

Colorado's Decision Support Systems (CDSS)

TSTool Training

Getting Started
(For General Use)

Version: 10.00.01, 2011-05-05

Duration: Less than 30 minutes

Level: Introduction

This Presentation

- Provides an introduction to TSTool for new users for general use (other training materials focus on use in CDSS, etc.)
- Is designed for self-paced training
- Is accompanied by examples, each of which reside in a folder distributed with this presentation
 - See the doc/Training folder under the software installation
 - Full use of TSTool requires access to databases and internet (some examples will not work without such access)

TSTool Feature Summary

- Read and write time series in various formats
- Automate processing using a command language
- Fill/manipulate data
- Quality control
- Analyze data and generate products

TSTool Origins in CDSS

- Originally developed for Colorado's Decision Support Systems (CDSS)
 - Read time series data from database and files
 - Fill missing data
 - Create input files for models
 - Process model results into products
- This presentation focuses on general features

TSTool ...Beyond CDSS

- Read/write CADSWES RiverWare files
- Read MODSIM time series files
- Read/write Army Corps HEC-DSS files
- Read/write National Weather Service River Forecast System files
- Process ensembles of time series
- Retrieve files using FTP and URLs
- Run on Windows and Linux/UNIX
- Run external programs and Python Scripts
- ...many enhancements beyond CDSS core

Starting TSTool

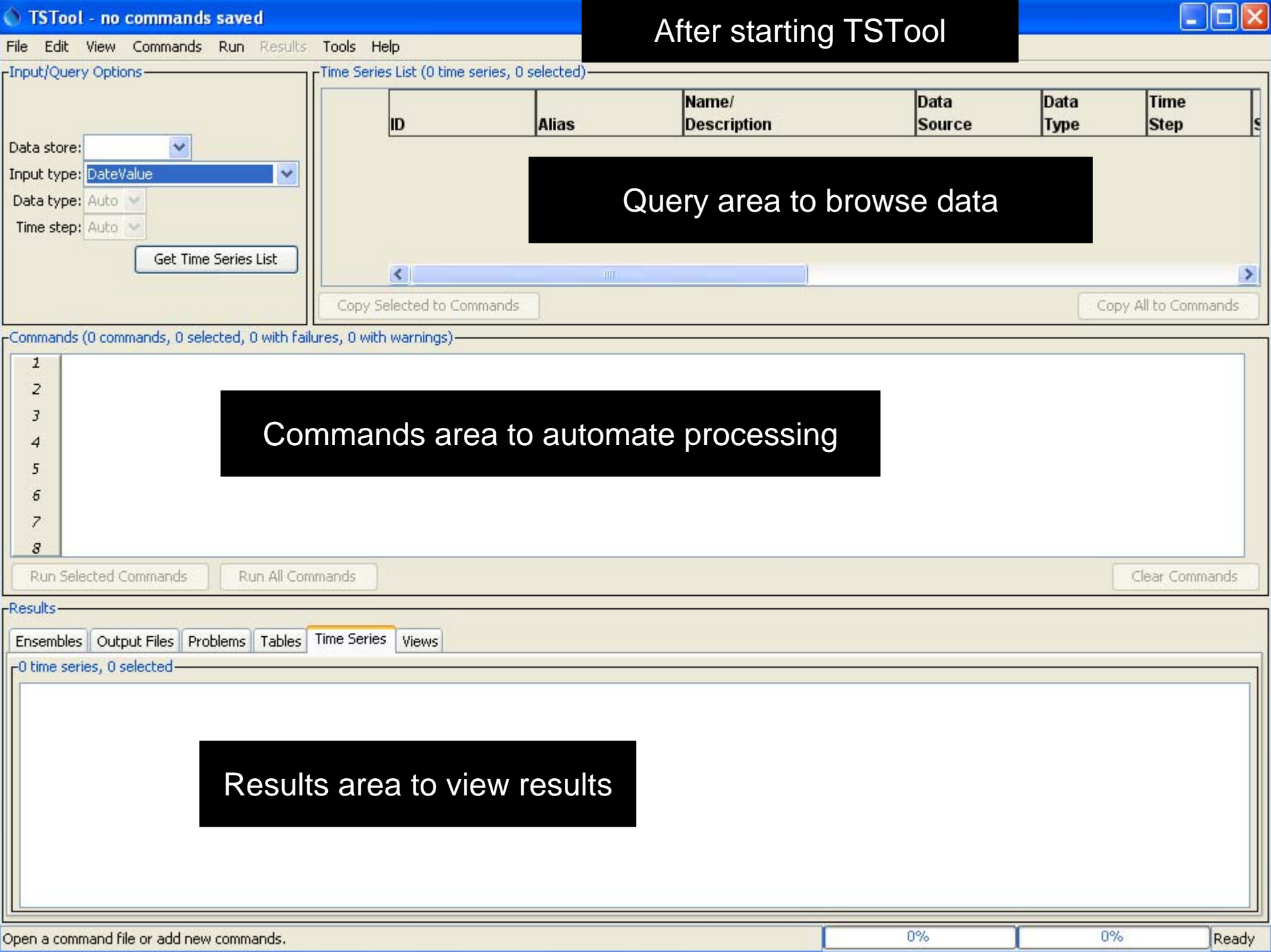
If not already installed, download and install the software from <http://cdss.state.co.us> (see the Products...DMI Utilities link).

