelectTi	meSeries() <	select time series for output/proc	:essing>			Copy All to Command	sk
Commands (13 co	Ensemble Processing	SetOutp	outDetailedHead	ers() <in reports="" summary=""></in>					
7 7 187 . WC	Table Processing	SetOutp	outPeriod() <f< td=""><td>or output products></td><td></td><td></td><td></td><td></td><td>1</td></f<>	or output products>					1
6 FillRec	General - Checking/Testing Results	SetOutp	outYearType()	. <e.g., calendar="" water,=""></e.g.,>		-quations=MonthlyEc	quations))	_
8 TS 6740	General - Comments	SortTime	eSeries() <so< td=""><td>ort time series></td><td></td><td>- Veer" Statistic-</td><td>-Dav@flav</td><td>+IE TestValue-7</td><td></td></so<>	ort time series>		- Veer" Statistic-	-Dav@flav	+IE TestValue-7	
9 TS 6740	General - File Handling	, WriteDa	ateValue() <w< td=""><td>vrite DateValue file></td><td></td><td>5.vear".Statistic</td><td>DayOfLa: DayOfLa</td><td>stLE.TestValue=3</td><td></td></w<>	vrite DateValue file>		5.vear".Statistic	DayOfLa: DayOfLa	stLE.TestValue=3	
10 TS 6740	General - Logging	. WriteRiv	verWare() <v< td=""><td>write RiverWare file></td><td></td><td>Year",Statistic=</td><td>DayOfFir</td><td>stLE,TestValue=</td><td></td></v<>	write RiverWare file>		Year",Statistic=	DayOfFir	stLE,TestValue=	
11 TS 6740	General - Running 🛛 🔰	WriteSta	ateCU() <wri< td=""><td>ite StateCU file></td><td></td><td>F.Year",Statistic=</td><td>DayOfFin</td><td>stLE, TestValue=</td><td></td></wri<>	ite StateCU file>		F.Year",Statistic=	DayOfFin	stLE, TestValue=	
12 Free(TS	General - Test Processing	. WriteSta	ateMod() <w< td=""><td>rite StateMod file></td><td></td><td></td><td></td><td></td><td></td></w<>	rite StateMod file>					
13 WriteSta	ateCU(OutputFile="C:\cdss\data\S	WriteSu	mmary() <wr< td=""><td>rite Summary file></td><td></td><td></td><td></td><td>Į</td><td>-</td></wr<>	rite Summary file>				Į	-
		Process	TSProduct()	<process a="" fil<="" product="" series="" td="" time=""><td>e></td><td></td><td></td><td>F</td><td></td></process>	e>			F	
Run Selected Co	mmands Run All Commands							Clear Command	ds
_Results									
Ensembles Outpu	# Files Tables Time Series								
r0 time series, 0 se	elected								-1
111									
111									
111									
111									
									- 11
<u> </u>					1		1		
Completed running c	ommands. Use Results and Tools menus.					100%		100% R	eady

📣 r da una - m- n-	cu0.company						
CEDIC WriteState	CU() Command						
THIS COMMAND CUR	THIS COMMAND CURRENTLY ONLY WRITES StateCU FROST DATE FILES.						
Time series with data	types FrostDateL28S, FrostDateL32S, FrostDateF32F, and FrostDateF28F are processed.						
Write frost date time :	series to a StateCU format file, which can be specified using a full or relative path (relative to the working directory).						
The working directory	/ is: C:\cdss\data\STATECU/MZARD\PuebloMemorialClimate						
The Browse button c	an be used to select an existing file to overwrite (or edit the file name after selection).						
StateCU file to write:	C:\cdss\data\STATECU/MZARD\PuebloMemorialClimate\PuebloMem.fd						
Output start:	Overrides the global output start, specify as YYYY.						
Output end:	Overrides the global output end, specify as YYYY.						
Command:	WriteStateCU(OutputFile="C:\cdss\data\STATECUWIZARD\PuebloMemorialClimate\Puebl oMem.fd")						
	Remove Working Directory Cancel OK						

If you notice, the Frost Date commands must be written to a <u>StateCU</u> output file where temp and precip are written to StateMod files.

Press OK.

Run all commands.

