



Project funded by
EUROPEAN UNION



DESIGN OF REDAS VER 1.1

June 2023 – Gebze Teknik Üniversitesi

Rapid Earthquake Damage Assessment-Near Real Time-Hazard and Loss Estimation Software

REDAS System consist of five main modules:

- Shakemap Generation Module,
- Hazard Module,
- Loss Module,
- Geotechnical Failure Module,
- Lifeline Module (Natural Gas Pipeline).

To produce earthquake hazard and loss maps in near real time by using offline/online station data.

Scope of REDAS V1.1



ShakeMap



REDAS V1.1 Active Models

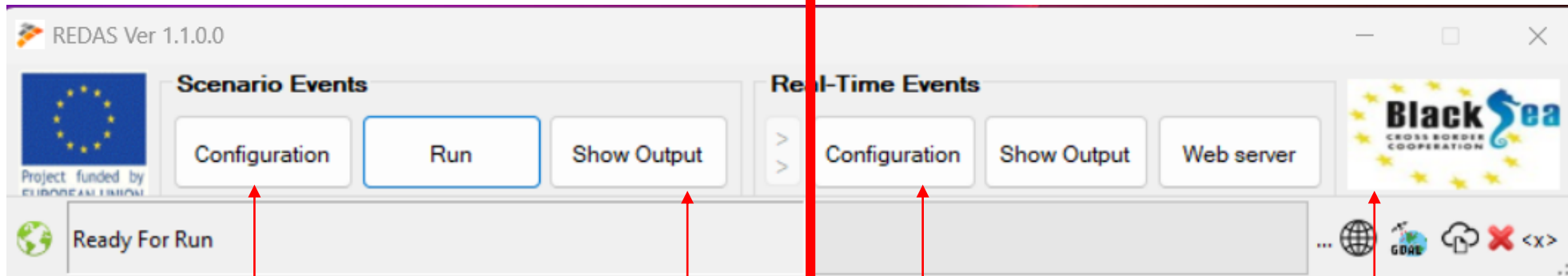
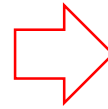
REDAS Interface and Modules

- Interface Design
- Folder Structures and File Systems

Main Interface

Scenario Based
To be utilized by users Manually

Event Based
Automatic triggering
First Priority for Analysis



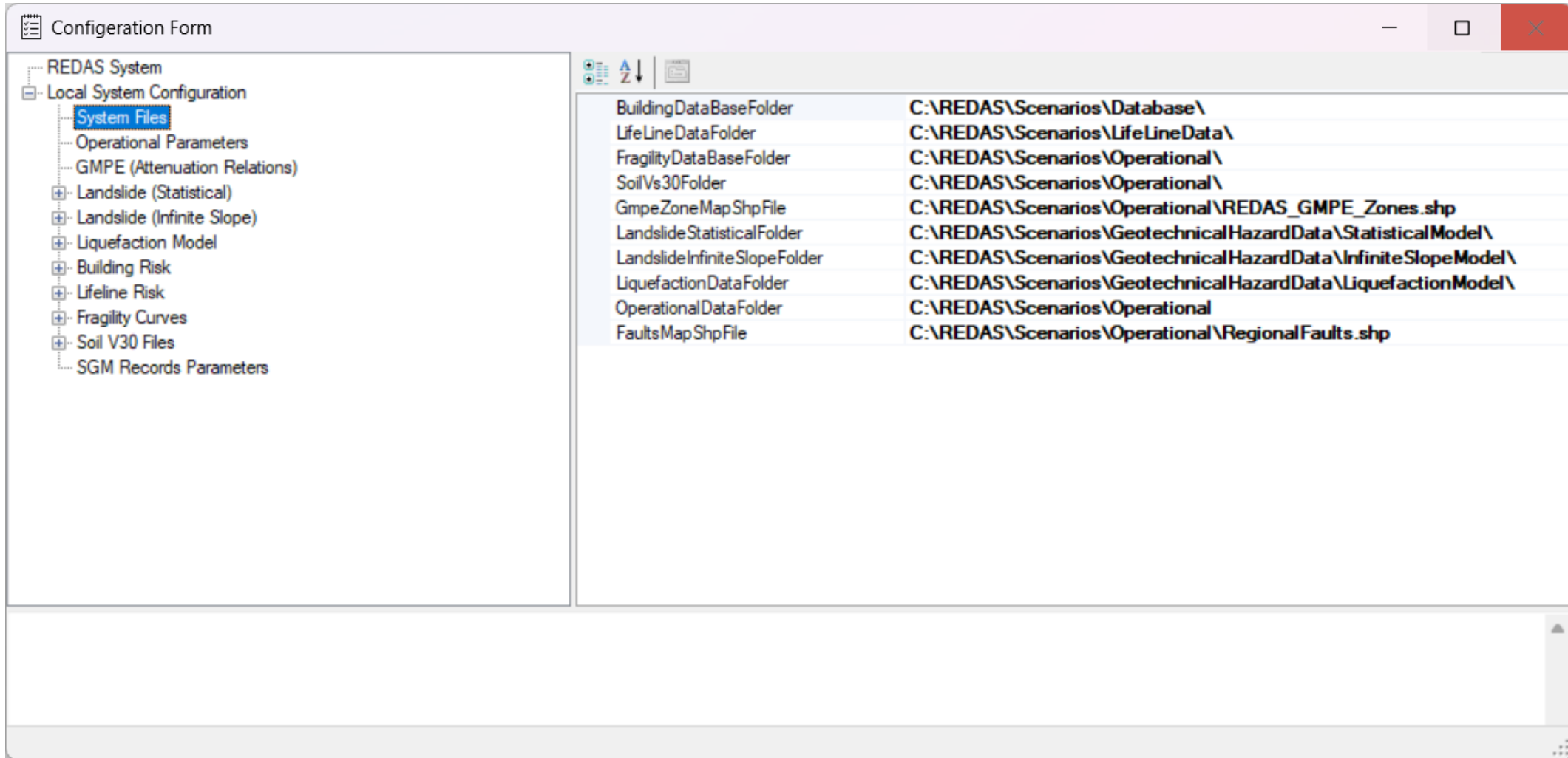
Configuration Can be
changed by user

PC Based Results and
Maps

Configuration is
harmonized
between the Shared
servers/ Can not be
Changed

www server Based
Results and Maps

Configurations/*System Files*



The screenshot displays the 'Configuration Form' window for REDAS. The left sidebar shows a tree view under 'Local System Configuration' with 'System Files' selected. The main area shows a table of configuration parameters and their paths.

| Parameter Name | Path |
|------------------------------|---|
| BuildingDataBaseFolder | C:\REDAS\Scenarios\Database\ |
| LifeLineDataFolder | C:\REDAS\Scenarios\LifeLineData\ |
| FragilityDataBaseFolder | C:\REDAS\Scenarios\Operational\ |
| SoilVs30Folder | C:\REDAS\Scenarios\Operational\ |
| GmpeZoneMapShpFile | C:\REDAS\Scenarios\Operational\REDAS_GMPE_Zones.shp |
| LandslideStatisticalFolder | C:\REDAS\Scenarios\GeotechnicalHazardData\StatisticalModel\ |
| LandslideInfiniteSlopeFolder | C:\REDAS\Scenarios\GeotechnicalHazardData\InfiniteSlopeModel\ |
| LiquefactionDataFolder | C:\REDAS\Scenarios\GeotechnicalHazardData\LiquefactionModel\ |
| OperationalDataFolder | C:\REDAS\Scenarios\Operational |
| FaultsMapShpFile | C:\REDAS\Scenarios\Operational\RegionalFaults.shp |

Configurations/*Operational Parameters*

Configuration Form

- REDAS System
 - Local System Configuration
 - System Files
 - Operational Parameters**
 - GMPE (Attenuation Relations)
 - Landslide (Statistical)
 - Landslide (Infinite Slope)
 - Liquefaction Model
 - Building Risk
 - Lifeline Risk
 - Fragility Curves
 - Soil V30 Files
 - SGM Records Parameters

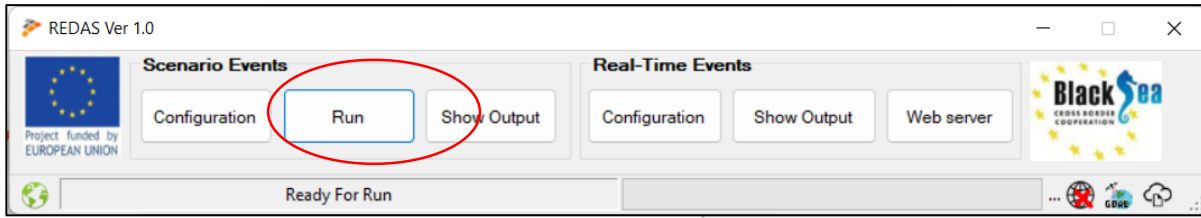
| | |
|------------------------------|------|
| HazardOption | True |
| DamageOption | True |
| LifeLineRiskOption | True |
| LandslideStatisticalOption | True |
| LandslideInfiniteSlopeOption | True |
| LiquefactionHazardOption | True |
| IMinHazard | 3 |
| IMinRisk | 5 |
| HazardGridSize | 0.01 |
| RiskGridSize | 0.01 |
| IncludeRecordBias | True |

REDAS V1.1 Active Models

Scenario & Real Events

- Event data Xml File (Point Source)
- Event data Xml File (Fault Source)
- Event Data SGM Record xml Files
- Online Shared Events
- Online Shared Events SGM Record Data

Run Event / Scenario Based

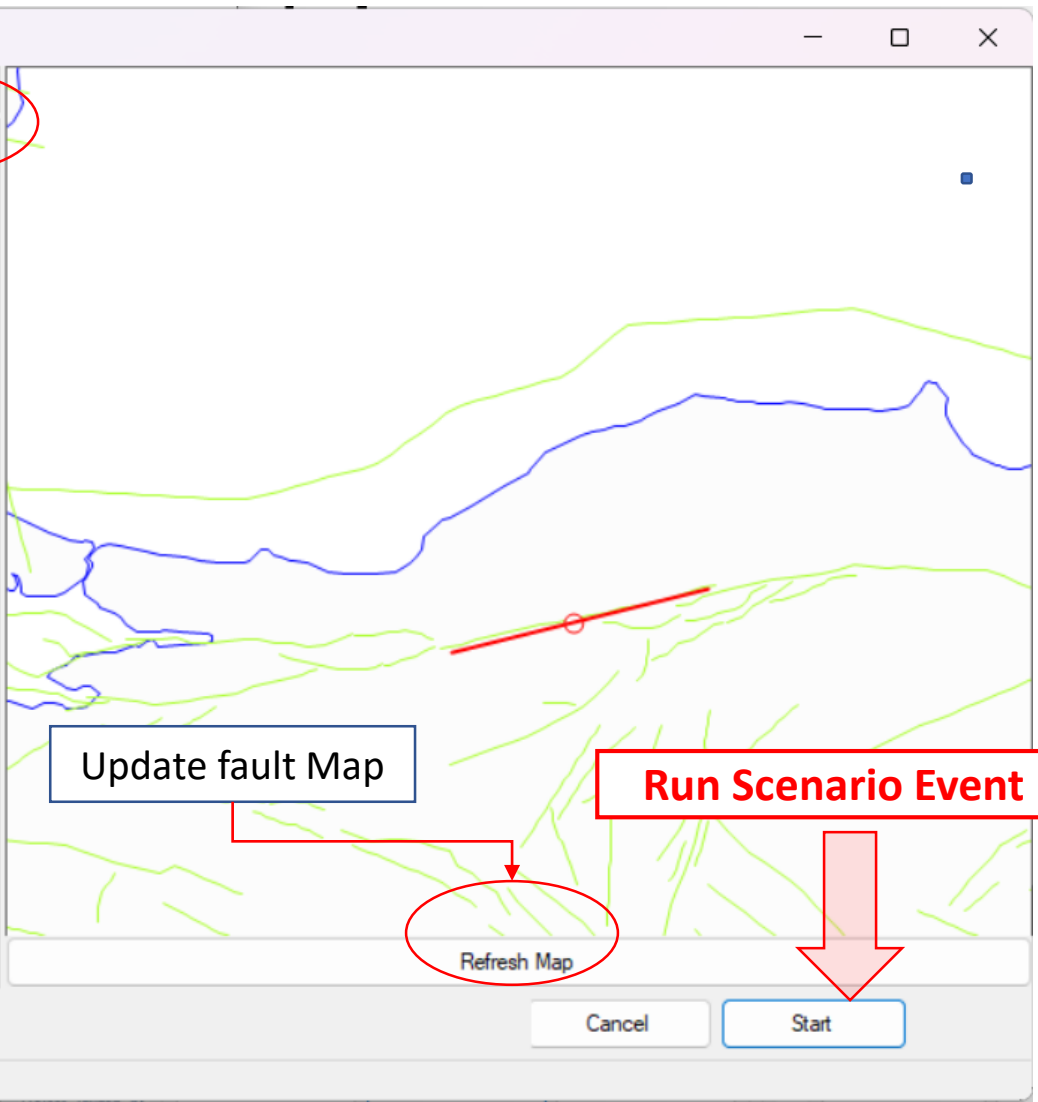


Open event Xml file

Scenario Event parameters can be entered directly to the input class form Or can be read from xml file