Multiple versions can be installed and will be listed in the CDSS menu.

To run, for example:

Start...All Programs...CDSS...TSTool-
10.00.01

If necessary, cancel the HydroBase login (HydroBase can be disabled in the TSTool configuration file).



After starting TSTool

Query area to browse data

Commands area to automate processing

Results area to view results

Input/Query Options

Data store: Input type: DateValue Data time: Auto Time step: Auto

Get Time Series List

Time Series List (4 time series, 0 selected)

	ID	Alias	Name/ Description	Data Source	Data Type	Time Step
1	COOP:050125		ALAMOS		4	Day
2	COOP:051778		COLORADO SPRING		4	Day
3	COOP:052223		DENVER WATER	ACIS	4	Day
4	COOP:053005		FT COLLINS	ACIS	4	Day

Copy Selected to Commands

Copy All to Commands

Commands (0 commands, 0 selected, 0 with failures, 0 with warnings)

1

1) Specify input and query options – each data store and input type has choices and limitations based on the data

2) “Get Time Series List” – Select the example1-PrecipitationCommands/ACIS-Colorado-Precipitation.dv file

3) View the time series list – right click on headings for sort options.

Run Selected Commands

Run All Commands

Clear Commands

Results

Ensembles Output Files Problems Tables Time Series Views

0 time series, 0 selected

Input/Query Options

Data store:

Input type: DateValue

Data type: Auto

Time step: Auto

Get Time Series List

Time Series List (4 time series, 0 selected)

	ID	Alias	Name/ Description
1	COOP:050125		ALAMOSA
2	COOP:051778		COLORADO SPRINGS MUNI AP
3	COOP:052223		DENVER WATER DEPT
4	COOP:053005		FT COLLINS

Copy Selected to Commands

Copy All to Commands

1) Copy time series identifiers (TSIDs) to commands

Commands (4 commands, 0 selected, 0 with failures, 0 with warnings)

```
1 COOP:050125.ACIS.4.Day~DateValue~C:\Develop\TSTool_SourceBuild\TSTool\doc\Training\  
2 COOP:051778.ACIS.4.Day~DateValue~C:\Develop\TSTool_SourceBuild\TSTool\doc\Training\  
3 COOP:052223.ACIS.4.Day~DateValue~C:\Develop\TSTool_SourceBuild\TSTool\doc\Training\  
4 COOP:053005.ACIS.4.Day~DateValue~C:\Develop\TSTool_SourceBuild\TSTool\doc\Training\  
5  
6  
7
```