© TSTool - no commands saved										
File Edit View Commands Run Results Tools Help										
Input/Query Options	Time Seri	ies List (122 time series,	, 1 selected) —							
Input type: HydroBace		ID	CO Abbrev	Name/Description	Data Source	Data Type	Time Step	Units	Start	
	83	6743		PUEBLO CITY RESERVOI	NOAA	TempMin	Day		1941 🔨	
B4 6740 PUEBLO MEMORIAL AP NOAA TempMin Day									1954	
Data type: Climate - TempMin 285 6765 PUEBLO RESERVOIR NOAA TempMin Day									1975	
Time step: Day 💙	86	6738		PUEBLO WB AIRPORT	NOAA	TempMin	Day		1948	
Where: Division 💙 Equals 💙 2 - Arkansas 💙	87	6977		RED WING 1 WSW	NOAA	TempMin	Day		1982	
Where: V Matches V	88	/16/		RUCKY FURD 2 SE	NUAA	Тетриіп	Day		1893	
Where: V Matches V	89	201		Ruon I N	INUAA	rempmin	Day		1930	
Cot Time Series List			_							
Get Time Series List	Copy	Selected to Commands						Copy All t	o Commands	
Commands (12 commands, 0 selected, 0 with failures, 0 with warnings)										
6 FillRegression(TSID="6740, NOAA, TempMin, Day", Indep	endentTS	5ID="7167.NOAA.Te	empMin.Dav"	.NumberOfEquations=One	eEquation)					
7 Free(TSList=AllMatchingTSID.TSID="7167.NOAA.TempM	lin.Day"))								
8 T5 6740L285 = NewStatisticYearTS(TSID="6740.NOAA.	TempMin.	Day", NewTSID="67	740.NOAA.Fr	ostDateL285.Year", Stat	tistic=DayOfLastl	.E, TestValue=28,	AllowMissingCour	nt=0, Search	Start=	
9 TS 6740L32S = NewStatisticYearTS(TSID="6740.NOAA.	TempMin.	Day", NewTSID="67	740.NOAA.Fr	ostDateL325.Year", Stat	tistic=DayOfLastl	E, TestValue=32,	AllowMissingCour	nt=0, Search	Start=	
10 TS 6740F32F = NewStatisticYearTS(TSID="6740.NOAA.	TempMin.	Day", NewTSID="67	740.NOAA.Fr	ostDateF32F.Year", Stat	tistic=DayOfFirst	LE, TestValue=32	, AllowMissingCou	unt=0, Searc	:hStart 🗉	
11 TS 6740F28F = NewStatisticYearTS(TSID="6740.NOAA.	TempMin.	.Day", NewTSID="67	740.NOAA.Fr	ostDateF28F.Year", Stat	tistic=DayOfFirst	LE, TestValue=28	AllowMissingCou	unt=0, Searc	:hStart	
12 Free(TSList=AllMatchingTSID, TSID="*.*.*.DAY")									~	
<									>	
Bun Selected Commande								Clos	r Commando	
Kur Seetted Commands								Cied	Commanus	
_Results										
Ensembles Output Files Problems Tables Time Series Views										
=4 time series, 4 selected										
1) 67401-295 Dow of your far loot yolyo <= 29,000000 _ 6740 NOAA Frontbu	stal 296 Var	or (1011 to 2010)								
 7) 6740L203 - Day of year for last value <= 20.000000 - 6740 NOAA FrostDay 7) 6740L32S - Day of year for last value <= 32.000000 - 6740 NOAA FrostDay 	atel 325 Ve:	ar (1911 to 2010)								
3) 6740E32E - Day of year for first value <= 32.000000 - 6740.NOAA.FrostD	ateE32E.Ye	ear (1911 to 2010)								
4) 6740F28F - Day of year for first value <= 28.000000 - 6740.NOAA.FrostD	ateF28F.Ye	ear (1911 to 2010)								
Considered and the second state of Table and Table and the						100	1% Í	100%	l Pau l	
Completed running commands. Use Results and Tools menus.						100		100%	Ready	

Under the Results menu click on Table.

This table displays the frost dates as number of days. These values can be copied into excel to average the frost dates and fill the missing data with the averages.

🕥 TSTool - Time Series - Table 📃 📃										
DATE	6740L28S, FrostDateL28S, DayOfYear	6740L32S, FrostDateL32S, DayOfYear	6740F32F, FrostDateF32F, DayOfYear	6740F28F, FrostDateF28F, DayOfYear						
1911					▲					
1912										
1913										
1914										
1915										
1916										
1917										
1918	120.00	120.00	300.00	300.00						
1919	100.00	107.00	284.00	301.00						
1920	114.00	118.00	286.00	302.00						
1921	117.00	118.00								
1922	109.00	110.00	281.00	282.00						
1923			293.00	304.00						
1924	117.00	119.00	279.00	287.00						
1925	120.00	120.00	288.00	298.00						
1926	93.00	103.00	293.00	297.00						
1927	111.00	112.00	286.00	306.00						
1928			296.00	296.00						
1929	100.00	118.00	294.00	297.00						
1930	93.00	93.00	290.00	298.00						
1931	116.00	116.00	289.00	301.00						
1932	119.00	119.00	279.00	279.00						
4000	105.00	106.00			<u> </u>					
	Graph Summary Save Close									
Currently	-selected worksheet	interval: Year								

Excel can convert this format into the format associated with StateCU frost dates.