Event Parameters can be specified / modified

| | |
|--------------|----------------------|
| id | 20230607194447 |
| netid | EU |
| network | NETWORK |
| lat | 40.81551 |
| lon | 32.47989 |
| mag | 7 |
| depth | 0 |
| mech | Unkown |
| year | 2023 |
| month | 6 |
| day | 7 |
| hour | 19 |
| minute | 44 |
| second | 47 |
| time | 2023-06-07T19:44:47Z |
| timezone | GMT |
| locstring | Location |
| created | Created By |
| Fault_Name | Fault Name |
| Fault_Strike | 70 |
| Fault_Dip | 45 |
| Fault_Width | 15 |
| Fault_Top | 2 |
| Fault_Lat | (Collection) |
| Fault_Lon | (Collection) |

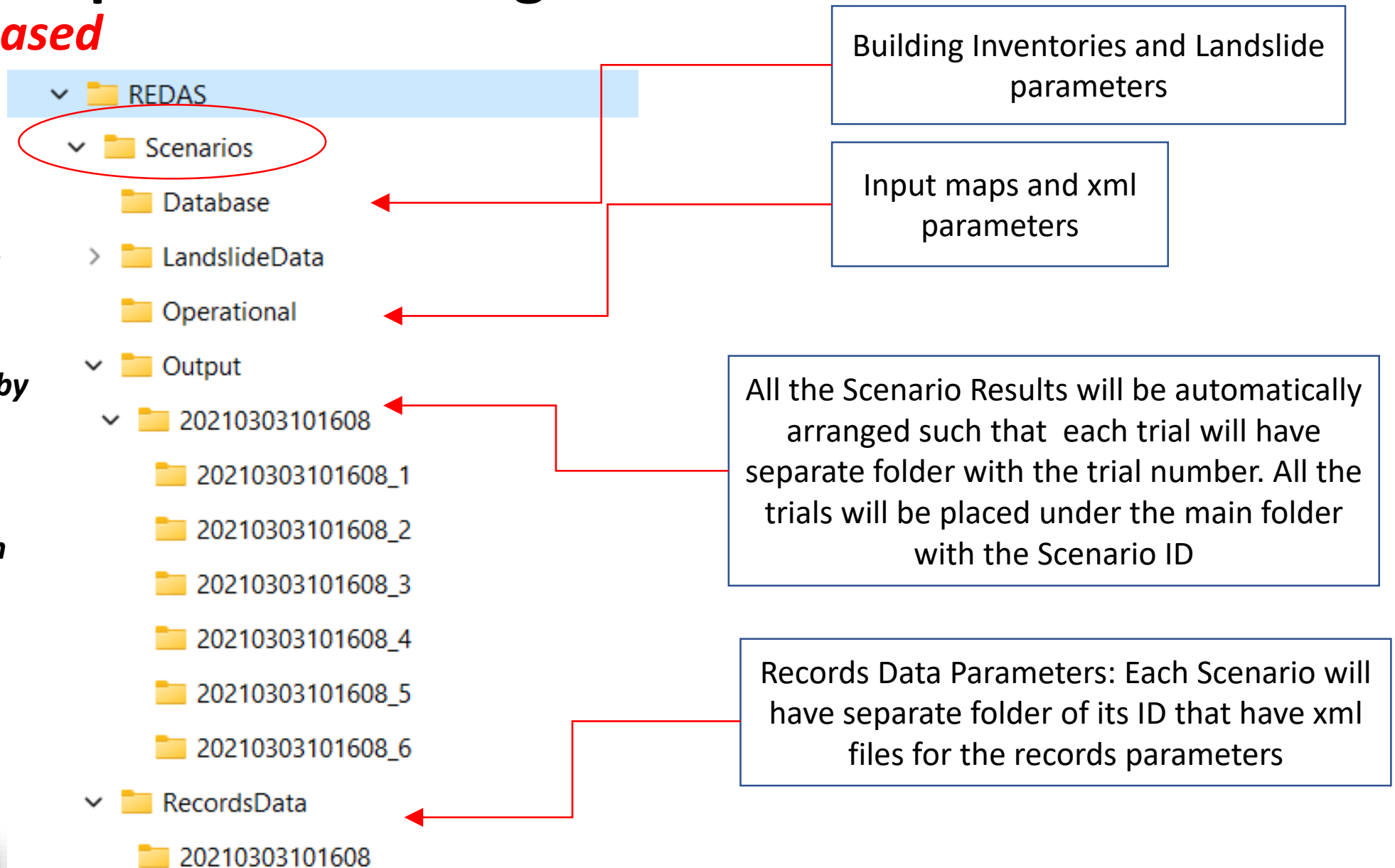


Input & Output Data Management

Scenario Based

Scenario Based Data and Results
Is located under REDAS/Local Folder by Default

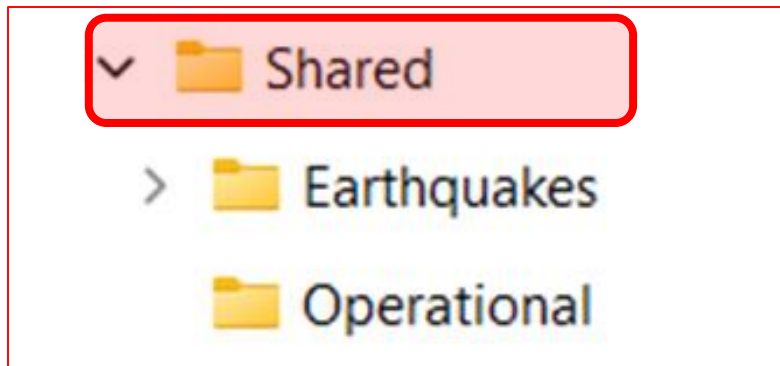
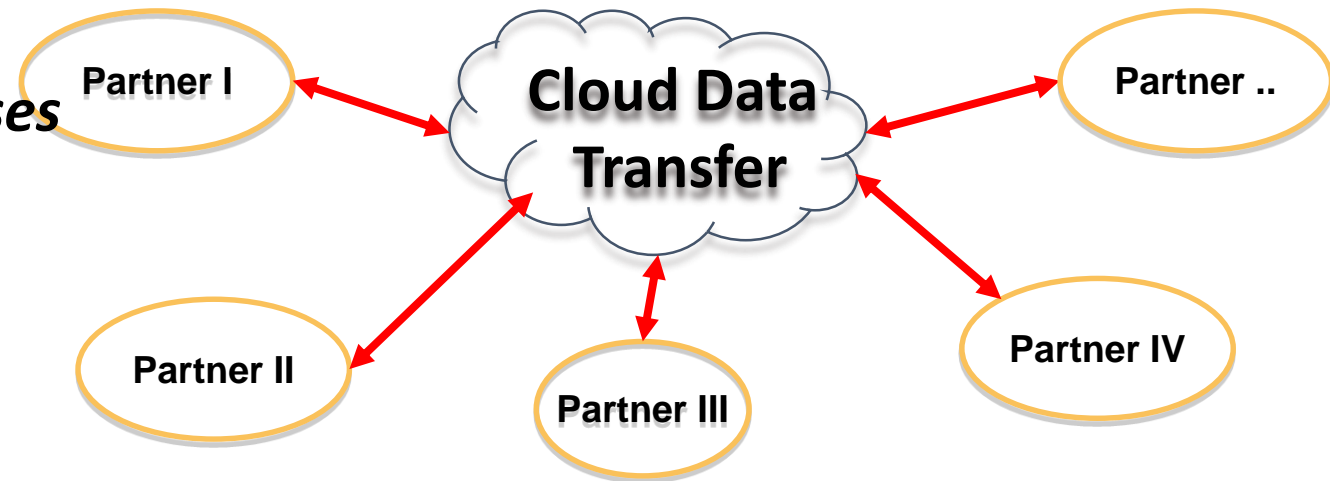
But the locations can be changed by the users



Cloud Data Transfer for the REDA System

Real Events

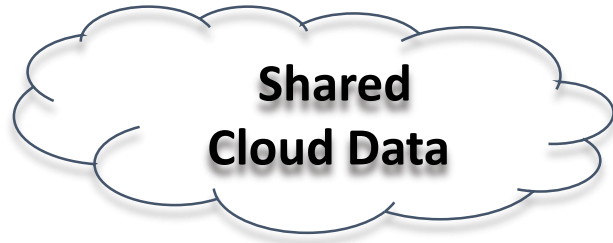
- *A Common Cloud service to be organized by all the partners. “Shared cloud folder” to be arranged*
- *No need-to-know Partners’ IP Addresses*
- *Easy to manage and install*
- *Flexible to Add new partners*
- *Flexible to Add new Servers*



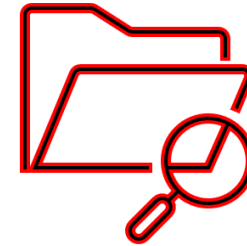
Cloud Data Transfer

The Cloud transfer folder can be configured to be a shared “Cloud folder” using a common cloud service such that gdrive, onedrive, dropbox, amazon, ... etc. The physical location of the shared “Cloud folder” can be arranged according to the requirement of the cloud service. The expected size of each event will be in terms of 1 MB, so a standard service or even a free service can be utilized by all the partners.

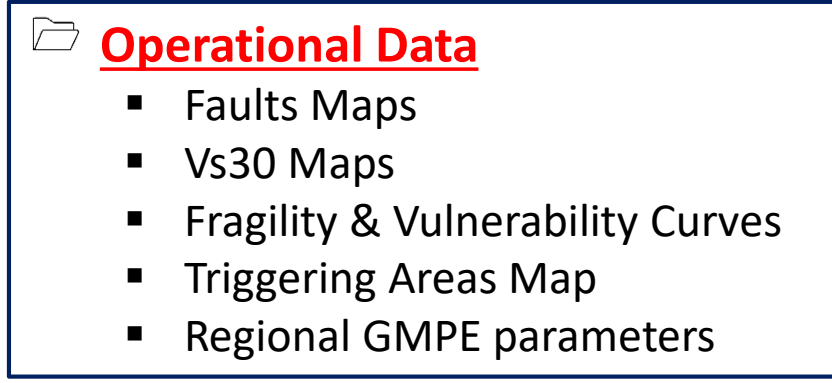
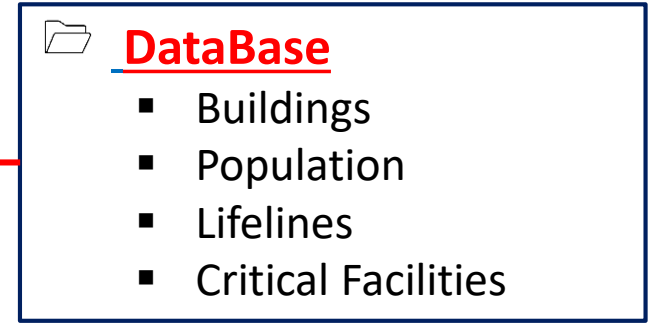
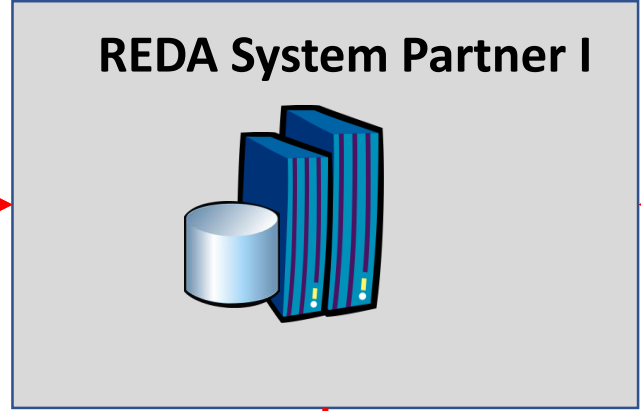
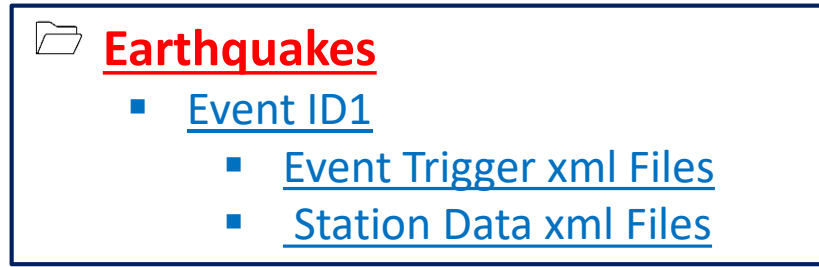
Online Event Processing Data for the REDA System



