Command Reference: ReadDelimitedFile()

Read time series from a delimited file

Version 11.03.03, 2015-06-10

The ReadDelimitedFile() command reads one or more time series from a column-oriented delimited file, where columns contain date/time and values. This command is useful for processing comma-separated-value (CSV) files exported from spreadsheets and mining data from the web (see also the WebGet() and FTPGet() commands). The command processes files that include the following types of information:

- 1. Comments in the header (before data) and embedded in data records (e.g., because bad data values were commented out).
- 2. Column headers as non-commented line at the top of the file.
- 3. Data records, in column format, containing date/time strings, data values, and other information.
- 4. Metadata, such as station identifiers, data types, units, and interval may be read from the file or specified with command parameters.

The mapping of data in the file to data in the time series occurs first by assigning column names, using one of the following methods:

- 1. Read column names from a line in the file, suitable when the column headings are simple strings and agree closely with the contents of the data columns.
- 2. Assign column names with command parameters. The file being read may include metadata within column headings and data records; however, the information can be difficult to extract because of formatting. For example, column headings may include the data type as "Precipitation\n(in)" (where \n indicates a newline). Consequently, the command supports assigning column names via command parameters in order to ensure robust data handling.

In any case, rather than trying to automatically determine other metadata like data type and units from the column heading, the values can be assigned with the DataType and Units parameters. Additional functionality may be added in the future automate metadata discovery. Examples of use for the two cases are shown in the examples below.

The command syntax is as follows:

ReadDelimitedFile(Parameter=Value,...)

Command Parameters

Parameter	Description	Default
InputFile	The name of the delimited input file to read, surrounded by double quotes to protect whitespace and special	None – must be specified.
	characters. Global property values can be used with the	
	<pre>syntax \${PropertyName} (see also the</pre>	
	SetProperty() command).	
Delimiter	The delimiter character(s) that separate columns.	None – must be
		specified.
Treat	Indicate whether consecutive delimiter characters should	False (columns
Consecutive	be treated as a single delimiter, for example, when	are separated by a
Delimiters	multiple spaces are used to line up columns.	

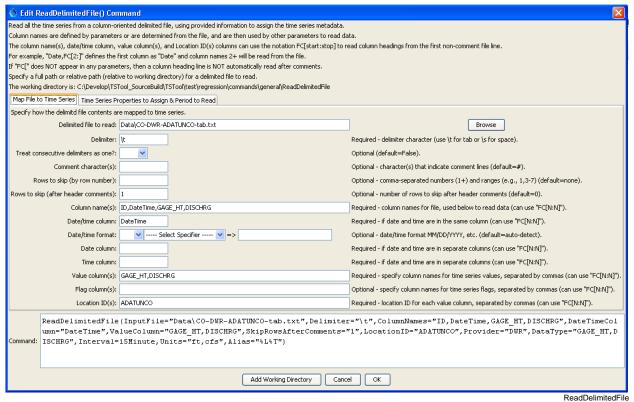
AsOne		single delimiter
		character)
Comment	Character(s) that if found at the start of lines in the file,	#
	indicate that the line is a comment. The characters are	
	interpreted individually (e.g., #\$ indicates that lines	
	starting with # or \$ will be treated as comments).	
SkipRows	Indicate absolute rows (1+) in the file to skip, using	No rows will be
	single numbers and ranges a-b, separated by commas.	skipped.
	Rows are skipped prior to other processing.	
SkipRowsAfter	Indicate the number of rows to skip after header	No rows will be
Comments	comments. Use this parameter to skip column headers	skipped.
	prior to the data lines. This parameter is typically not	
	used if column names are read from the file.	
ColumnNames	The user-specified names for columns in the file, used to	None – must be
	ensure that column headings in files are properly	specified.
	interpreted. These names are used in other parameters to	
	specify columns in the file. Separate column names with	
	commas. Column names can be specified as literal	
	strings or as FC[start:stop] to read columns from	
	the file header (assumed to be the first row after leading	
	comments), where start is 1+ and stop is blank to	
	read all columns or a negative number to indicate the	
	offset from the end column.	7 1 110
DateTime	The column matching a value in ColumnNames, which	Required if
Column	indicates the date/time column in the file. Date and time	DateColumn is
D	are in one column with no separating delimiter characters.	not specified.
DateTime	The format for date/time strings in the date/time column.	Will automatically
Format	If blank, common formats such as ISO YYYY-MM-DD	be determined by
	hh:mm and MM/DD/YYYY will automatically be	examining date/time
	detected. However, it may be necessary to specify the	strings.
	format to ensure proper parsing. This format will be used	
	to parse date/times from the DateTimeColumn or the	
	merged string from the DateColumn and	
	TimeColumn (if specified). The format string will	
	depend on the formatter type. Currently, only the "C"	
	formatter is available, which uses C programming	
	language specifiers. The resulting format includes the	
	formatter and specifiers (e.g., C: %m%d%y).	
DateColumn	The column matching a string in ColumnNames, which	Required if
	indicates the date column in the file.	DateTimeColumn
∏-i-m-a-C-a-1		is not specified.
TimeColumn	The column matching a string in ColumnNames, which	A time column is
	indicates the time column in the file. Specify this	required only when
	parameter when DateColumn is specified and time is	DateColumn is
	specified in a separate column. The DateColumn and	specified and the
	TimeColumn contents are merged with a joining colon	interval requires time.
	character and are then treated as if DateTimeColumn	unie.
	had been specified.	