🛛 Microsoft Excel - PuebloMemorialFDfilled.xls											×						
📳 Elle Edit View Insert Format Iools Data Window Help – 🗗 🛪												×					
1	📬 🛃 💪	<u>a</u> 4	🕰 i 🖻 🕻	≞ • 10 -	😣 Σ 🔹	2 I 🛍 🤇	🕘 🚆 Ari	al	v 10	• B .	ζ∐⊔∣≣	三 三	a. \$ %	≢ 🔛 ·	- 🖄 - 🛓	<u>A</u> -]	•• ₹
1	11 12 2	🔊 🖄 🗌	3 Y 🔰	- Ha 😥 🗋	Reply with	Changes	End Review										
	M13 🔸 🏂																
	A	В	С	D	E	F	G	Н		J	K	L	M	N	0	-	Ξ
1	1911	107.046	116.5977	283.0115	291.4138		1911	4/16	4/25	10/9	10/17	_					-
2	1912	107.046	116.5977	283.0115	291.4138		1912	4/16	4/25	10/9	10/17						
3	1913	107.046	116.5977	283.0115	291.4138		1913	4/16	4/25	10/9	10/17					_	
4	1914	107.046	116.5977	283.0115	291.4138		1914	4/16	4/25	10/9	10/17						
5	1915	107.046	116.5977	283.0115	291.4138		1915	4/16	4/25	10/9	10/17						
6	1916	107.046	116.5977	283.0115	291.4138		1916	4/16	4/25	10/9	10/17						
7	1917	107.046	116.5977	283.0115	291.4138		1917	4/16	4/25	10/9	10/17						
8	1918	120	120	300	300		1918	4/29	4/29	10/26	10/26						
9	1919	100	107	284	301		1919	4/9	4/16	10/10	10/27						
10	1920	114	118	286	302		1920	4/23	4/27	10/12	10/28						
11	1921	117	118	283.0115	291.4138		1921	4/26	4/27	10/9	10/17						
12	1922	109	110	281	282		1922	4/18	4/19	10/7	10/8						
13	1923	107.046	116.5977	293	304		1923	4/16	4/25	10/19	10/30						
14	1924	117	119	279	287		1924	4/26	4/28	10/5	10/13						
15	1925	120	120	288	298		1925	4/29	4/29	10/14	10/24						
16	1926	93	103	293	297		1926	4/2	4/12	10/19	10/23						
17	1927	111	112	286	306		1927	4/20	4/21	10/12	11/1						
18	1928	107.046	116.5977	296	296		1928	4/16	4/25	10/22	10/22						
19	1929	100	118	294	297		1929	4/9	4/27	10/20	10/23						
20	1930	93	93	290	298		1930	4/2	4/2	10/16	10/24						
21	1931	116	116	289	301		1931	4/25	4/25	10/15	10/27						
22	1932	119	119	279	279		1932	4/28	4/28	10/5	10/5						
23	1933	105	106	283.0115	291.4138		1933	4/14	4/15	10/9	10/17						
24	1934	95	97	294	301		1934	4/4	4/6	10/20	10/27						
25	1935	102	125	290	297		1935	4/11	5/4	10/16	10/23						
26	1936	107.046	116.5977	283.0115	291.4138		1936	4/16	4/25	10/9	10/17						
27	1937	95	115	280	308		1937	4/4	4/24	10/6	11/3						
28	1938	99	100	293	296		1938	4/8	4/9	10/19	10/22						
29	1939	108	111	283	283		1939	4/17	4/20	10/9	10/9						
30	1940	103	109	289	303		1940	4/12	4/18	10/15	10/29						
31	1941	86	109	280	304		1941	3/26	4/18	10/6	10/30						
32	1942	91 / 5heats	99 / Sheet? /	, 298	299		1942	3/31	4/8	10/24	10/25						-
Ready	/ // <u>////////////////////////////////</u>	CI A Dileetz	. A priceto y						1	·1				NUM :	5CRL		//

Cut and past into StateCU frost date table and the table will automatically convert dates from 04/16 to April 16.