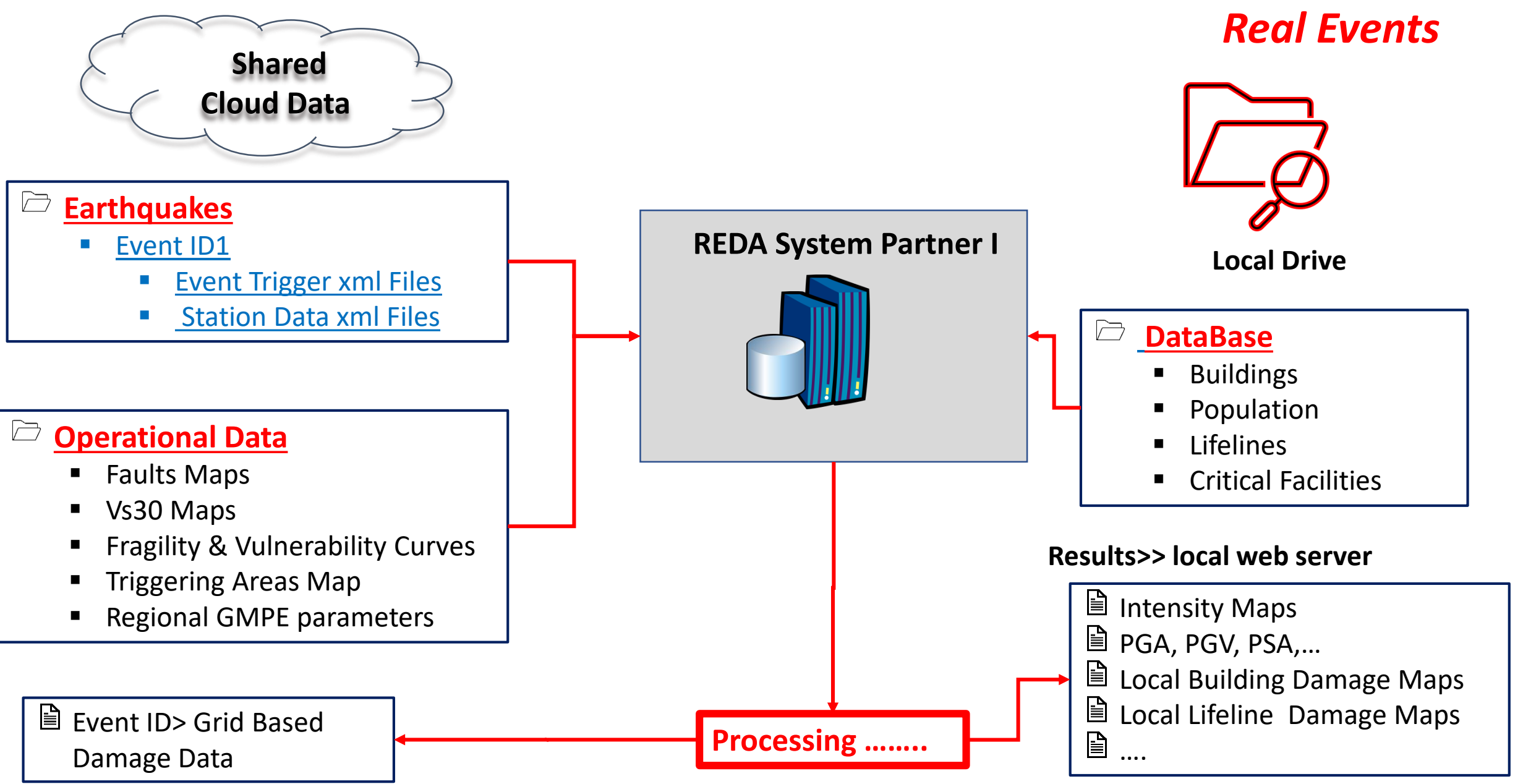
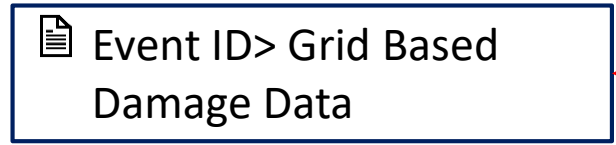
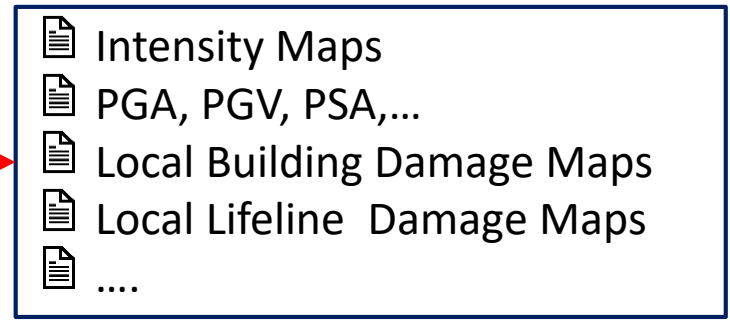
Real Events



Local Drive



Results>> local web server

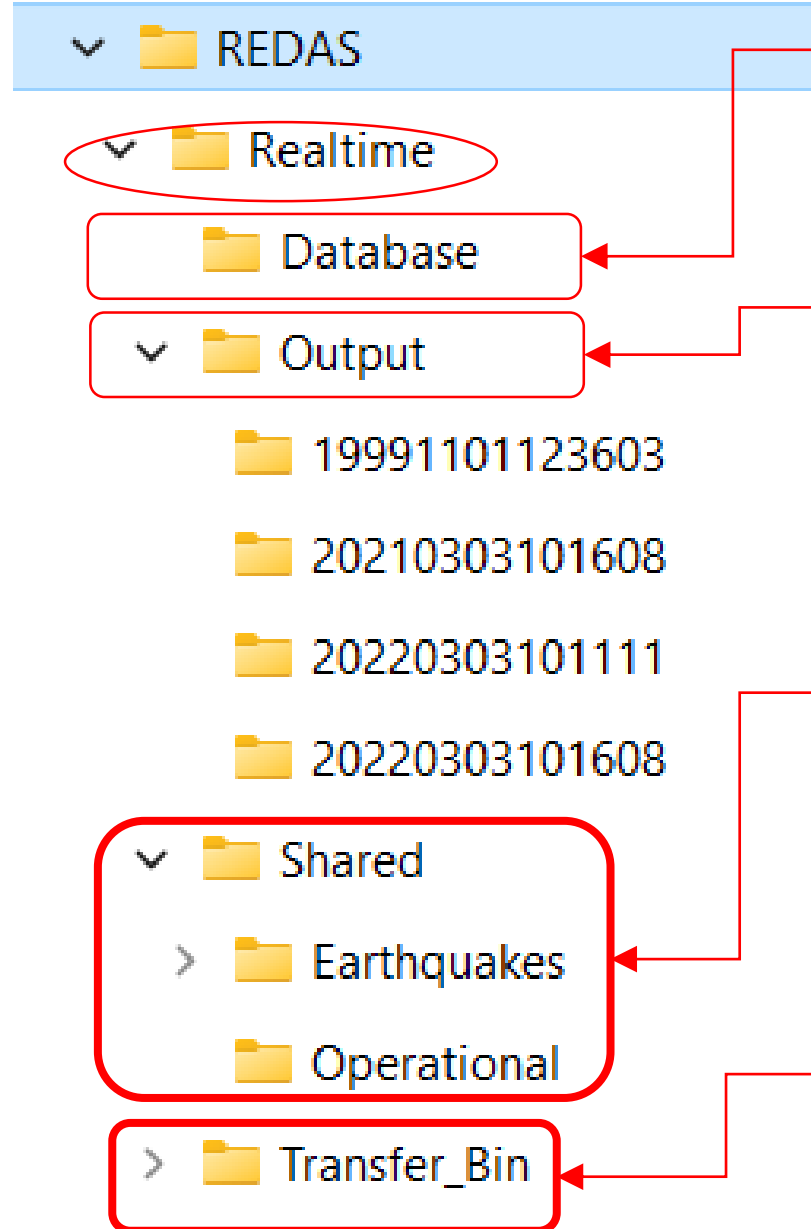


Input & Output Data Management

Real Events

Shared Event Based Data and Results Is located under REDAS/Shared Folder by Default

But the locations can not be changed by the users



Building Inventories and Landslide parameters (will not be Shared)

All the Events' Results will be automatically placed under the main folder with the Event ID. New Results will over-write the previous ones.

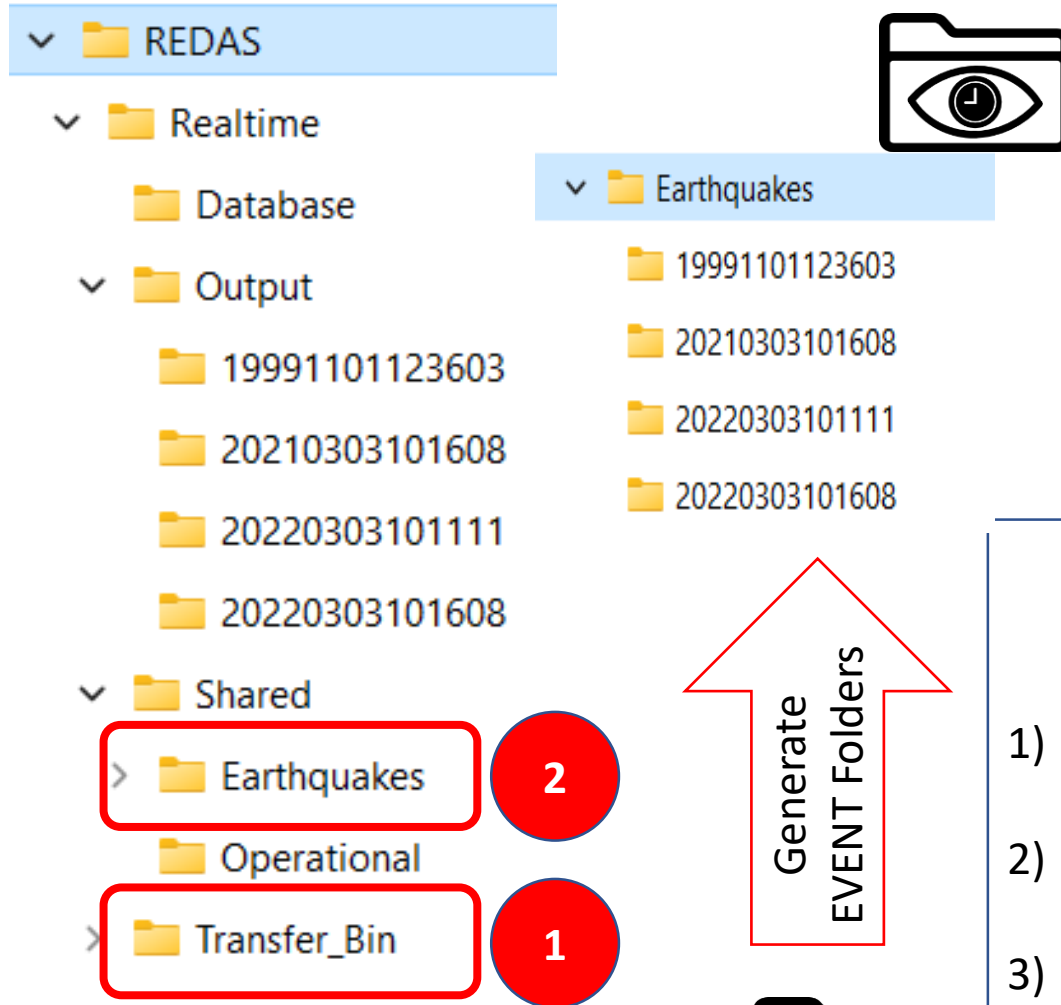
All Earthquake and Operational Parameters will be shared under "shared" Folder. **This Folder will be shared by Cloud among all the Joint Institutes.**
Earthquake Folder: The contents of the folder will be generated automatically by REDAS with the insertion of xml files into **Transfer_Bin**