Run Selected Commands

Run All Commands

2) Run commands

Results

Ensembles Output Files Problems Tables Time Series Views

4 time series, 4 selected

```
1) ALAMOSA - COOP:050125.ACIS.4.Day (1995-01-01 to 2011-12-31)  
2) COLORADO SPRINGS MUNI AP - COOP:051778.ACIS.4.Day (1995-01-01 to 2011-12-31)  
3) DENVER WATER DEPT - COOP:052223.ACIS.4.Day (1995-01-01 to 2011-12-31)  
4) FT COLLINS - COOP:053005.ACIS.4.Day (1995-01-01 to 2011-12-31)
```

3) Select time series and right click to graph

Graph - Area
Graph - Area (stacked)
Graph - Bar (left of date)
Graph - Bar (center on date)
Graph - Bar (right of date)
Graph - Duration
Graph - Line
Graph - Line (log Y-axis)
Graph - Period of Record
Graph - Point
Graph - Predicted Value (under development)
Graph - Predicted Value Residual (under development)
Graph - XY-Scatter

Table

Report - Summary (HTML)

Report - Summary (Text)

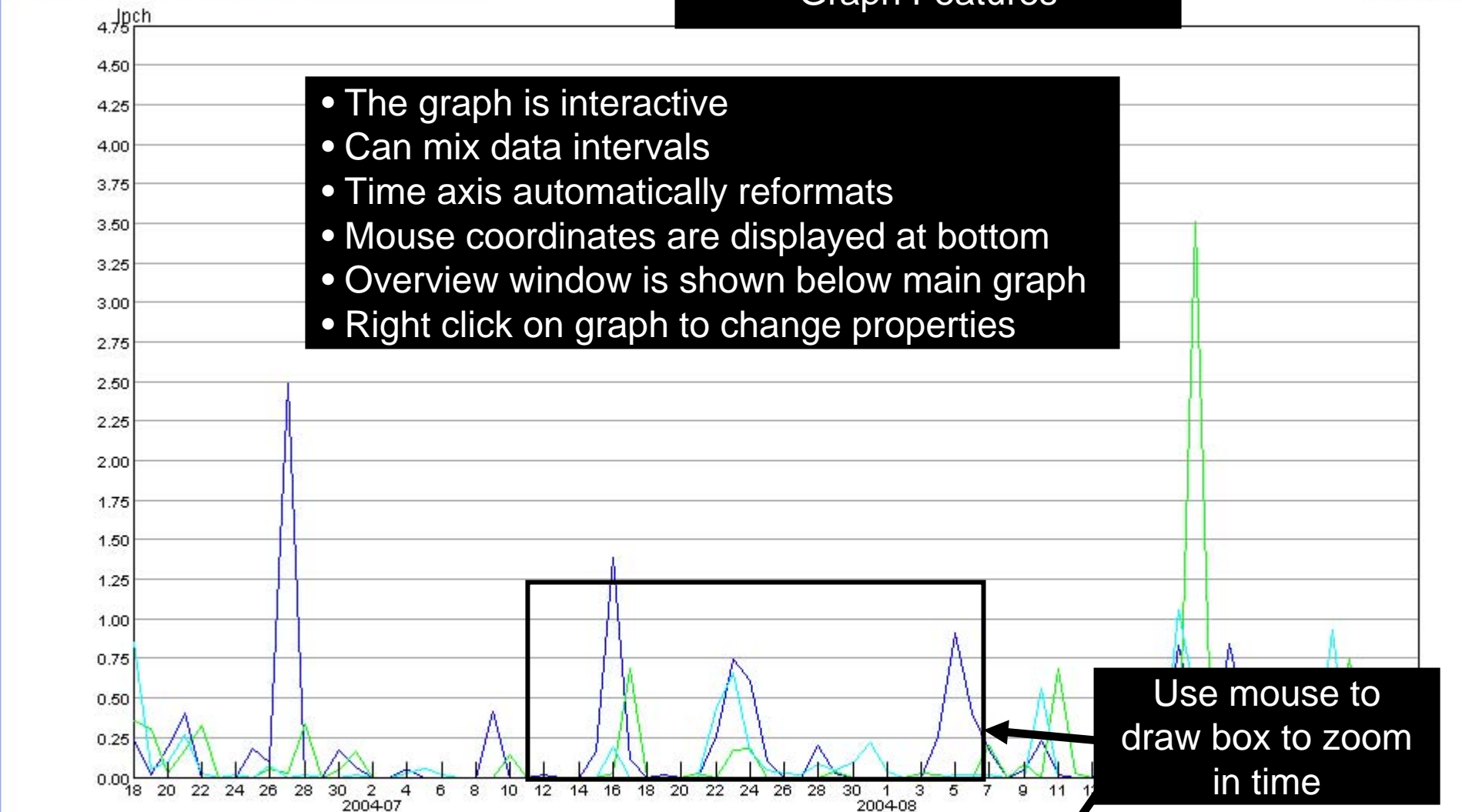
Find Time Series...