• %	StateC	U - View/Edit Hi	istorical Frost D	ate Data			×			
E	ile <u>E</u> o	dit <u>H</u> elp								
н	istorica	al frost dates fo	r station: 6740	PUEBLO MEM	ORIAL AP					
	Year	Last spring 28 deg F day	Last spring 32 deg F day	First fall 28 deg F day	First fall 32 deg F day	<u>^</u>				
	1911	April 16	April 25	October 09	October 17	—				
	1912	April 16	April 25	October 09	October 17					
	1913	April 16	April 25	October 09	October 17					
	1914	April 16	April 25	October 09	October 17					
	1915	April 16	April 25	October 09	October 17					
	1916	April 16	April 25	October 09	October 17					
	1917	April 16	April 25	October 09	October 17					
	1918	April 30	April 30	October 27	October 27					
	1919	April 10	April 17	October 11	October 28					
	1920	April 23	April 27	October 12	October 28					
	Values are historical 28 deg F and 32 deg F frost dates for spring (last) and fall (first). Blank fields represent missing data.									

Once you create extended climate files, it's a good idea to save them to a directory to be used at a later date.

芦 PuebloMemorialClimate											
Eile Edit View Favorites Iools Help											
G Back 🔹 🕤 🖌 🤣 Search 🔊 Folders 🕼 🕉 🗙 🖌 🗐 🏢											
Address 🛅 C:\cdss\data\STATECL	Address 🛅 C:\cdss\data\STATECUWIZARD\PuebloMemorialClimate										
Name 🔺	Size	Туре	Date Modified								
PuebloMem.fd	8 KB	FD File	12/9/2008 3:39 PM								
PuebloMem.ppt	15 KB	Microsoft PowerPoi	12/9/2008 1:00 PM								
PuebloMem.tmp	15 KB	TMP File	12/9/2008 1:59 PM								
3 objects				35.8 KB	🚽 My Computer 🛛 🏼 🎢						

These files can be copied into your Scenario analysis in StateCU. You will need to direct StateCU in the Input File List to your newly created frost date data.

💳 StCharles										
<u>File Edit View Favorites Iools Help</u>										
🚱 Back + 🔊 - 🏂 🔎 Search 🎼 Folders 🛛 😰 🏂 🗙 🍤 💷 -										
Address 🛅 C:\cdss\data\STATECUWIZARD\StCharles										
Name 🔺	Size	Туре	Date Modified							
🛅 Old climate data		File Folder	12/2/2008 9:58 AM							
StCharles.BD1	89 KB	BD1 File	12/2/2008 2:36 PM							
StCharles.CCH	9 KB	CCH File	12/1/2008 3:48 PM							
🕒 StCharles.ccu	3 KB	CCU File	12/2/2008 2:36 PM							
😫 StCharles.cds	62 KB	CDS File	12/1/2008 4:08 PM							
🔊 StCharles.cir	18 KB	CIR File	12/2/2008 2:36 PM							
🕑 StCharles.cli	2 KB	CLI File	12/2/2008 10:06 AM							
🔊 StCharles.ddc	8 KB	DDC File	12/2/2008 2:36 PM							
🕒 StCharles.ddh	13 KB	DDH File	12/2/2008 12:51 PM							
🗐 StCharles.def	1 KB	DEF File	12/2/2008 2:36 PM							
🕑 StCharles.dwb	191 KB	DWB File	12/2/2008 2:36 PM							
🕒 StCharles.fd	8 KB	FD File	12/2/2008 10:05 AM							
🕑 StCharles.fd.bak	8 KB	BAK File	12/1/2008 2:11 PM							
🔊 StCharles.ipy	14 KB	IPY File	12/2/2008 10:15 AM							
🖬 StCharles.ipy.backup	14 KB	BACKUP File	12/2/2008 10:11 AM							
StCharles.KBC	16 KB	KBC File	12/1/2008 4:07 PM							
🖬 StCharles.log	9 KB	LOG File	12/2/2008 2:36 PM							
😫 StCharles.obc	782 KB	OBC File	12/2/2008 2:36 PM							
StCharles.ppt	15 KB	Microsoft PowerPoi	12/2/2008 10:01 AM							
🕒 StCharles.rcu	2 KB	RCU File	12/2/2008 2:36 PM							
😻 StCharles.str	2 KB	STR File	12/1/2008 4:07 PM							
🕑 StCharles.sum	146 KB	SUM File	12/2/2008 2:36 PM							
StCharles.swb	198 KB	SWB File	12/2/2008 2:36 PM							
StCharles.tmp	15 KB	TMP File	12/1/2008 10:38 AM							
🖬 StCharles.wsl	17 KB	WSL File	12/2/2008 2:36 PM							
🖬 tempddh	12 KB	File	12/9/2008 3:53 PM							
🖬 tempipy	9 KB	File	12/9/2008 3:53 PM							
PuebloMem.ppt	15 KB	Microsoft PowerPoi	12/9/2008 1:00 PM							
PuebloMem.tmp	15 KB	TMP File	12/9/2008 1:59 PM							
PuebloMem.fd	8 KB	FD File	12/9/2008 3:39 PM							
3 objects selected				35.8 KB	My Computer					

HCF/word/TSTool Climate