ValueColumn	The column(s) matching a string in ColumnNames,	None – must be
	which indicate the data value columns. Separate column	specified.
	names with commas. The FC[start:stop] notation	•
	discussed for ColumnNames can also be used.	
FlagColumn	The column(s) matching a string in ColumnNames,	Flags are not read.
	which indicate the data flag columns. Separate column	
	names with commas. The FC[start:stop] notation	
	discussed for ColumnNames can also be used. If	
	specified, the number of columns must match the	
	ValueColumn parameter, although blanks are allowed.	
	Double-quotes around flags are not considered part of the	
	flag.	
LocationID	The location identifier(s) to assign to time series for each	None – must be
	of the value columns (or specify one value to apply to all	specified.
	columns). The FC[start:stop] notation discussed	
	for ColumnNames can also be used.	
Provider	The data provider identifier to assign to time series for	No provider will be
	each of the value columns (or specify one value to apply	assigned.
	to all columns).	
DataType	The data type to assign to time series for each of the value	Use the value
	columns (or specify one value to apply to all columns).	column names for
		the data types.
Interval	The interval for the time series. Only one interval is	None – must be
	recognized for all the time series in the file. Interval	specified.
	choices are provided when editing the command. If it is	
	possible that the date/times are not evenly spaced, then	
Scenario	use the IRREGULAR interval. The scenario to assign to time series for each of the value	No scenario will be
Scenario	columns (or specify one value to apply to all columns).	assigned.
Units	The data units to assign to time series for each of the	No units will be
OHICS	value columns (or specify one value to apply to all	assigned.
	columns).	assigned.
Missing	Strings that indicate missing data in the file (e.g., "m").	Interpret empty
	<i>C S</i> (1.6.,).	column values as
		missing data.
Alias	The alias to assign to time series, as a literal string or	No alias will be
	using the special formatting characters listed by the	assigned.
	command editor. The alias is a short identifier used by	
	other commands to locate time series for processing.	
InputStart	The date/time to start reading data. Can be specified	All data or global
	using processor \${Property}.	input start.
InputEnd	The date/time to end reading data Can be specified	All data or global
	using processor \${Property}.	input end.

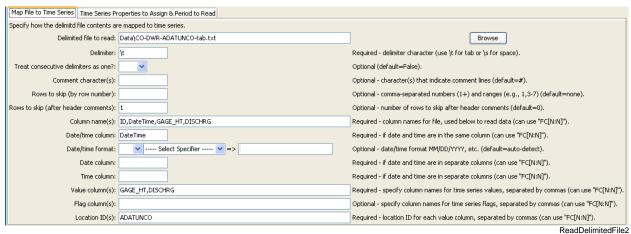
Example of Column Names Assigned with Command Parameter

The following example for two time series (gate height and discharge) illustrates a format where column headings are complex enough to require assignment of column names using a command parameter:

The following dialog is used to edit the command and illustrates the syntax for the command. The column headings are skipped because they are assigned with a command parameter. Because the delimiter is a tab, the space between date and time columns is NOT used as a delimiter and the date/time information is treated as one column.