Transfer_Bin is used to transfer the data to cloud. Event and records xml files to be placed into "Transfer_Bin" directly

Input & Output Data Management

File watchers for Real Events

Two File watchers are integrated into the system for Shared Event parameters



Folder Watcher 2:

Control the changes in Earthquakes Folders

1. Process the event xml shared by different Institutes.
2. Decide the relevant Institute event xml files using the event location within triggering map areas.
3. Process the event together with the records' parameters if any.
4. The results will be generated under Events folder

Folder Watcher 1:

Control the xml files' changes in **Transfer_Bin**

If a new xml file is detected:

- 1) Create new folder with the Event ID or append existing event ID folder under **Cloud/Earthquakes**
- 2) Move Event.xml to **Cloud/Earthquakes/EVENT_ID** by Adding Institute ID to xml files (Event_TR.xml)
- 3) Records' parameters xml files will be moved If there is suitable EVENT folder with the same Event ID

REDAS V1.1 Active Models

Ground Motion Maps

- Prediction Equations
- GMPE zone shape file and Zone-specific Weights
- Rupture distance Calculation
- Ground Motion Results (PGA, ...)

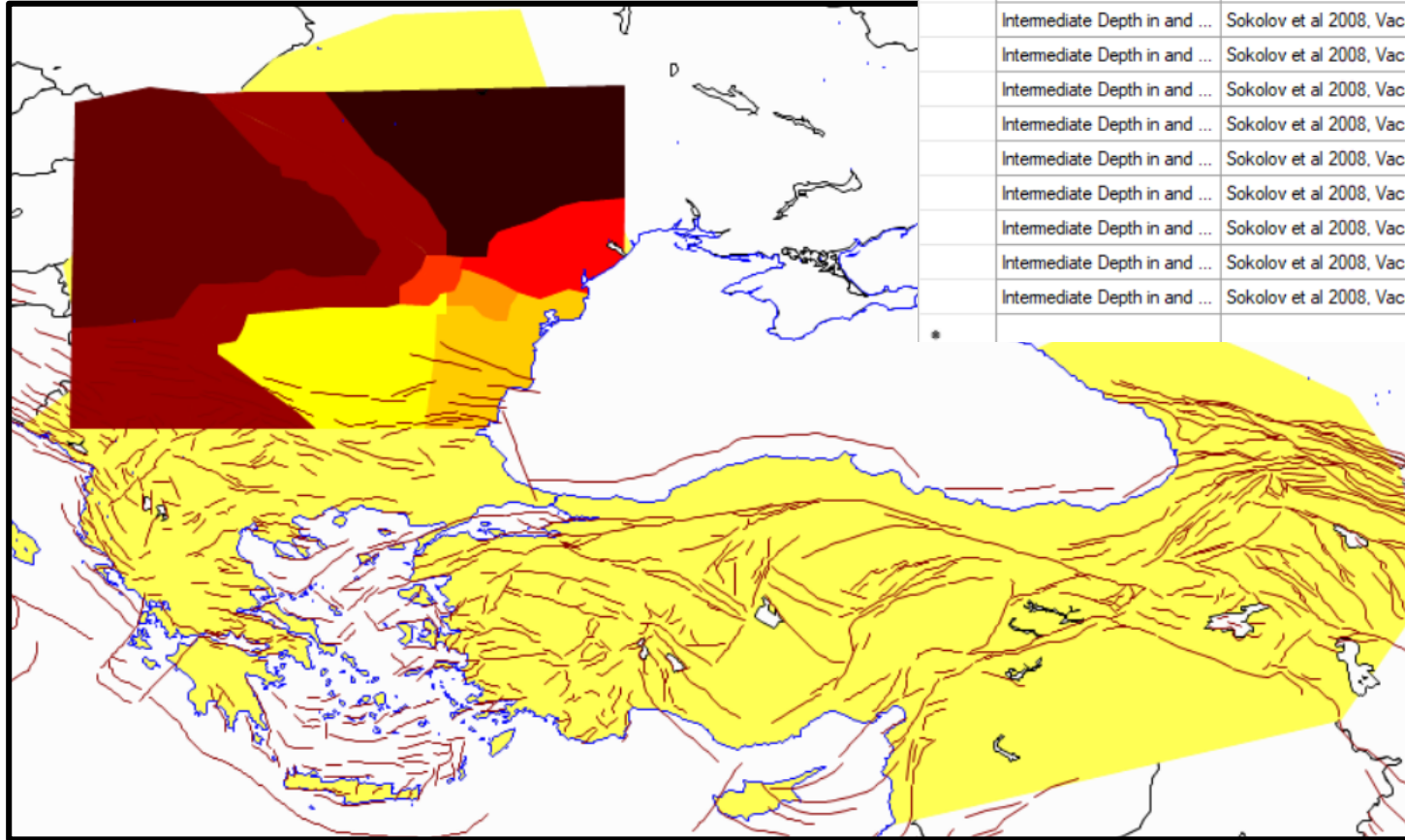
Ground Motion Prediction Equations

Configuration Form

- REDAS System
 - Local System Configuration
 - System Files
 - Operational Parameters
 - GMPE (Attenuation Relations)
 - Landslide (Statistical)
 - Landslide (Infinite Slope)
 - Liquefaction Model
 - Building Risk
 - Lifeline Risk
 - Fragility Curves
 - Soil V30 Files
 - SGM Records Parameters

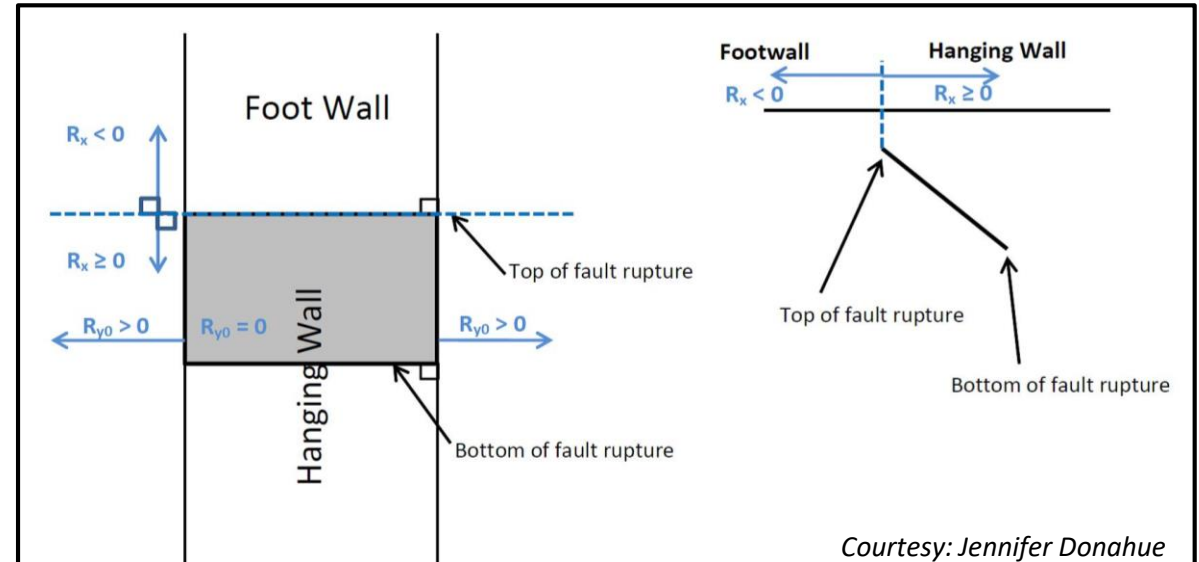
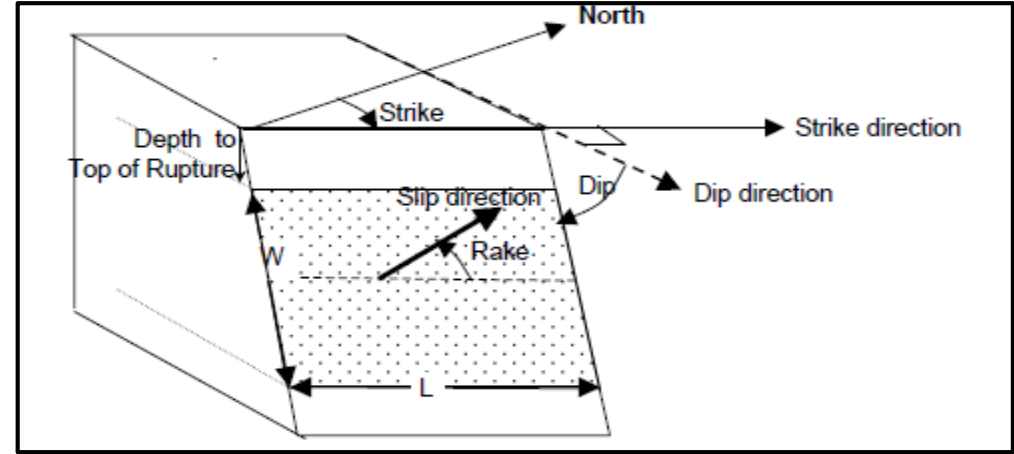
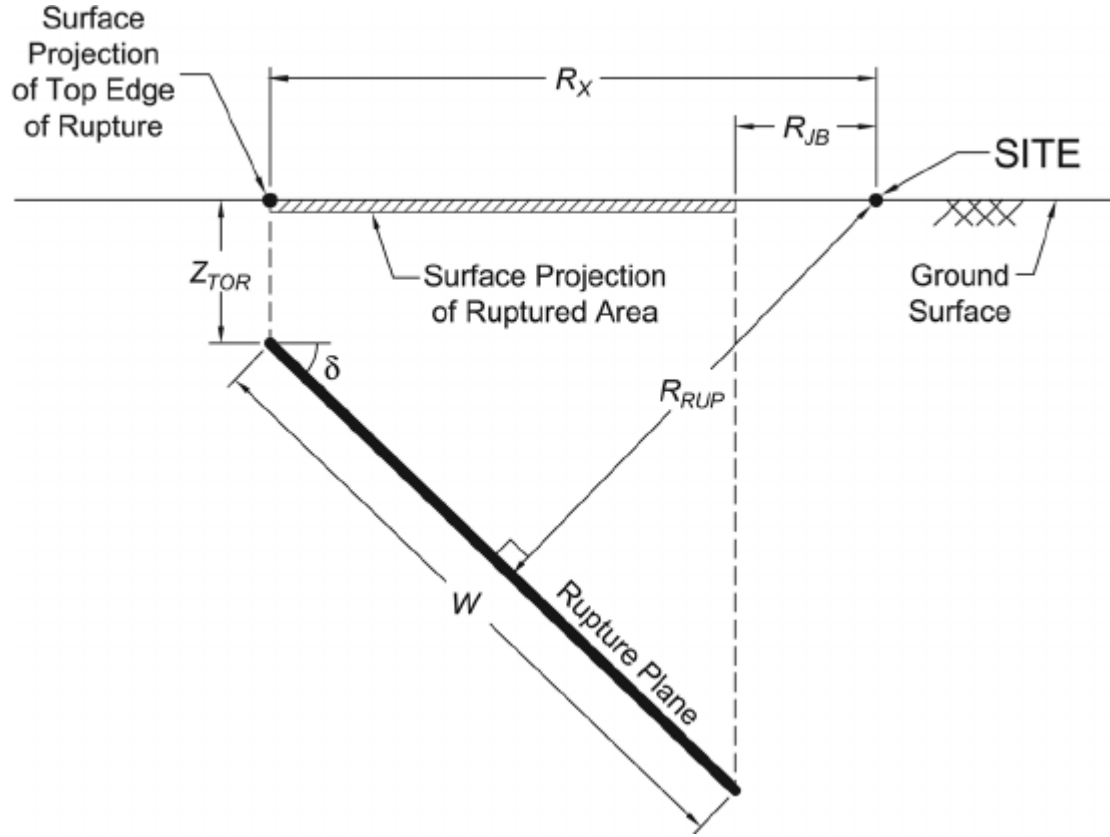
| Name | | String[] Array |
|-------|--|--|
| [0] | | Boore-Stewart-Seyhan-Atkinson, (2014) [BSSA14] |
| [1] | | Campbell-Bozorgnia, (2014) [CB14] |
| [2] | | Abrahamson-Silva-Kamai, (2014) [ASK14] |
| [3] | | Chiou-Youngs, (2014) [CY14] |
| [4] | | Akkar-Sandikkaya-Bommer, (2014) [ASB14] |
| [5] | | Boore et al. (2021) w bias [BWTB21] |
| [6] | | Boore et al. (2021) w/o bias [BWOB21] |
| [7] | | Kale-Akkar-Ansari-Hamzehloo (2015) [KAAH15] |
| [8] | | Sokolov et al (2008) [SKV08] |
| [9] | | Vacareanu et al (2015) [VAC15] |
| Alias | | String[] Array |
| [0] | | BSSA14 |
| [1] | | CB14 |
| [2] | | ASK14 |
| [3] | | CY14 |
| [4] | | ASB14 |
| [5] | | BWTB21 |
| [6] | | BWOB21 |
| [7] | | KAAH15 |
| [8] | | SKV08 |
| [9] | | VAC15 |