Select All for Output

Deselect All

Time Series Properties

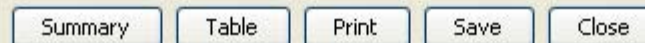
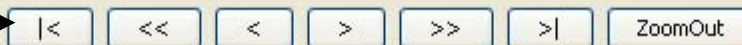
- The graph is interactive
- Can mix data intervals
- Time axis automatically reformats
- Mouse coordinates are displayed at bottom
- Overview window is shown below main graph
- Right click on graph to change properties



Use mouse to draw box to zoom in time

Visible Period (white):

Use buttons to page through data



Alternate views and other actions

DATE	COOP:050125, 4, Inch	COOP:051778, 4, Inch	COOP:052223, 4, Inch	COOP:052223, 4, Inch
1997-10-27			0.00	0.00
1997-10-28			0.00	0.00
1997-10-29			0.00	0.00
1997-10-30			0.00	0.00
1997-10-31			0.00	0.00
1997-11-01			0.00	0.00
1997-11-02			0.00	0.00
1997-11-03			0.00	0.00
1997-11-04			0.00	0.00
1997-11-05			0.00	0.00
1997-11-06			0.00	0.00
1997-11-07			0.00	0.00
1997-11-08			0.00	0.00
1997-11-09			0.03	0.14
1997-11-10			0.04	0.12
1997-11-11			0.03	0.02
1997-11-12			0.02	0.19
1997-11-13			0.02	0.00
1997-11-14			0.01	0.09
1997-11-15			0.00	0.00
1997-11-16			0.00	0.00
1997-11-17			0.00	0.00
1997-11-18			0.00	0.00
1997-11-19			0.00	0.00
1997-11-20			0.02	0.00
1997-11-21			0.00	0.00
1997-11-22			0.00	0.00
1997-11-23			0.00	0.00
1997-11-24			0.00	0.00
1997-11-25			0.00	0.00
1997-11-26			0.00	0.00
1997-11-27			0.01	0.00
1997-11-28			0.04	0.32
1997-11-29			0.00	0.00
1997-11-30			0.00	0.00
1997-12-01			0.00	0.00
1997-12-02			0.00	0.02

Column headings default
to information from time
series

Select cells,
right-click for
clipboard and
export options

Table scrolling, with
rows and columns
limited only by
computer memory

Alternate views
and other actions

Graph

Summary

Save

Close

Time series alias =
 Time series identifier = COOP:053005.ACIS.4.Day
 Description = FT COLLINS
 Data source = ACIS
 Data type = 4
 Data interval = Day
 Data units = Inch
 Period = 1995-01-01 to 2011-12-31
 Orig./Avail. period = 1995-01-01 to 2011-12-31

General time series metadata

Comments:
 No comments available.