ReadDelimitedFile() Command Editor when Literally Specifying Column Names



ReadDelimitedFile() Command Editor when Literally Specifying Column Names - Second Data Tab

The following example command file retrieves real-time time series data from the State of Colorado's website and reads the data:

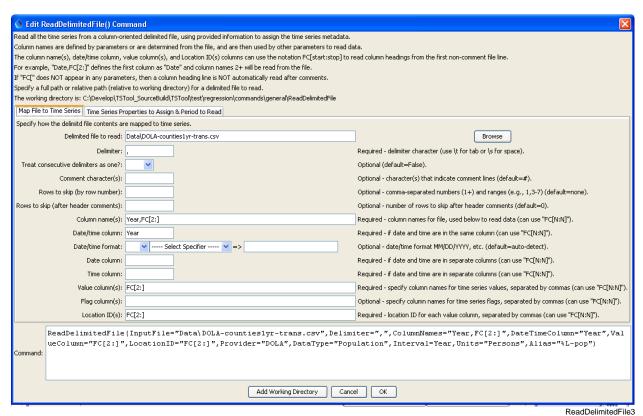
```
WebGet(URI="http://www.dwr.state.co.us/SurfaceWater/data/export_tabular.aspx
?
IDADATUNCO&MTYPEGAGE_HT, DISCHRG&INTERVAL1&START10/1/06&END10/6/06",
    LocalFile="Data\CO-DWR-ADATUNCO-tab.txt")
ReadDelimitedFile(InputFile="Data\CO-DWR-ADATUNCO-tab.txt",
    Delimiter="\t", ColumnNames="ID, DateTime, GAGE_HT, DISCHRG",
    DateTimeColumn="DateTime", ValueColumn="GAGE_HT, DISCHRG",
    SkipRowsAfterComments="1", LocationID="ADATUNCO", Provider="DWR",
    DataType="GAGE_HT, DISCHRG", Interval=15Minute, Units="ft, cfs", Alias="%L%T")
```

Example of Column Names Read from the File

The following simple example of annual county population data illustrates a format that allows reading column names from the file. In this case, the rows and columns have been transposed from the original format to be compatible with this command and in the command example shown in the figure below the "County" heading is replaced with "Year" to more clearly indicate the contents.

```
County, COLORADO, Adams, Alamosa, Arapahoe, Archuleta, Baca, Bent, Boulder, Broomfield, Chaffe e, ...
2000, 4338793, 366660, 15132, 491134, 10027, 4514, 5991, 296018, 0, 16294, 2229, 9386, ...
2001, 4456408, 360389, 15314, 502567, 10532, 4486, 5911, 282794, 41529, 16382, 2195, 9479, ...
...etc..
```

The following dialog is used to edit the command and illustrates the syntax for the command.



ReadDelimitedFile() Command Editor when Reading Column Names from the File

The following example command file retrieves population forecast data from the State of Colorado's website, transposes the rows and columns using a Python script, and reads the time series data. The Python script is not provided with this example but generates output as shown in the above data file example.

```
StartLog(LogFile="DOLA-county-pop.TSTool.log")
# This command file retrieves population data from the Colorado State Demographer
 website and processes the data into time series for use in analysis.
# First retrieve the data from the DOLA web site.
WebGet(URI="http://www.dola.state.co.us/dlg/demog/population/forecasts/counties1yr.csv",
 LocalFile="DOLA-counties1yr.csv")
# Transpose the rows/columns to match TSTool time series notation with dates in the
# first column.
SetProperty (PropertyName="ScriptDir", PropertyType=String,
RunPython(InputFile="${InstallDir}\python\table\transpose-csv.py",
  Arguments="\"${WorkingDir}\DOLA-counties1yr.csv\"
  \"${WorkingDir}\DOLA-counties1yr-trans.csv\"",Interpreter="Python")
# Read into time series from the delimited CSV file.
# Define column names dynamically based on the first non-comment line in the file
ReadDelimitedFile(InputFile="DOLA-countieslyr-trans.csv",Delimiter=",",
  ColumnNames="Year,FC[2:]",DateTimeColumn="Year",ValueColumn="FC[2:]",
  LocationID="FC[2:]", Provider="DOLA", DataType="Population", Interval=Year, Units="Persons",
  Alias="%L-pop")
```