Ground Motion Prediction Equations



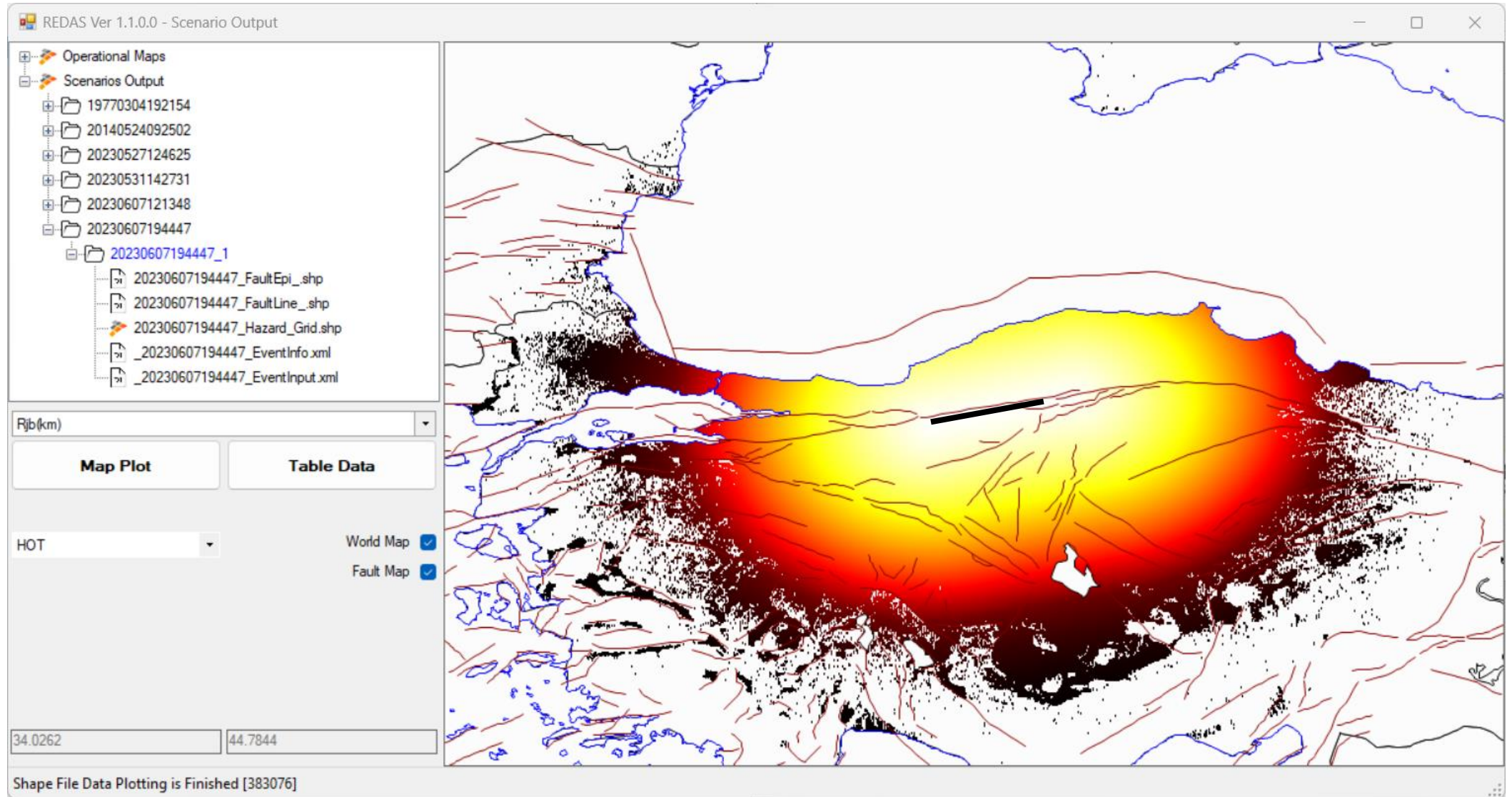
| | ZONE | GMPE | BSSA14 | CB14 | ASK14 | CY14 | KAH15 | BWTB21 | BWOB21 | SKV08 | VAC15 | ZMIN |
|---|-------------------------------|------------------------------|--------|------|-------|------|-------|--------|--------|-------|-------|--------|
| ▶ | Crustal earthquakes in and... | Boore et al (2014), Cauzz... | 0.50 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 |
| | Crustal earthquakes in Vra... | Boore et al (2014), Cauzz... | 0.50 | 0.00 | 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.000 |
| | Crustal earthquakes in and... | Boore et al (2021) with a... | 0.00 | 0.00 | 0.00 | 0.00 | 0.34 | 0.33 | 0.33 | 0.00 | 0.00 | 0.000 |
| | Intermediate Depth in and ... | Sokolov et al 2008, Vaca... | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 60.000 |
| | Intermediate Depth in and ... | Sokolov et al 2008, Vaca... | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 60.000 |
| | Intermediate Depth in and ... | Sokolov et al 2008, Vaca... | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 60.000 |
| | Intermediate Depth in and ... | Sokolov et al 2008, Vaca... | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 60.000 |
| | Intermediate Depth in and ... | Sokolov et al 2008, Vaca... | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 60.000 |
| | Intermediate Depth in and ... | Sokolov et al 2008, Vaca... | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 60.000 |
| | Intermediate Depth in and ... | Sokolov et al 2008, Vaca... | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 60.000 |
| | Intermediate Depth in and ... | Sokolov et al 2008, Vaca... | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 60.000 |
| | Intermediate Depth in and ... | Sokolov et al 2008, Vaca... | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 60.000 |
| | Intermediate Depth in and ... | Sokolov et al 2008, Vaca... | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 60.000 |
| | Intermediate Depth in and ... | Sokolov et al 2008, Vaca... | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 0.50 | 60.000 |

Rupture distance Calculation



Courtesy: Jennifer Donahue

Rupture distance Calculation



Soil Shear Wave Velocity Distribution, Vs30

Configuration Form

REDAS System

- Local System Configuration
 - System Files
 - Operational Parameters
 - GMPE (Attenuation Relations)
 - Landslide (Statistical)
 - Landslide (Infinite Slope)
 - Liquefaction Model
 - Building Risk
 - Lifeline Risk
 - Fragility Curves
 - Soil V30 Files
 - Global Vs30
 - Local > Vs30_Local_Serres
 - SGM Records Parameters

| | |
|------------|--|
| ID | Vs30_Global |
| CRS | GEOGCS["WGS 84",DATUM["WGS_1984",SPHEROID["WGS 84",6378137,298.257223563,AUTHORIT... |
| RasterFile | C:\REDAS\Scenarios\Operational\Vs30_Global.tif |
| Size | Int32[] Array |
| [0] | 3735 |
| [1] | 6326 |
| xLim | Double[] Array |
| [0] | 10.979947416472669 |
| [1] | 63.696614083139316 |
| yLim | Double[] Array |
| [0] | 22.387225104959583 |
| [1] | 53.512225104959569 |

Global Vs30 Raster Map



Local Vs30 Raster Maps



REDAS V1.1 Active Models

Building Losses

- Fragility Curves
- Building Inventory Shape File
- Building Loss Results
- Multi Regional Shape Files

Fragility Curves

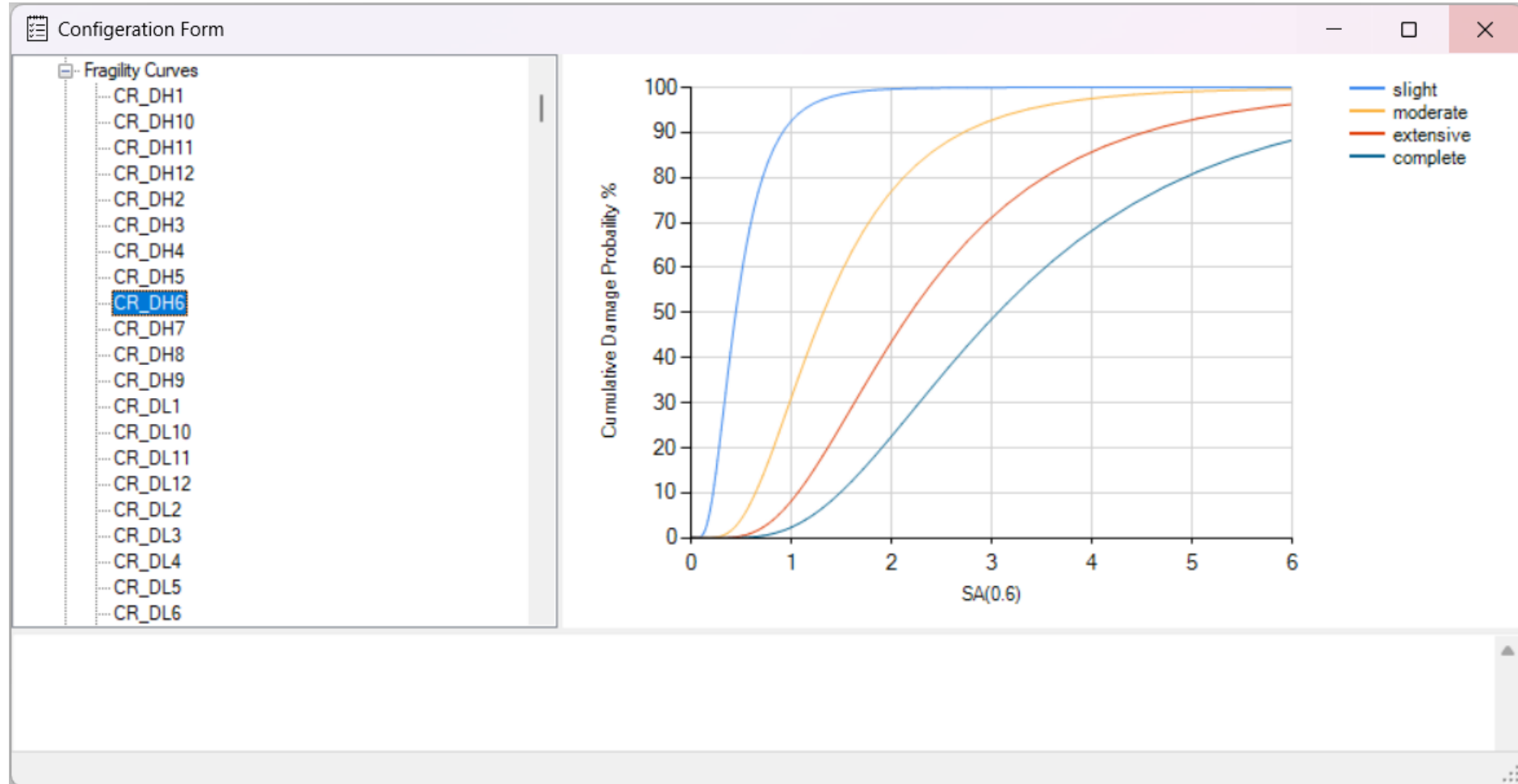
Configuration Form

Fragility Curves

- CR_LD_H1
- CR_LD_H10
- CR_LD_H11
- CR_LD_H12
- CR_LD_H2
- CR_LD_H3
- CR_LD_H4
- CR_LD_H5
- CR_LD_H6
- CR_LD_H7
- CR_LD_H8
- CR_LD_H9
- CR_LDUAL-DUL_H1
- CR_LDUAL-DUL_H10
- CR_LDUAL-DUL_H11
- CR_LDUAL-DUL_H12
- CR_LDUAL-DUL_H2
- CR_LDUAL-DUL_H3
- CR_LDUAL-DUL_H4
- CR_LDUAL-DUL_H5

| | |
|---------------|------------------------------------|
| id | CR_LD_H1 |
| lossCategory | structural |
| assetCategory | |
| description | All Martins-Silva Fragility Curves |
| format | discrete |
| > limitStates | String[] Array |
| imt | PGA |
| noDamageLimit | 0.02 |
| imls | (Collection) |
| poes_1 | (Collection) |
| poes_2 | (Collection) |
| poes_3 | (Collection) |
| poes_4 | (Collection) |

