Autocorrelation user guide

The autocorrelation (serial correlation) is a tool to search for repeating patterns in a signal. Autocorrelation of a random process is the correlation between values of the process at different times, as a function of the two times or of the time lag (i.e. correlation of a signal with itself at different time lags).

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REFERENCES Document Repository

CATEGORY Correlation Analysis

KEYWORDS Statistical analysis, Statistical properties of seismicity

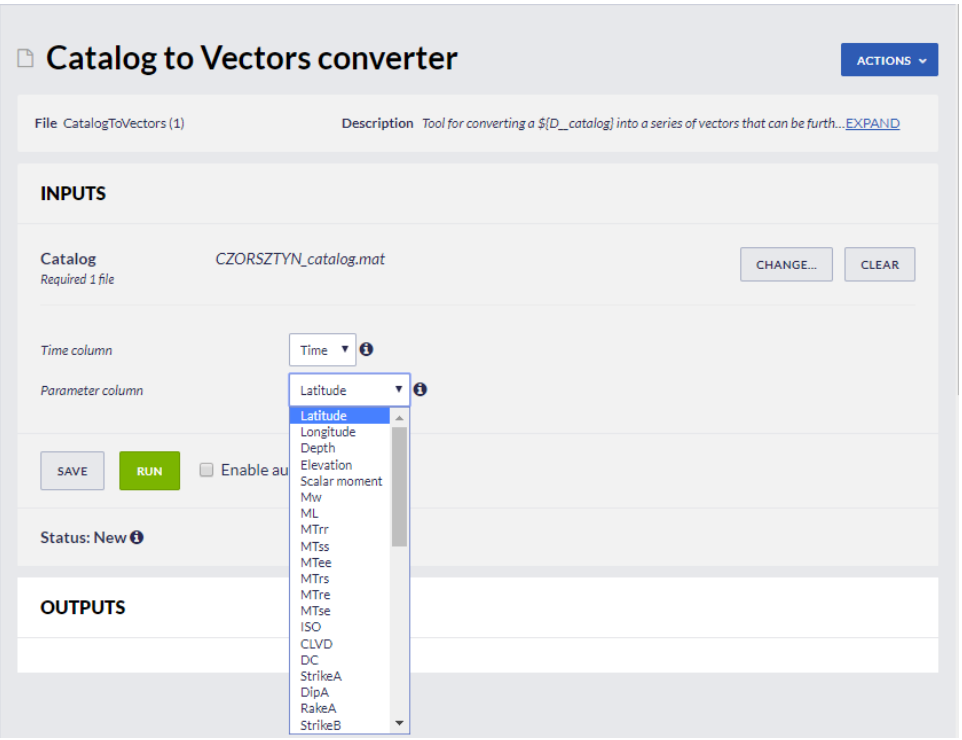
CITATION Please acknowledge use of this application in your work: IS-EPOS. (2017). *Autocorrelation* [Web application]. Retrieved from https://tcs.ah-epos.eu/

