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# Command Reference:

## NewStatisticTimeSeriesFromEnsemble()

Create a time series containing a statistic determined from a time series ensemble

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The `NewStatisticTimeSeriesFromEnsemble()` command uses data from time series in an ensemble to calculate a statistic for each interval in the ensemble, and assigns the statistic value to the corresponding interval in the result. For example, for a statistic of `Mean` applied to a daily time series, all January 1, 1970 values will be used for the sample and the mean value will be assigned to January 1, 1970 in the output time series. Leap year values will be included if they are included in the period of the ensemble.

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

**Edit NewStatisticTimeSeriesFromEnsemble() Command**

Create a time series as a statistic determined from an ensemble of time series, giving the result an alias.  
A statistic is a value computed from a sample consisting of values at an interval from each time series in the ensemble.  
It is recommended that a new time series identifier (TSID) be specified for the result to avoid confusion with the original time series.

Ensemble to analyze (EnsembleID):

New time series ID:  Specify to avoid confusion with TSID from original TS.

Alias to assign:  Insert:  Required - use %L for location, etc.

Statistic:  Required - statistic to calculate.

Allow missing count:  Optional - number of missing values allowed in sample (default=no limit).

Minimum sample size:  Optional - minimum required sample size (default=determined by 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).

Output start:  Optional - output start date/time (default=full time series period).

Output end:  Optional - output end date/time (default=full time series period).

Command:  
`NewStatisticTimeSeriesFromEnsemble (Alias="Mean", EnsembleID="TestEnsemble", NewTSID="Test..Streamflow.6Hour", Statistic=Mean)`

NewStatisticTimeSeriesFromEnsemble

### NewStatisticTimeSeriesFromEnsemble() Command Editor

The command syntax is as follows:

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

The following older command syntax is updated to the above syntax when a command file is read:

```
TS Alias = NewStatisticTimeSeriesFromEnsemble (Parameter=Value, ...)
```

### Command Parameters

| Parameter           | Description                                                                                                                                                                                                                                                                               | Default                                                                              |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| EnsembleID          | The identifier for the ensemble to analyze.                                                                                                                                                                                                                                               | None – must be specified.                                                            |
| NewTSID             | The time series identifier to be assigned to the new time series, which is useful to avoid confusion with the original time series. <b>This parameter may be required in the future.</b>                                                                                                  | None – use the same identifier as the original time series.                          |
| Alias               | The alias to assign to the time series, as a literal string or using the special formatting characters listed by the command editor. The alias is a short identifier used by other commands to locate time series for processing, as an alternative to the time series identifier (TSID). | None – must be specified.                                                            |
| Statistic           | The statistic to compute. See the <b>Available Statistics</b> table below.                                                                                                                                                                                                                | None – must be specified.                                                            |
| Allow Missing Count | The number of missing values allowed in the sample of values 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.                                                                       | Missing values are ignored in the sample used to compute the statistic.              |
| MinimumSample Size  | The minimum number of values in the sample that are required to compute the statistic.                                                                                                                                                                                                    | Use the sample with no restrictions, although some statistics may have requirements. |
| AnalysisStart       | The date/time for the analysis start, using a precision that matches the original time series.                                                                                                                                                                                            | Analyze the full period.                                                             |
| AnalysisEnd         | The date/time for the analysis start, using a precision that matches the original time series.                                                                                                                                                                                            | Analyze the full period.                                                             |
| OutputStart         | The date/time for the output start, using a precision that matches the original time series. An output period longer than the analysis period will result in missing values in output.                                                                                                    | Output the full period.                                                              |
| OutputEnd           | The date/time for the output start, using a precision that matches the original time series. An output period longer than the analysis period will result in missing values in output.                                                                                                    | Output the full period.                                                              |

### Available Statistics

| Statistic                | Description                                                           | Limitations                                          |
|--------------------------|-----------------------------------------------------------------------|------------------------------------------------------|
| Exceedance Probability10 | The data value corresponding to a 10% chance of value being exceeded. | Small sample size will skew – see statistic details. |
| Exceedance Probability30 | The data value corresponding to a 30% chance of value being exceeded. | Small sample size will skew – see statistic details. |
| Exceedance Probability50 | The data value corresponding to a 50% chance of value being exceeded. | Small sample size will skew – see statistic details. |
| Exceedance Probability70 | The data value corresponding to a 70% chance of value being exceeded. | Small sample size will skew – see statistic details. |
| Exceedance               | The data value corresponding to a 90%                                 | Small sample size will skew –                        |

| Statistic     | Description                                  | Limitations                   |
|---------------|----------------------------------------------|-------------------------------|
| Probability90 | chance of value being exceeded.              | see statistic details.        |
| GeometricMean | Geometric mean of all values in the sample.  | All values must be $\geq 0$ . |
| Max           | Maximum of all values in the sample.         | None.                         |
| Mean          | Arithmetic mean of all values in the sample. | None.                         |
| Median        | Median of all values in the sample.          | None.                         |
| Min           | Minimum of all values in the sample.         | None.                         |

