
Command Reference: CalculateTimeSeriesStatistic()

Calculate time series statistic

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The `CalculateTimeSeriesStatistic()` command calculates a statistic for a time series (typically a single value, but may have multiple output values such as `TrendOLS`) and optionally adds the result to a table and/or sets a time series property. Some statistics, such as `Max` also have date/time. Multiple time series can be processed. The sample from each time series consists of data values for the full period or a shorter analysis period if specified for the command. Missing values typically are ignored unless significant for the statistic (e.g., `Statistic=MissingCount`).

The following dialog is used to edit the command and illustrates the command syntax. Most statistics do not require additional input; however, those that do utilize the `Value*` parameters to specify additional information. See the documentation below and move the mouse over the entry fields in the dialog.

Edit CalculateTimeSeriesStatistic() Command

Calculate a statistic for time series and optionally save in a table and/or time series property.
An example of a statistic is the count of missing values.

Input Analysis Output Table Output Property

TS list: Optional - indicates the time series to process (default=AllTS).

TSID (for TSList=AllMatchingTSID):

EnsembleID (for TSList=EnsembleID):

Command:

```
CalculateTimeSeriesStatistic(Statistic="NqYY", Value1=7, Value2=10, Value3=0, TableID="Table1", TableTSIDColumn="TSID", TableStatisticColumn="7q10")
```

Cancel OK

CalculateTimeSeriesStatistic

CalculateTimeSeriesStatistic() Command Editor Showing Input Parameters

Input	Analysis	Output Table	Output Property						
<p>Statistics results may include 1+ values and may include the date/time of the result. Mouse over Value1, Value2, and Value3 fields for help understanding input - help will be blank if value is not used for a statistic. Specify dates with precision appropriate for the data, use blank for all available data, OutputStart, or OutputEnd.</p>									
Statistic to calculate: NqYY		Required - may require other parameters.							
Value1: 7		Optional - may be needed as input to calculate statistic.							
Value2: 10		Optional - may be needed as input to calculate statistic.							
Value3: 0		Optional - may be needed as input to calculate statistic.							
Analysis start:		Optional - analysis start date/time (default=full time series period).							
Analysis end:		Optional - analysis end date/time (default=full time series period).							
<input type="checkbox"/> Analysis window: <table border="1"> <tr> <td>Start</td> <td>End</td> </tr> <tr> <td>Month: Day: Hour:</td> <td>Month: Day: Hour:</td> </tr> <tr> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>		Start	End	Month: Day: Hour:	Month: Day: Hour:	<input type="text"/>	<input type="text"/>	Optional - analysis window within input year (default=full year).	
Start	End								
Month: Day: Hour:	Month: Day: Hour:								
<input type="text"/>	<input type="text"/>								

CalculateTimeSeriesStatistic() Command Editor Showing Analysis Parameters

Input	Analysis	Output Table	Output Property
<p>Statistics results can be saved to a table. The table and its columns will be created if not found. The TSID column is used to match a row in the table to receive output statistics, which are written to columns. The date/time corresponding to a statistic can be output for some statistics (e.g., Last, Max). Use table commands to save the table results to a file.</p>			
Table ID for output: Table1		Optional - if statistic should be saved in table.	
Table TSID column: TSID		Required if using table - column name for TSID.	
Format of TSID: -- Select Specifier -- =>		Optional - use %L for location, etc. (default=alias or TSID).	
Table statistic column: 7q10		Required if using table - column name(s) for statistic(s).	
Table statistic date/time column:		Optional - column name for statistic date/time.	

CalculateTimeSeriesStatistic() Command Editor Showing Output Table Parameters

Input	Analysis	Output Table	Output Property
<p>The calculated statistic can be set as a time series and processor property. The time series property can be referenced later in commands using \${ts:Property} syntax. The processor property can be referenced later in commands using \${Property} syntax.</p>			
Time series property:		Optional - time series property to set as statistic value.	
Statistic value property:		Optional - processor property to set as statistic value.	

CalculateTimeSeriesStatistic() Command Editor Showing Output Property Parameters

The command syntax is as follows:

```
CalculateTimeSeriesStatistic(Parameter=Value,...)
```