Step by step

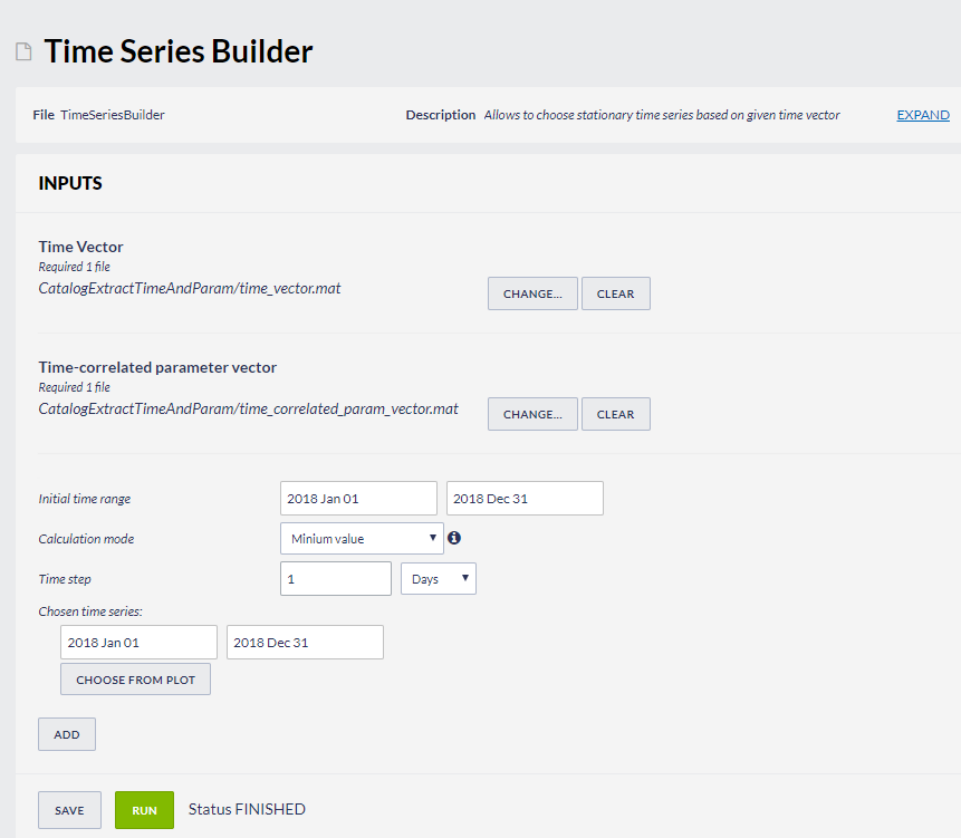
In order to use the **Autocorrelation** application the user must upload a time series data available in the workspace. This is the mandatory input to the application. The time series data can be easily created with other tools available on the EPISODES Platform, as described below.

The workflow for Autocorrelation application:

1. Choose a catalog (or extract part of the catalog with **Catalog Filter**) from a selected episode.
2. Add to user workspace the **Catalog to Vector converter** application. It allows to extract vectors of time and time–correlated attributes of user's choice from the seismic catalog.
   Select the seismic catalog to be used and choose the parameter to be analyze (e.g. Mw).



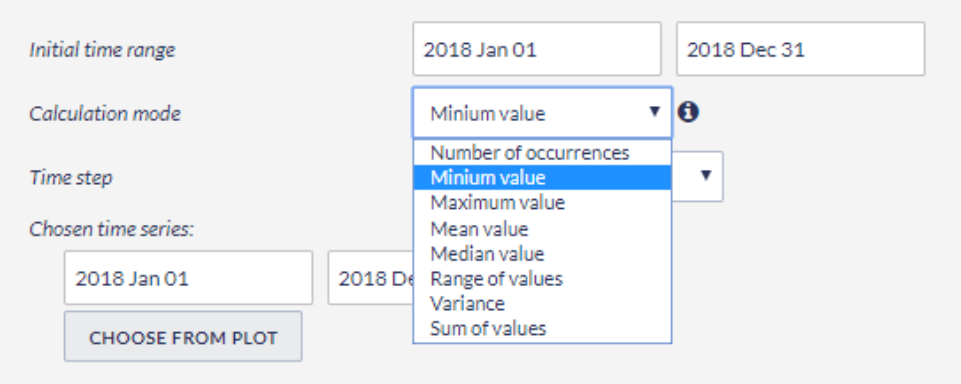
3. The application generates two files: time_vector.mat and time_correlated_param_vector.mat. These are input files to the Time Series Builder application that user should use next.
4. Add the **Time Series Builder** to the workspace. This application allows the user to generate data series based on time vector and time-correlated parameter vector files created in the previous step.



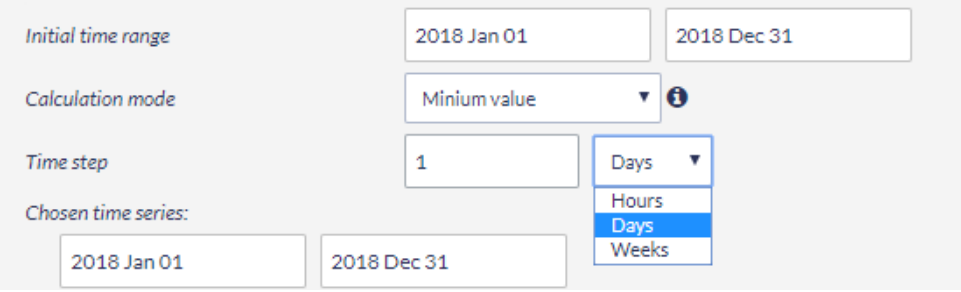
In the following steps the user needs to specify:

- Initial time range – initial time range for analysis

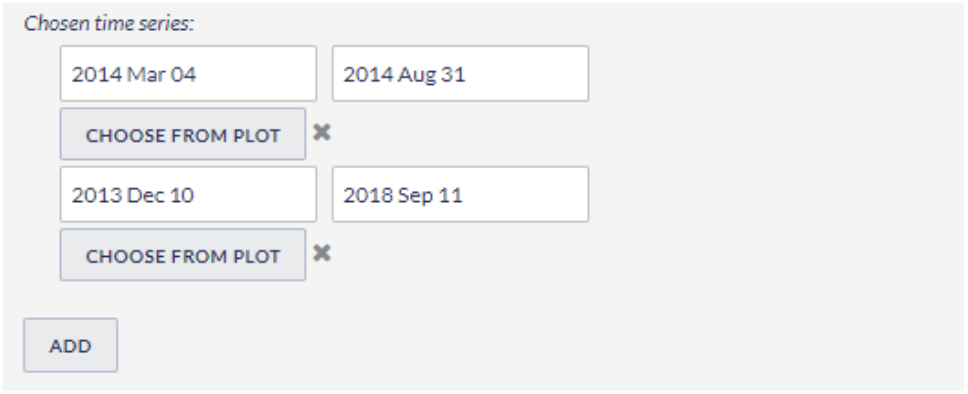
- Calculation mode – specifies way of parameter calculation from the time-correlated parameter vector values to compute time series (see figure below)

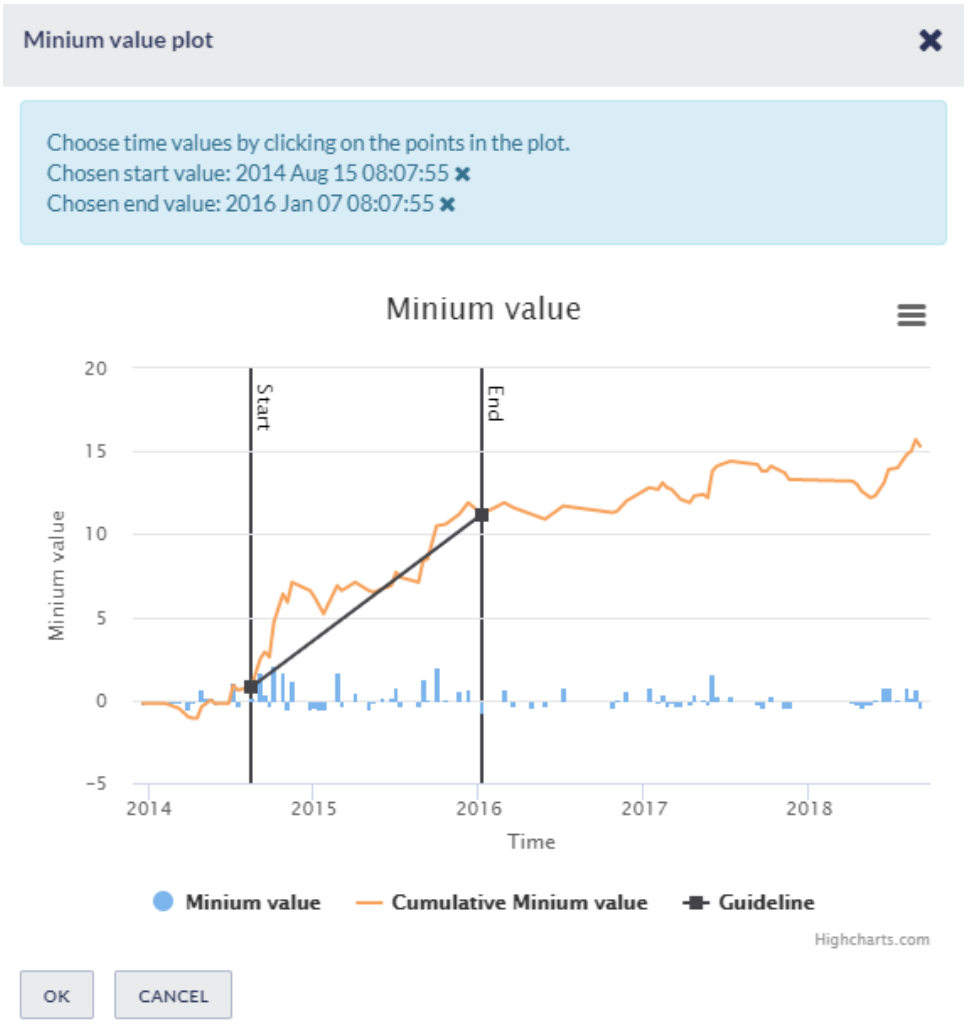


- Time step - time step used for the analysis (see figure below)