Fragility Curves



Building Inventory Shape File

Configuration Form

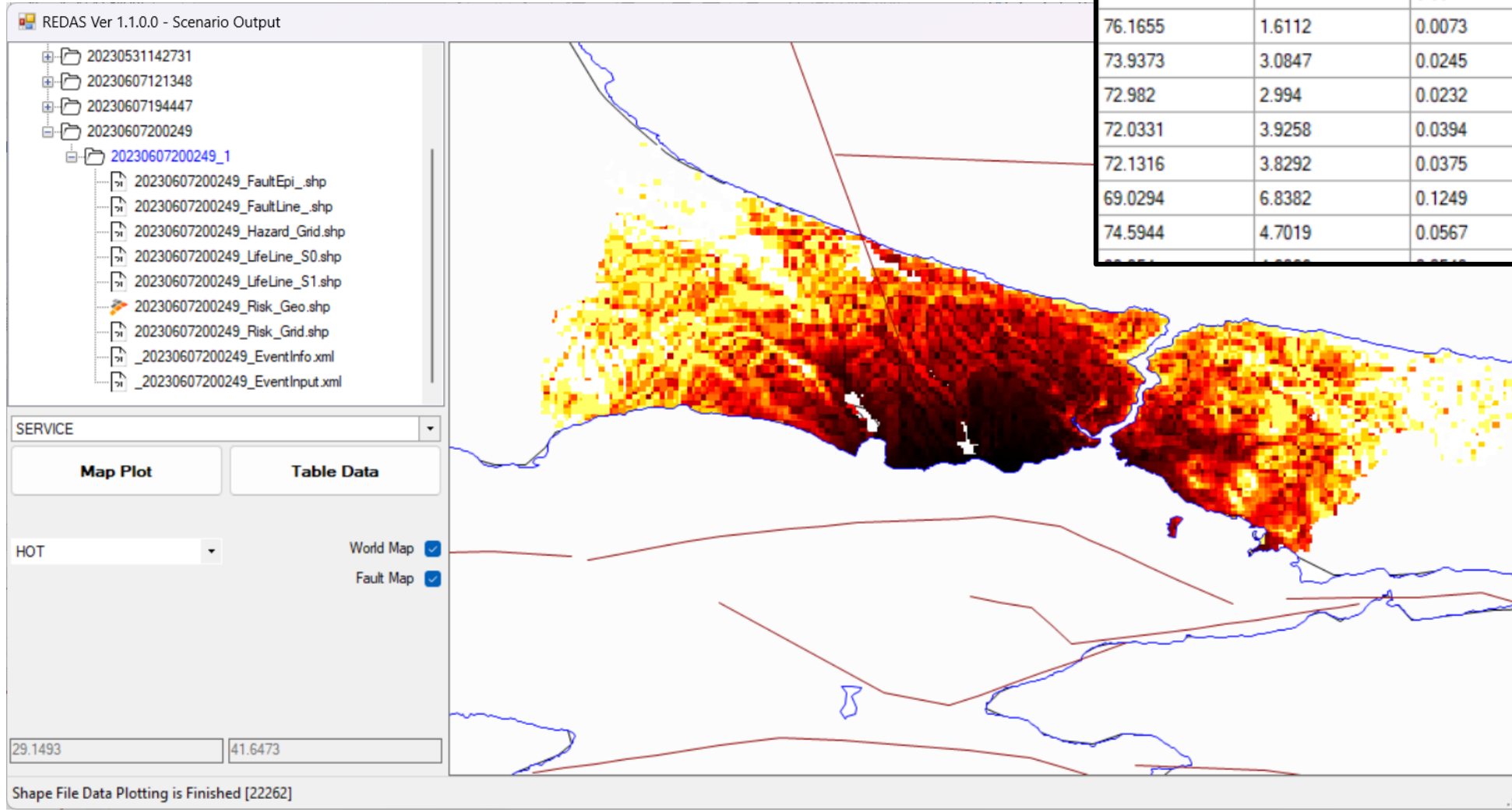
REDAS System

- Local System Configuration
 - System Files
 - Operational Parameters
 - GMPE (Attenuation Relations)
 - Landslide (Statistical)
 - Landslide (Infinite Slope)
 - Liquefaction Model
 - Building Risk
 - Building_Population_GeoGrid_DataBase
 - RO_buildings
 - sample_serres_wgs84
 - sample_thessaloniki_wgs84
 - Lifeline Risk
 - Fragility Curves
 - Soil V30 Files
 - SGM Records Parameters

| ID | RO_buildings |
|-------------|--|
| CRS | WGS 84 EPSG4326 |
| RecordCount | 121 |
| ShpFile | C:\REDAS\Scenarios\Database\RO_buildings.shp |
| ▼ xLim | Double[] Array |
| [0] | 27.271325201496893 |
| [1] | 29.715232742097406 |
| ▼ yLim | Double[] Array |
| [0] | 45.467411239137405 |
| [1] | 43.733701483936386 |

Building Loss Results

| NDAMAGE | SDAMAGE | MDAMAGE | EDAMAGE | CDAMAGE |
|---------|---------|---------|---------|---------|
| 60.1695 | 14.9114 | 0.8257 | 0.079 | 0.0144 |
| 60.403 | 14.712 | 0.7962 | 0.0752 | 0.0136 |
| 76.3938 | 1.6711 | 0.0078 | 0.0002 | 0 |
| 76.1655 | 1.6112 | 0.0073 | 0.0002 | 0 |
| 73.9373 | 3.0847 | 0.0245 | 0.0009 | 0.0001 |
| 72.982 | 2.994 | 0.0232 | 0.0008 | 0.0001 |
| 72.0331 | 3.9258 | 0.0394 | 0.0016 | 0.0002 |
| 72.1316 | 3.8292 | 0.0375 | 0.0015 | 0.0001 |
| 69.0294 | 6.8382 | 0.1249 | 0.0067 | 0.0008 |
| 74.5944 | 4.7019 | 0.0567 | 0.0025 | 0.0003 |



REDAS V1.1 Active Models

Liquefaction Hazard

- Hazard Procedure
- Raster Files
- Hazard Results
- Multi Regional Folders

Landslide Hazard (Statistical)

- Hazard Procedure
- Raster Files
- Hazard Results
- Multi Regional Folders

Landslide Hazard (Physical)

- Hazard Procedure
- Raster Files
- Hazard Results
- Multi Regional Folders

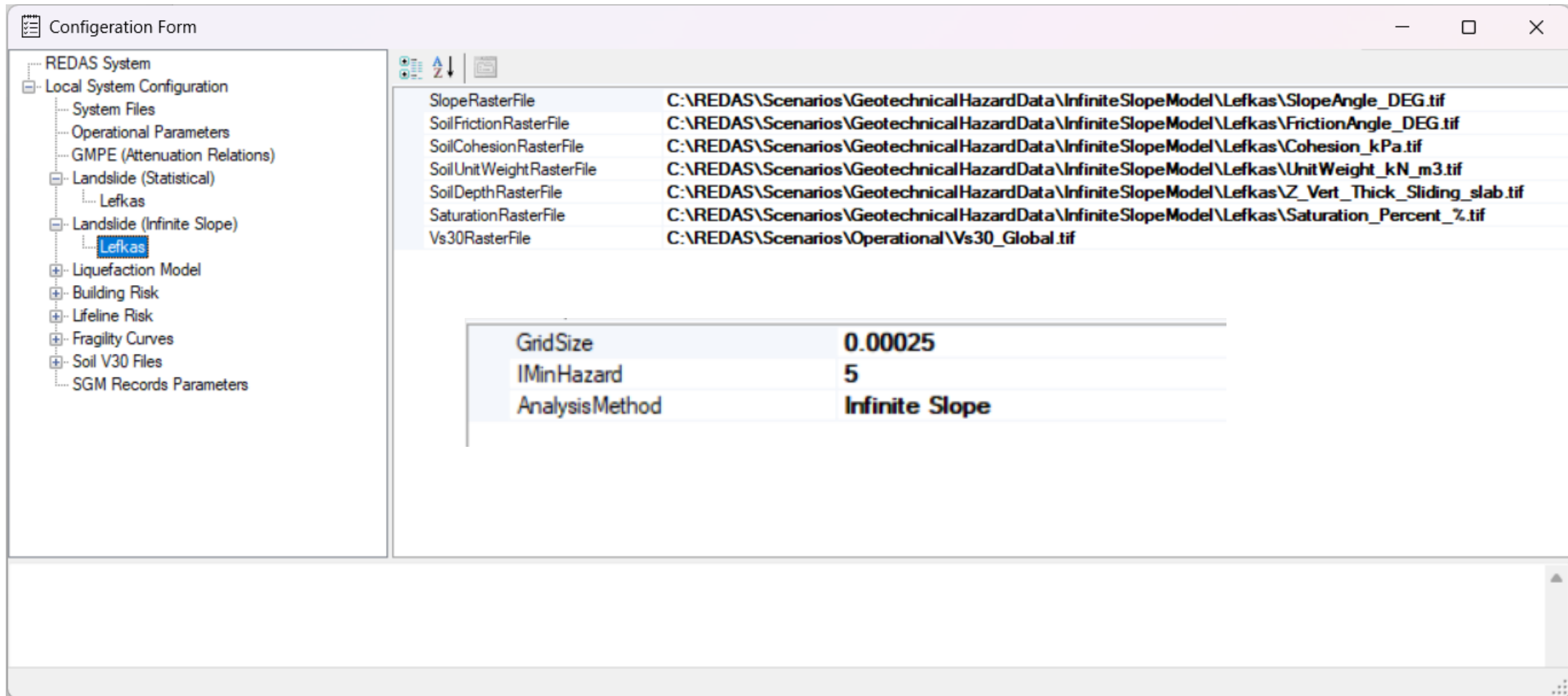
Raster Files for Landslide Hazard (Statistical)

The screenshot displays the 'Configuration Form' window in REDAS. The left sidebar shows a tree view with 'Landslide (Statistical)' selected. The main area contains two tables of configuration data.

| Parameter | Value |
|---------------------|--|
| SlopeRasterFile | C:\REDAS\Scenarios\Geotechnical Hazard Data\Statistical Model\Lefkas\Slope.tif |
| LithologyRasterFile | C:\REDAS\Scenarios\Geotechnical Hazard Data\Statistical Model\Lefkas\Lithology.tif |
| LandCoverRasterFile | C:\REDAS\Scenarios\Geotechnical Hazard Data\Statistical Model\Lefkas\LandCover_Values_nodata.tif |
| CtiRasterFile | C:\REDAS\Scenarios\Geotechnical Hazard Data\Statistical Model\Lefkas\CTI.tif |
| Vs30RasterFile | C:\REDAS\Scenarios\Geotechnical Hazard Data\Statistical Model\Lefkas\Vs30.tif |

| | |
|----------------|---|
| GridSize | 0.00025 |
| IMinHazard | 5 |
| AnalysisMethod | Nowicki et al., 2018, Jessee et al., 2018 |

Raster Files for Landslide Hazard (Infinite Slope)