Command Parameters

Parameter	Description	Default
TSList	Indicates the list of time series to be processed, one of: <ul style="list-style-type: none"> AllMatchingTSID – all time series that match the TSID (single TSID or TSID with wildcards). AllTS – all time series before the command. EnsembleID – all time series in the ensemble. FirstMatchingTSID – the first time series that matches the TSID (single TSID or TSID with wildcards). LastMatchingTSID – the last time series that matches the TSID (single TSID or TSID with wildcards). SelectedTS – the time series selected with the SelectTimeSeries() command. 	AllTS
TSID	The time series identifier or alias for the time series to be processed, using the * wildcard character to match multiple time series. Can be specified with processor \${Property}.	Required if TSList=*TSID.
EnsembleID	The ensemble to be processed, if processing an ensemble. Can be specified with processor \${Property}.	Required if TSList=EnsembleID.
Statistic	Statistic to compute as shown in the Statistic Details table below.	None – must be specified.
Value1	Input data required by the statistic. Currently the dialog does not check the value for correctness – it is checked when the statistic is computed.	See Statistic Details table below.
Value2	Input data required by the statistic. Currently the dialog does not check the value for correctness – it is checked when the statistic is computed.	See Statistic Details table below.
Value3	Input data required by the statistic. Currently the dialog does not check the value for correctness – it is checked when the statistic is computed.	See Statistic Details table below.
AnalysisStart	The date/time to start analyzing data as valid date/time string or \${Property}.	Full period is analyzed.
AnalysisEnd	The date/time to end analyzing data as valid date/time string or \${Property}.	Full period is analyzed.
Analysis WindowStart	The calendar date/time for the analysis start within each year. Specify using the format MM, MM-DD, MM-DD hh, or MM-DD hh:mm, consistent with the time series interval precision. A year of 2000 will be used internally to parse the date/time. Use this parameter to limit data processing within the year, for example to analyze only a season. The analysis window has	Analyze the full year.

Parameter	Description	Default
	only been enabled for Count, GECOUNT, GTCount, Last, LastNonmissing, LECOUNT, LTCount, Max, Min, MissingCount, MissingPercent, NonmissingCount, and NonmissingPercent statistics.	
Analysis WindowEnd	Specify date/time for the analysis end within each year. See AnalysisWindowStart for details.	Analyze the full year.
TableID	Identifier for table that receives the statistic. An existing table can be specified. If not found, a new table will be created. Can be specified with processor <code>\${Property}</code> .	Optional – table output is not required.
TableTSIDColumn	Table column name that is used to look up the time series. If a matching TSID is not found, a row will be added to the table. If a TSID is found, the statistic cell value for the time series is modified. The column name can use processor <code>\${Property}</code> and time series % specifiers (e.g., %L for location) and properties using syntax <code>\${ts:Property}</code> .	Optional – table output is not required.
TableTSIDFormat	The specification to format the time series identifier to insert into the TSID column. Use the format choices and other characters to define a unique identifier.	Time series alias if available, or the time series identifier.
TableStatistic Column	Table column name(s) to receive the statistic value(s). If not found in the table, a new column is added automatically. The column names can use processor <code>\${Property}</code> and use time series % specifiers (e.g., %L for location) and properties using syntax <code>\${ts:Property}</code> .	Optional – table output is not required.
TableStatistic DateTimeColumn	Table name for date/time corresponding to statistic, if available (for example for Max).	Date/time not output to table.
TimeSeries PropertyName	If specified, the output statistic will be set as a property value for the time series. In the future, statistics with multiple values will use a variation of the property name.	No property is set.
Statistic ValueProperty	Name of the processor property to set the value of the statistics.	No property is set.

The following table provides additional information about specific statistics, in particular to describe how the statistic is computed, whether additional input needs to be provided with `Value` command parameters, and whether multiple statistic values are output in results.

Statistic Details

Statistic	Description	Analysis Window Allowed?	Date/Time for Statistic Calculated?	Required Values
Count	Number of data values total, including missing and non-missing.	Yes		
DeficitMax	Maximum deficit value (where deficit is mean minus value).	No		
DeficitMean	Mean deficit value (where deficit is mean minus value).	No		
DeficitMin	Minimum deficit value (where deficit is mean minus value).	No		
DeficitSeqLengthMax	Maximum number of sequential intervals where each value is less than the mean (for example maximum drought length).	No		
DeficitSeqLengthMean	Mean number of sequential intervals where each value is less than the mean (for example mean drought length).	No		
DeficitSeqLengthMin	Minimum number of sequential intervals where each value is less than the mean (for example minimum drought length).	No		
DeficitSeqMin	Maximum sum of sequential values where each value is less than the mean (for example maximum drought water volume).	No		
DeficitSeqMean	Mean of the sum of sequential values where each value is less than the mean (for example mean drought water volume).	No		
DeficitSeqMin	Minimum sum of sequential values where each value is less than the mean (for example minimum drought water volume).	No		
GECount	Count of values greater than or equal to <code>Value1</code> .	Yes		<code>Value1</code> – criteria to check
GTCCount	Count of values greater than <code>Value1</code> .	Yes		<code>Value1</code> – criteria to check
Lag-1Auto Correlation	Autocorrelation between values and the those that follow in the next time step, given by: $r_k = \frac{\sum_{i=1}^{N-k} (Y_i - Y_{mean})(Y_{i+k} - Y_{mean})}{\sum_{i=1}^N (Y_i - Y_{mean})^2}$	No		