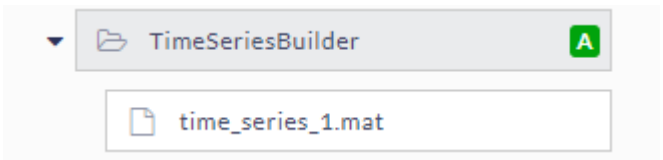


- Chosen time series – select a single or multiple range(s) of time for which time series will be calculated. It can be typed manually or selected from interactive graphs (see figures below)

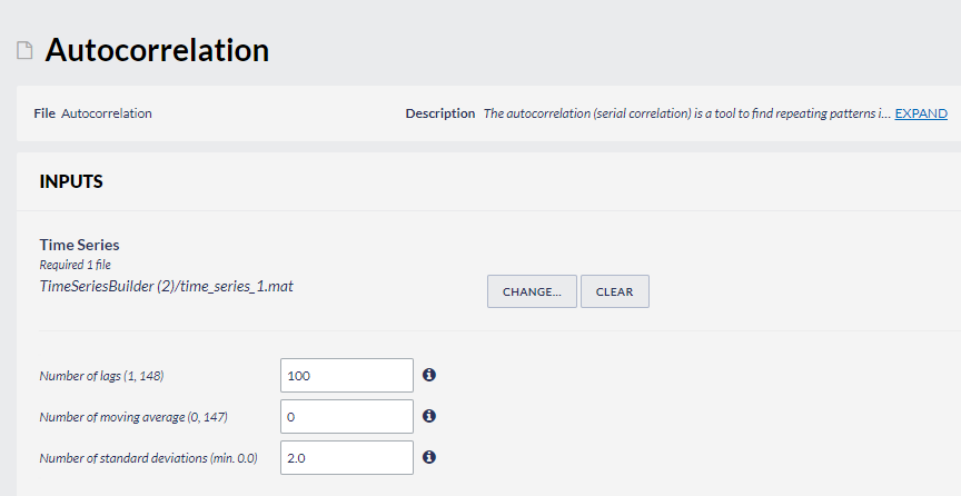




Press the RUN button to initiate the process. Time series are calculated and saved in the user's workspace as .mat file.

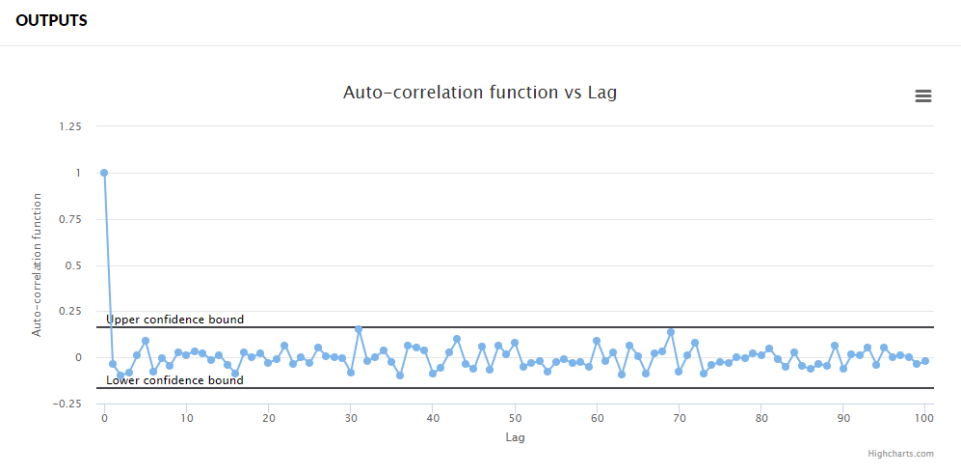


5. Add **Autocorrelation** application to the workspace. The mandatory input is the time series file generated in the previous step. User can also specify additional parameters of autocorrelation function (see figure below)



Launch the application by pressing the RUN button.

The main output from the application is a plot of the autocorrelation function calculated using the specified parameters:



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