### Statistic Details

| Statistic               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Exceedance Probability* | <p>The statistic for each time step in the analysis period is computed as follows:</p> <ol style="list-style-type: none"> <li>The data values are extracted for each trace with missing values being ignored. The sample size is <math>n</math>.</li> <li>The data values are sorted into ascending order.</li> <li>Exceedance probabilities are computed for the number of sample values according to Weibull plotting positions as follows (for <math>i=1, \dots, n</math>): <ol style="list-style-type: none"> <li>If <math>n = 1</math>, the exceedance probability <math>P_i = 1.0</math>. This is an extreme case due to small sample size.</li> <li>Otherwise, <math>P_i = (n - (i - 1)) / (n + 1)</math>. Therefore, when <math>i=1</math>, <math>P_i = n / (n + 1)</math> and when <math>i=n</math>, <math>P_i = 1 / (n + 1)</math>. The probabilities will be listed from high to low value (the opposite order of the sorted data values).</li> </ol> </li> <li>The data value corresponding to the requested probability is calculated by iterating over the probabilities until the calculated probability for a value is less than the requested probability: <ol style="list-style-type: none"> <li>If the first probability satisfies the condition, the computed value is set to the minimum value in the sample (no extrapolating past the end).</li> <li>Otherwise, the value is interpolated from the previous and current sample values.</li> </ol> <p>If no calculated probability is less than the requested probability, the computed value is set to the maximum value in the sample (no extrapolating past the end).</p> <p>To create an exceedance probability plot, use several commands with different exceedance probability levels (listed low to high). Graphing the time series in a bar graph with <code>BarOverlap=True</code> will draw the bars on top of each other to give the desired appearance. The edges of the colors will represent the specific exceedance probabilities and the colored areas will represent ranges of exceedance probabilities.</p> </li> </ol> |

## Examples

The following example command file illustrates how to compute the mean statistic for one monthly data:

```
# Test computing a statistic time series for Month data where Statistic=Mean
StartLog(LogFile="Results/Test_NewStatisticTimeSeriesFromEnsemble_Month_Mean.TSTool.log")
# Define 2 years of data that when averaged equal even numbers
# The 2nd time series is shifted by 1 from the first.
# Include missing values in the first time series but not the second.
NewPatternTimeSeries(Alias="ts1",NewTSID="ts1..Streamflow.Month",
    Description="test data 1",SetStart="2000-01",SetEnd="2001-12",Units="CFS",
    PatternValues=".5,1.5,,3.5,4.5,5.5,6.5,7.5,8.5,9.5,10.5,11.5,
```

```

1.5,2.5,3.5,4.5,5.5,6.5,7.5,8.5,9.5,10.5,11.5,12.5")
NewPatternTimeSeries (Alias="ts2",NewTSID="ts2..Streamflow.Month",
  Description="test data 2",SetStart="2000-01",SetEnd="2001-12",Units="CFS",
  PatternValues="1.5,2.5,3.5,4.5,5.5,6.5,7.5,8.5,9.5,10.5,11.5,12.5,
  2.5,3.5,4.5,5.5,6.5,7.5,8.5,9.5,10.5,11.5,12.5,13.5")
# Create an ensemble to hold the above time series
NewEnsemble (TSList=AllTS,NewEnsembleID="TestEnsemble",NewEnsembleName="Test Ensemble")
# Compute the statistic
NewStatisticTimeSeriesFromEnsemble (Alias="Mean",EnsembleID="TestEnsemble",
  NewTSID="Test..Streamflow.Month.Mean",Statistic=Mean)

```

The following figure illustrates the results:

The screenshot shows a window titled "TSTool - Time Series - Table". It contains a table with four columns: "DATE", "ts1, Streamflow, CFS", "ts2, Streamflow, CFS", and "Mean, Streamflow, CFS". The table lists data for each month from 2000-01 to 2001-12. Below the table are four buttons: "Graph", "Summary", "Save", and "Close". At the bottom, it says "Currently-selected worksheet interval: Month".

| DATE    | ts1, Streamflow, CFS | ts2, Streamflow, CFS | Mean, Streamflow, CFS |
|---------|----------------------|----------------------|-----------------------|
| 2000-01 | 0.50                 | 1.50                 | 1.00                  |
| 2000-02 | 1.50                 | 2.50                 | 2.00                  |
| 2000-03 |                      | 3.50                 | 3.50                  |
| 2000-04 | 3.50                 | 4.50                 | 4.00                  |
| 2000-05 | 4.50                 | 5.50                 | 5.00                  |
| 2000-06 | 5.50                 | 6.50                 | 6.00                  |
| 2000-07 | 6.50                 | 7.50                 | 7.00                  |
| 2000-08 | 7.50                 | 8.50                 | 8.00                  |
| 2000-09 | 8.50                 | 9.50                 | 9.00                  |
| 2000-10 | 9.50                 | 10.50                | 10.00                 |
| 2000-11 | 10.50                | 11.50                | 11.00                 |
| 2000-12 | 11.50                | 12.50                | 12.00                 |
| 2001-01 | 1.50                 | 2.50                 | 2.00                  |
| 2001-02 | 2.50                 | 3.50                 | 3.00                  |
| 2001-03 | 3.50                 | 4.50                 | 4.00                  |
| 2001-04 | 4.50                 | 5.50                 | 5.00                  |
| 2001-05 | 5.50                 | 6.50                 | 6.00                  |
| 2001-06 | 6.50                 | 7.50                 | 7.00                  |
| 2001-07 | 7.50                 | 8.50                 | 8.00                  |
| 2001-08 | 8.50                 | 9.50                 | 9.00                  |
| 2001-09 | 9.50                 | 10.50                | 10.00                 |
| 2001-10 | 10.50                | 11.50                | 11.00                 |
| 2001-11 | 11.50                | 12.50                | 12.00                 |
| 2001-12 | 12.50                | 13.50                | 13.00                 |

Buttons: Graph, Summary, Save, Close

Currently-selected worksheet interval: Month

NewStatisticTimeSeriesFromEnsemble\_Table

### NewStatisticTimeSeriesFromEnsemble() Command Results