Statistic	Description	Analysis Window Allowed?	Date/Time for Statistic Calculated?	Required Values
Last	Last non-missing or missing value. Second statistic is the date/time of the value.	Yes	Yes	
LastNonmissing	Last non-missing value. Second statistic is the date/time of the value.	Yes	Yes	
LECount	Count of values less than or equal to Value1.	Yes		Value1 – criteria to check
LTCCount	Count of values less than Value1.	Yes		Value1 – criteria to check
Max	Maximum value.	Yes	Yes (first)	
Mean	Mean value.	No		
Min	Minimum value.	Yes	Yes (first)	
MissingCount	Number of missing values.	Yes		
MissingPercent	Percent of values that are missing.	Yes		
MissingSeqLengthMax	Maximum number of sequential values that are missing.	No		
NonmissingCount	Number of non-missing values.	Yes		
NonmissingPercent	Percent of values that are not missing.	Yes		
NqYY	<p>This statistic is typically used to evaluate the return period of low flows and is implemented only for daily data. The N indicates the number of daily values to be averaged and YY indicates the return interval. For example, 7q10 indicates the flow corresponding to the 10-year recurrence interval for minimum average daily flow (for 7 days) in a year. This statistic is computed as follows, using 7q10 as an example:</p> <ol style="list-style-type: none"> 1. Determine the number of years to be analyzed (from analysis period command parameters or time series data). 2. For each year, loop through each day from January 1 to December 31. Compute an average flow by averaging 7 days, in this case with 3 values on each side of the current day and including the current day. If at the end of the year, use 3 values from adjoining years. The number of missing data allowed is 	No		<p>Value1 – specify the number of daily values to be averaged. Currently this must be an odd number to allow bracketing the current day.</p> <p>Value2 – specify the return interval (e.g., 10).</p> <p>Value3 – specify the number of missing values allowed in the average (e.g., 0 for most rigorous analysis). It may be useful to set this value if, for example, a single daily value is available in the time series, for example entered on the first day of the month.</p>

Statistic	Description	Analysis Window Allowed?	Date/Time for Statistic Calculated?	Required Values
	<p>controlled by the Value3 command parameter.</p> <p>3. For the year, save the minimum 7-day average.</p> <p>4. Utilize the minimum values for all years, with log-Pearson Type III distribution, to determine the value for the 10-year recurrence interval. See http://pubs.usgs.gov/sir/2008/5126/section3.html for a description of NqYY and “Hydrology for Engineers, 3rd Edition,” Linsley, Kohler, Paulhus for a description of log-Pearson Type III distribution.</p>			
Skew	<p>Skew coefficient, as follows:</p> $Cs = \frac{N \sum_{i=1}^N (Y_i - Y_{mean})^3}{(n-1)(n-2)s^3}$ <p>where s = standard deviation</p>	No		
StdDev	Standard deviation.	No		
SurplusMin	Maximum surplus value (where surplus is value minus mean).	No		
SurplusMean	Mean surplus value (where surplus is value minus mean).	No		
SurplusMin	Minimum surplus value (where surplus is value minus mean).	No		
SurplusSeq LengthMax	Maximum number of sequential intervals where each value is greater than the mean (for example maximum water surplus length).	No		
SurplusSeq LengthMean	Mean number of sequential intervals where each value is greater than the mean (for example mean water surplus length).	No		
SurplusSeq LengthMin	Minimum number of sequential intervals where each value is greater than the mean (for example minimum water surplus length).	No		
SurplusSeqMin	Maximum sum of sequential values where each value is greater than the mean (for example maximum water surplus volume).	No		
SurplusSeqMean	Mean of the sum of sequential values where each value is greater	No		

Statistic	Description	Analysis Window Allowed?	Date/Time for Statistic Calculated?	Required Values
	than the mean (for example mean water surplus volume).			
SurplusSeqMin	Minimum sum of sequential values where each value is greater than the mean (for example minimum water surplus volume).	No		
Total	Total of values.	No		
TrendOLS	Ordinary least squares analysis is used to compute results that are named TableStatisticColumn with appended _Intercept, Slope, and R2.	No		
Variance	Variance.	No		

The following example illustrates how to use the command to compute the 7q10 statistic for daily flow:

```
ReadDateValue(Alias="linsley", InputFile="Data\linsley.dv")
NewTable(TableID="Table1", Columns="TSID, string; 7q10, double")
CalculateTimeSeriesStatistic(Statistic="NqYY", Value1=7, Value2=10, Value3=6,
TableID="Table1", TableTSIDColumn="TSID", TableStatisticColumn="7q10")
WriteTableToDelimitedFile(TableID="Table1",
OutputFile="Results/Test CalculateTimeSeriesStatistic 7q10 linsley_out.csv")
```