

Stress Inversion user guide

i This application evaluates stress axis orientation (σ_1 , σ_2 , σ_3 axis orientation as well as P and T axes orientation) and relative stress magnitude (R value) by inverting earthquake focal mechanisms. Stress state can be defined for a point (0D case), profile or time change (1D case), map (2D). The framework of calculating the deviatoric stress tensor together with its uncertainties using bootstrap resampling method is also provided along with a variety of plots.
See also [MSATSI documentation](#).

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PLATFORM

REFERENCES [Document Repository](#)

CATEGORY Visualizations

KEYWORDS Source mechanism, Moment tensor, Stress inversion

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Step by Step

After selecting a catalog in the User's workspace, click on 'ACTIONS', then 'USE IN APPLICATION' and then 'Stress Inversion' as highlighted in Figure 1.

An alternative approach to perform stress inversion, by computing and adding in the workspace the parameters one by one is appended at the end of the chapter.

For a comprehensive scientific description of the process and the parameters definition and constraints please visit <http://www.induced.pl/msatsi>

Song Tranh catalog

File
SONG_TRANH_catalog.mat

Summary
Number of events: **5708** Time: 2013 Aug 24

Data

Name	Description
ID	
Time	Event occurrence time
Lat	Latitude [deg]
Long	Longitude [deg]

ACTIONS

- USE IN APPLICATION...
- USE IN VISUALIZATION...
- SHOW FILE INFORMATION
- DOWNLOAD
- COPY
- CREATE LINK
- MOVE
- RENAME
- DELETE
- Catalog Export
- Catalog Filter
- Completeness Magnitude Estimation
- FOCI application
- GMPParameters Tool
- Inter-event Time Distribution Analysis
- Localization
- Magnitude Conversion
- Signal download tool
- Source size distribution functions/Stationary Hazard
- Spectral Analysis
- Stress Inversion**
- Time Series Builder
- Time dependent hazard in mining front surroundings
- Time dependent hazard in selected area

Figure 1. Selection of the application from the data uploaded in the workspace

The following screen now appears (Figure 2) and the following fields, corresponding to parameter values and options, are requested to be fulfilled by the user:

Status CREATED

1 / 1
Catalog
Tetsing_Platform/SONG_TRANH_catalog.mat
From Tree
CHANGE FILE

Number of valid mechanisms: 114.

Analysis type:

0D

Bootstrap resamplings:

500

Confidence level:

95

PT plots:

☐

Advanced options:

☐

Plot type:

Stereonet

Confidence intervals:

Bootstrap

R plot:

☒

Stereonet:

☒

Advanced options:

☒

Projection:

Wulff

S1:

☒

S2:

☒

S3:

☒

Stress axis labels:

☒

Title:

X label:

Y label:

Z label:

Figure 2. Selection of input parameters and files for the application

Using Seismic Catalog: The seismic catalog has been already selected in the previous step, however, the User may select another dataset from the workspace for stress inversion.

The number of valid mechanisms: This is an informative field showing the number of available focal mechanisms, such that the User knows about the sample size that is going to be analyzed.

Analysis Type: Three options are currently available in the EPISODES Platform: 0D, 1D and 2D, and can be selected after clicking on the small arrow at the tab. If 1D or 2D options are selected, the user is requested to enter the parameter(s) and window(s) of X, or X and Y dimensions, respectively (Figure 3)

Analysis type:

2D

Grid X dimension:

Time

window:

100

Grid Y dimension:

Depth

window:

0.5

Figure 3. Additional input parameters for the application

Bootstrap Resamplings: Positive integer values are valid in this field, defining the number of Bootstrap Resamplings to be performed.

Confidence Level: A number between 0 and 100 is requested, defining the percentage of confidence interval of the results.

PT Plots: on/off (Switches the plotting of P and T axes).

Advanced Options: A number of advanced options are available after clicking on the small box (Figure 4). See at the MSATSI manual for details (<http://www.induced.pl/msatsi>)

Advanced options:	☒
Damping:	☒
Damping coeff:	0
Fraction valid fault planes:	0.5
Minimum events node:	20

Figure 4. Additional input parameters for the application

Plot Type: The User may select one of the available options (accordingly to the *Analysis Type*) after clicking on the small arrow.

Confidence Intervals: The User may select one of the available options after clicking on the small arrow.

Rplot: on/off, plot can be activated/ deactivated by ticking or not the box, respectively.