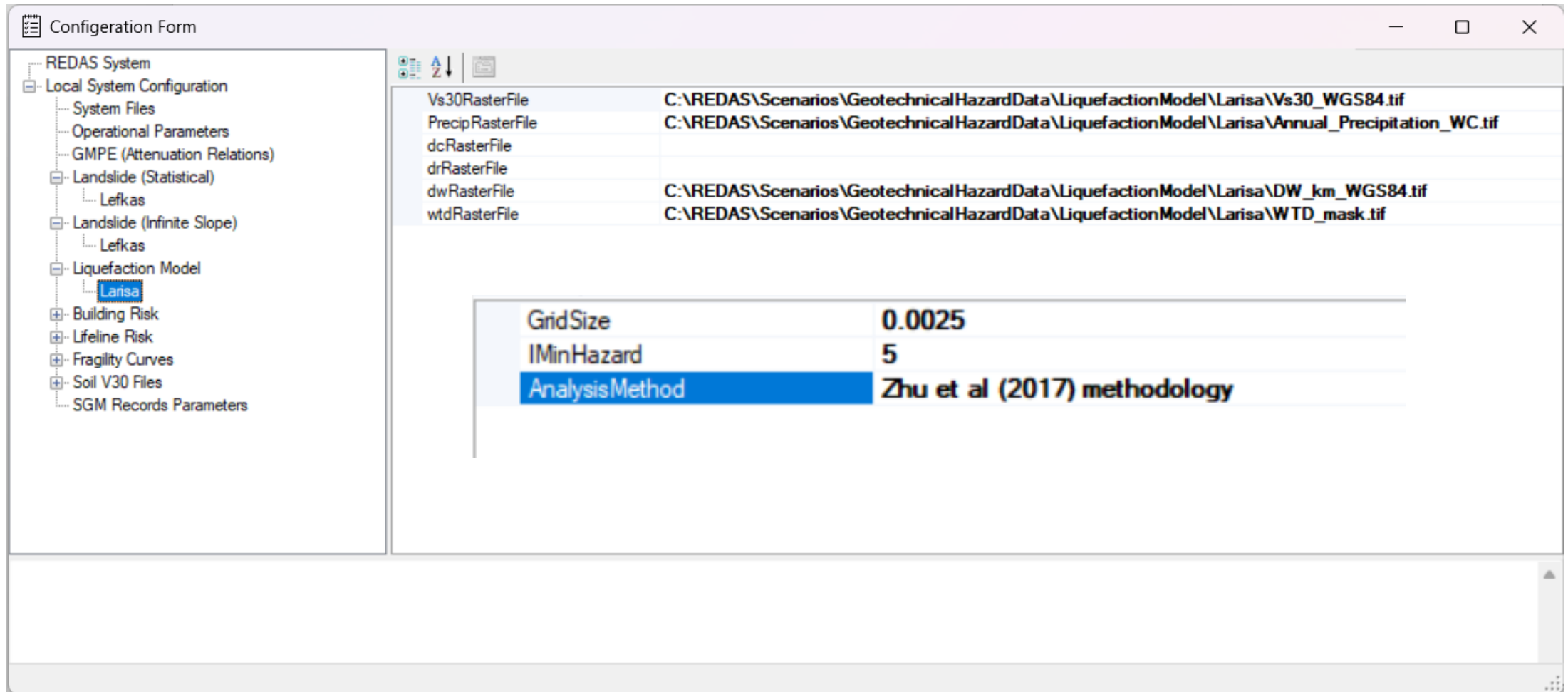


The screenshot displays the 'Configuration Form' window for REDAS. The left sidebar shows a tree view with 'Landslide (Infinite Slope)' > 'Lefkas' selected. The main area shows a list of raster files and a summary table of parameters.

| Parameter | Value |
|--------------------------|---|
| SlopeRasterFile | C:\REDAS\Scenarios\GeotechnicalHazardData\InfiniteSlopeModel\Lefkas\SlopeAngle_DEG.tif |
| SoilFrictionRasterFile | C:\REDAS\Scenarios\GeotechnicalHazardData\InfiniteSlopeModel\Lefkas\FrictionAngle_DEG.tif |
| SoilCohesionRasterFile | C:\REDAS\Scenarios\GeotechnicalHazardData\InfiniteSlopeModel\Lefkas\Cohesion_kPa.tif |
| SoilUnitWeightRasterFile | C:\REDAS\Scenarios\GeotechnicalHazardData\InfiniteSlopeModel\Lefkas\UnitWeight_kN_m3.tif |
| SoilDepthRasterFile | C:\REDAS\Scenarios\GeotechnicalHazardData\InfiniteSlopeModel\Lefkas\Z_Vert_Thick_Sliding_slab.tif |
| SaturationRasterFile | C:\REDAS\Scenarios\GeotechnicalHazardData\InfiniteSlopeModel\Lefkas\Saturation_Percent_%.tif |
| Vs30RasterFile | C:\REDAS\Scenarios\Operational\Vs30_Global.tif |

| | |
|----------------|----------------|
| GridSize | 0.00025 |
| IMinHazard | 5 |
| AnalysisMethod | Infinite Slope |

Raster Files for Liquefaction Model

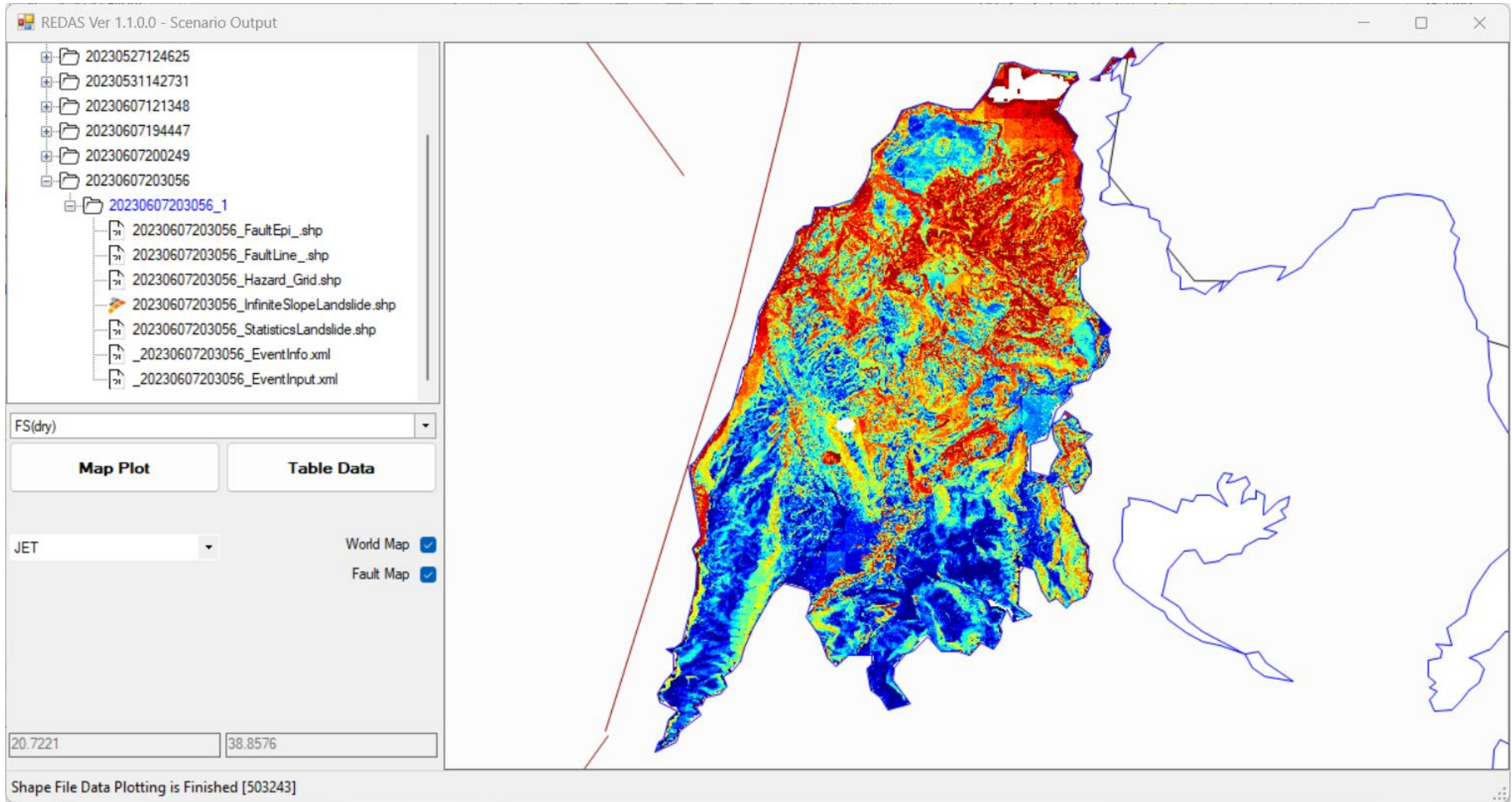


The screenshot displays the 'Configuration Form' window for the REDACT software. The left-hand tree view shows the configuration hierarchy: REDAS System > Local System Configuration > Liquefaction Model > Larisa. The main panel on the right is divided into two sections. The top section lists raster files for various parameters, and the bottom section shows numerical and methodological settings.

| Parameter | File Path |
|------------------|---|
| Vs30RasterFile | C:\REDAS\Scenarios\Geotechnical HazardData\LiquefactionModel\Larisa\Vs30_WGS84.tif |
| PrecipRasterFile | C:\REDAS\Scenarios\Geotechnical HazardData\LiquefactionModel\Larisa\Annual_Precipitation_WC.tif |
| dcRasterFile | |
| drRasterFile | |
| dwRasterFile | C:\REDAS\Scenarios\Geotechnical HazardData\LiquefactionModel\Larisa\DW_km_WGS84.tif |
| wtdRasterFile | C:\REDAS\Scenarios\Geotechnical HazardData\LiquefactionModel\Larisa\WTD_mask.tif |

| | |
|----------------|------------------------------|
| GridSize | 0.0025 |
| IMinHazard | 5 |
| AnalysisMethod | Zhu et al (2017) methodology |

Landslide Hazard Results



REDAS V1.1 Active Models

Pipeline Losses

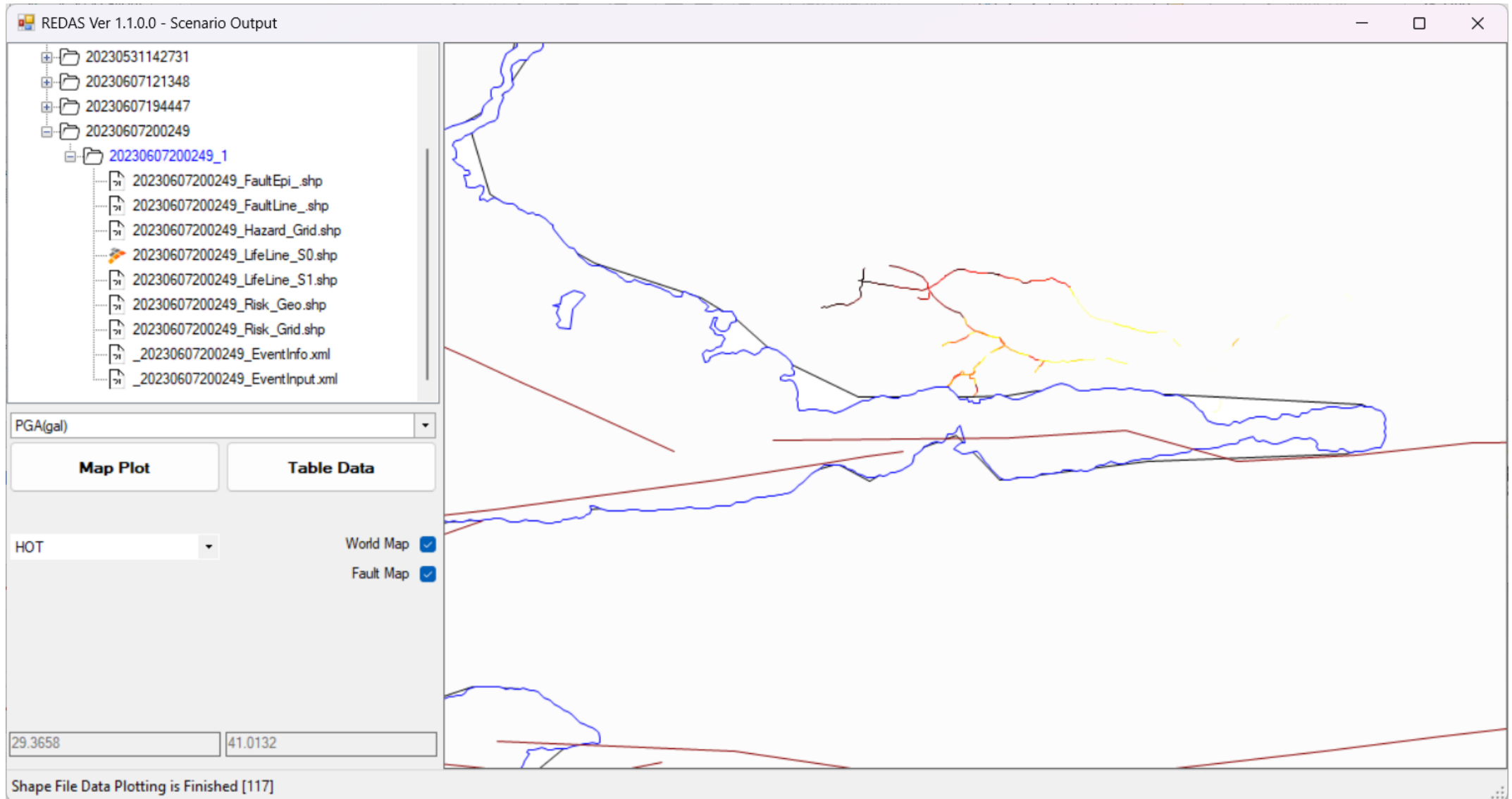
- Loss functions
- Pipeline Inventory Shape Files
- Loss Results
- Multi Regional Shape Files