Time series creation history:
 Created new time series with interval determined from TSID "COOP:053005.ACIS.4.Day"
 Read DateValue time series from 1995-01-01 to 2011-12-31
 Read time series from "C:\Develop\TSTool_SourceBuild\TSTool\doc\Training\00-intro-GettingSt

Additional information if available (e.g., from original data)

extractACISPrecip:

Calendar Year 1995

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.2	0.7	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.4	0.8	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.1	0.0	0.0	0.0	0.0
10	0.0	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0
11	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
12	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0

Default report format for data interval

Alternate views and other actions

- Graph
- Table
- Search
- Print
- Save
- Close

Time Series Identifier (TSID)

- LocID.Source.DataType.Interval
- LocID.Source.DataType.Interval~InputType
- LocID.Source.DataType.Interval~InputType~Filename
- LocID.Source.DataType.Interval~DataStore

The TSID uniquely identifies the time series and allows TSTool to find the time series in a database, files, or website.

The DataStore concept is being phased in and allows more flexibility in configuring input and output.

An alias also can be used to identify time series and can be set in some commands that create time series. Aliases are in many cases interchangeable with TSIDs and allow users to identify time series using metadata that is more relevant for a specific application.

Opening and Running an Existing Command File

- File...Open...Command File
- Select a *.TSTool file (in this case choose example1-PrecipitationCommands\PrecipitationCommandsWithAlias.TSTool)
- Press the Run All Commands button under the command list
- View the results

Opening and Running a Command File

File Edit View Commands Run Results Tools Help

New
Open
Save
Print
Properties
Set Working Directory...
Exit

Command File...
HydroBase...
RiversideDB...
e Series List

Time Series List (4 time series, 0 selected)

ID	Alias	Name/ Description	Data Source	Data Type	Time Step
1	COOP:050125			4	Day
2	COOP:051778			4	Day
3	COOP:052223	DENVER WATER DEPT	ACIS	4	Day
4	COOP:053005	FT COLLINS	ACIS	4	Day

Copy Selected to Commands

Copy All to Commands

1) Open an existing command file

Commands (4 commands, 1 selected, 0 with failures, 0 with warnings)

```
1 ReadTimeSeries(Alias="%L-precipitation",TSID="COOP:050125.ACIS.4.Day~DateValue~ACIS-Colorado-Precipitation.dv",IfNotFound=Warn)
2 ReadTimeSeries(Alias="%L-precipitation",TSID="COOP:051778.ACIS.4.Day~DateValue~ACIS-Colorado-Precipitation.dv",IfNotFound=Warn)
3 ReadTimeSeries(Alias="%L-precipitation",TSID="COOP:052223.ACIS.4.Day~DateValue~ACIS-Colorado-Precipitation.dv",IfNotFound=Warn)
4 ReadTimeSeries(Alias="%L-precipitation",TSID="COOP:053005.ACIS.4.Day~DateValue~ACIS-Colorado-Precipitation.dv",IfNotFound=Warn)
5
6
7
8
9
10
```

Commands have a readable text form, with comments used to describe processing – note the use of an alias and the path to input file is relative to the command file location

Run Selected Commands Run All Commands Clear Commands

2) Run commands to generate results

Results

Ensembles Output Files Problems Tables Time Series Views

4 time series, 4 selected

```
1) COOP:050125-precipitation - ALAMOSA - COOP:050125.ACIS.4.Day (1995-01-01 to 2011-12-31)
2) COOP:051778-precipitation - COLORADO SPRINGS MUNI AP - COOP:051778.ACIS.4.Day (1995-01-01 to 2011-12-31)
3) COOP:052223-precipitation - DENVER WATER DEPT - COOP:052223.ACIS.4.Day (1995-01-01 to 2011-12-31)
4) COOP:053005-precipitation - FT COLLINS - COOP:053005.ACIS.4.Day (1995-01-01 to 2011-12-31)
```

More Information

Help...View Documentation to view the TSTool documentation

See other training materials