Stereonet: on/off, off, plot can be activated/ deactivated by ticking or not the box, respectively.

Advanced Options: A number of advanced options are available after clicking on the small box (Figure 5). See at the MSATSI manual for details (<http://www.induced.pl/msatsi>)

Advanced options:	☒
Projection:	Wulff
S1:	☒
S2:	☒
S3:	☒
Title:	
X label:	
Y label:	
Z label:	

Figure 5. Additional input parameters for the application

After choosing all the aforementioned parameters the User may click on 'RUN' button to proceed to the calculation process. The results are soon to be available and saved by the system (Figure 6). Those results include schemes, as well as tables with results with option to perform simple plots with those results. These results are shown in the red frame of Figure 7.

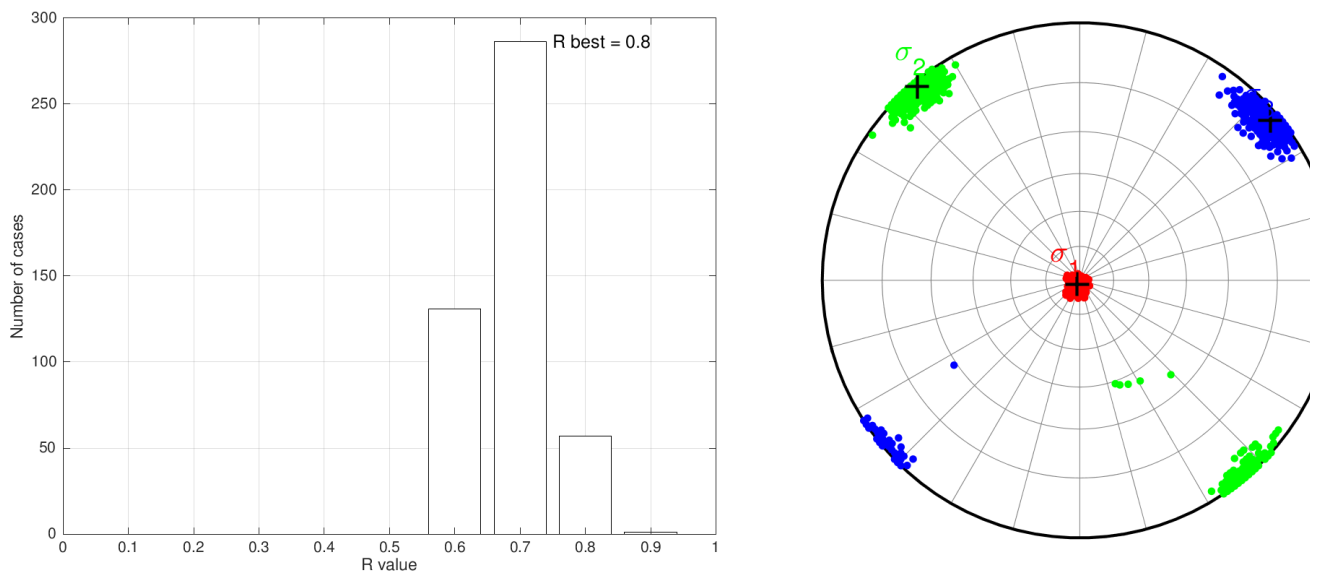


Figure 6. Example of some of the output graphs produced by the application

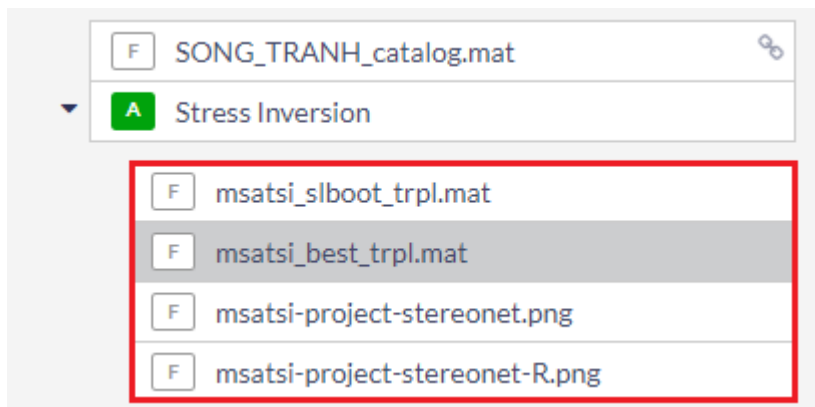


Figure 7. Outputs of the application

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