Pipeline Loss functions

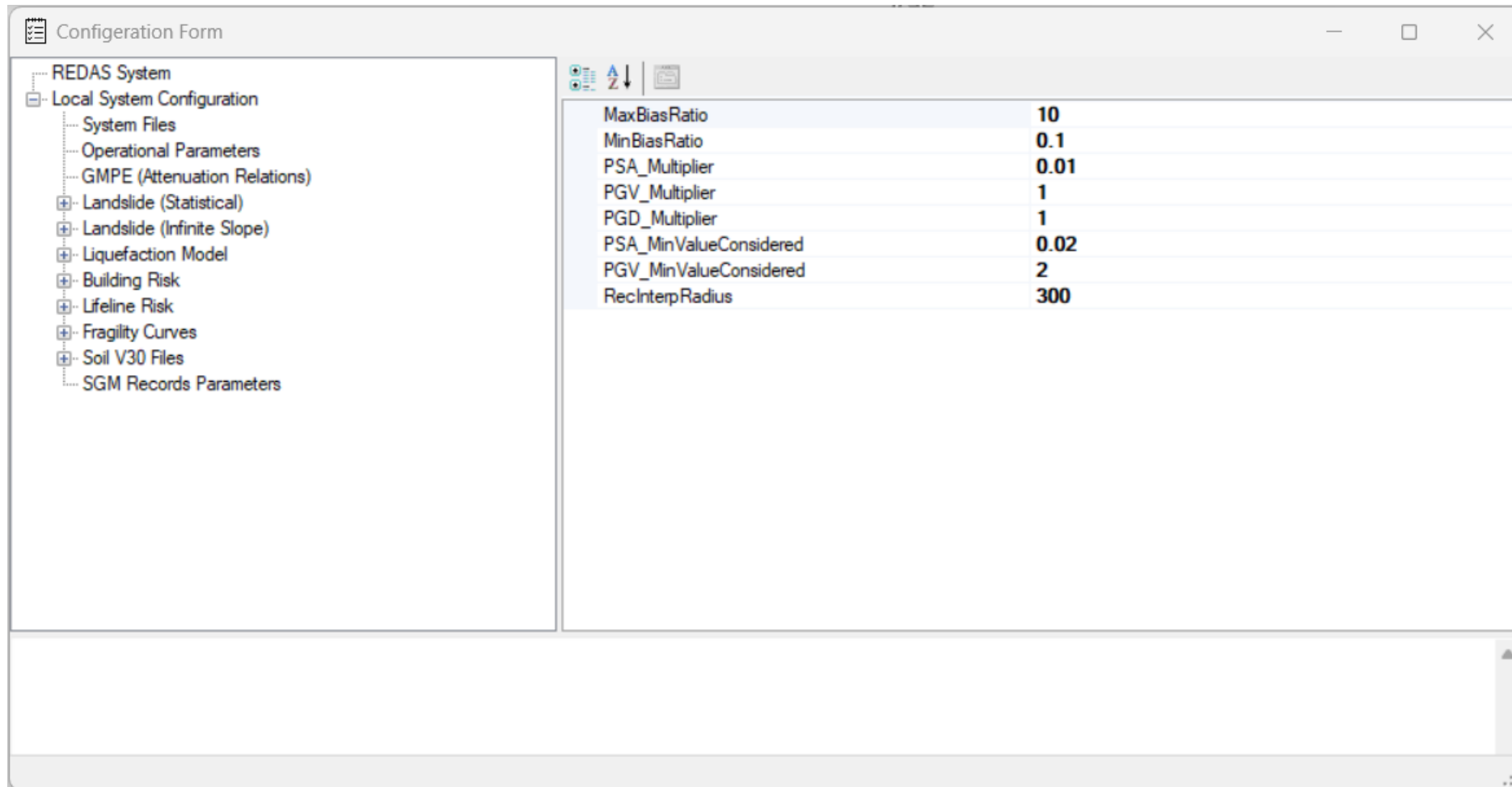
The screenshot shows the 'Configuration Form' window for REDAS. The left pane displays a tree view of the configuration structure, including 'Local System Configuration', 'System Files', 'Operational Parameters', 'GMPE (Attenuation Relations)', 'Landslide (Statistical)', 'Landslide (Infinite Slope)', 'Liquefaction Model', 'Building Risk', 'Lifeline Risk', 'Fragility Curves', 'Soil V30 Files', and 'SGM Records Parameters'. The right pane shows a table of configuration parameters for the 'LifeLineData' scenario.

| Parameter | Value |
|----------------|----------------------------------|
| DataBaseFolder | C:\REDAS\Scenarios\LifeLineData\ |
| AnalysisMethod | String[] Array |
| [0] | JWA (1998) |
| [1] | ALA (2001) |
| [2] | Chen et al.(2002) |
| Factor | Double[] Array |
| [0] | 0.5 |
| [1] | 0.5 |
| [2] | 0 |

Pipelines Loss Results



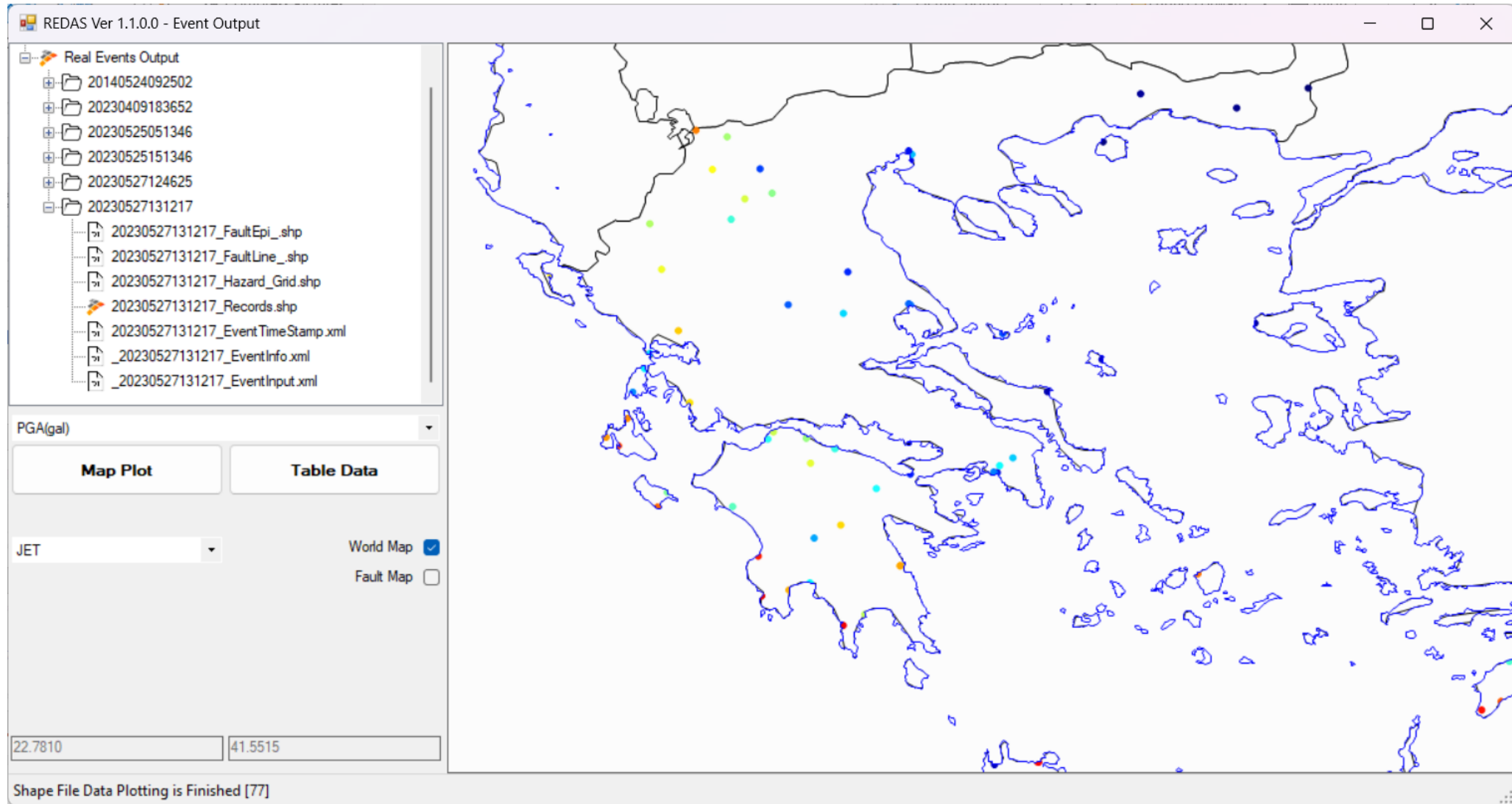
Station Data Integration



The screenshot displays the 'Configuration Form' window for REDAS. The left sidebar shows a tree view of configuration categories, with 'Local System Configuration' expanded. The main area on the right shows a list of parameters and their values:

| | |
|------------------------|------|
| MaxBiasRatio | 10 |
| MinBiasRatio | 0.1 |
| PSA_Multiplier | 0.01 |
| PGV_Multiplier | 1 |
| PGD_Multiplier | 1 |
| PSA_MinValueConsidered | 0.02 |
| PGV_MinValueConsidered | 2 |
| RecInterpRadius | 300 |

Station Data Integration



REDAS V1.1 Statistics

Coding Language: C#

Extra Resources: GDAL, EGIS

Number of Classes and variables used : 2200

Number of functions >200

Total number of coding lines > 18,513

Number of Windows Form: 8

| Hierarchy | Maint... | Cyclom... | Depth... | Class ... | Lines of ... | Lines of Executable code ^ |
|--|----------|-----------|----------|-----------|--------------|----------------------------|
| ▲ C# REDAS (Debug) | 78 | 2,792 | 7 | 359 | 18,513 | 8,885 |
| ▷ { } System.Windows.Forms | 100 | 1 | 1 | 0 | 0 | 0 |
| ▷ { } REDAS.IntensityEGISRenderSetting | 89 | 15 | 1 | 7 | 94 | 20 |
| ▷ { } REDAS.PolyLineEGISRenderSetting | 88 | 17 | 1 | 10 | 93 | 22 |
| ▷ { } REDAS.MainEGISRenderSetting | 81 | 18 | 1 | 7 | 111 | 29 |
| ▷ { } REDAS.ServiceEGISRenderSetting | 80 | 20 | 1 | 10 | 106 | 29 |
| ▷ { } REDAS.Properties | 82 | 27 | 3 | 13 | 299 | 59 |
| ▷ { } REDAS | 78 | 2,694 | 7 | 350 | 17,810 | 8,726 |

Thanks ...