**THE LOGIC**

1st Approach
- Source Parameters (Epicenter, Magnitude, Depth)
- Theoretical Relations (Attenuation)

2nd Approach
- Engineering Parameters (PGA, PGV, Displacement Spectra) from the real data

Combination of the approaches
THE STRUCTURE

Building/Geology/Lifeline etc. Database

Analysis Parameters

Vulnerability Curves
Attenuations

AFAD-RED

Maps
Intensity, PGA, PGV, Ss, S1

Online Event Check

AFAD Eartquake Observation and Analysis Center

Damage and Fatality Losses
* Grid
* Town
* District
* County
THE STRUCTURE

DATABASES

• Governmental Borders
• Geological Maps
• Fault Map
• Distribution of Vs30
• Building
• Lifelines
• Critical Facilities
• Population
• Station ID
• Detailed Geotechnical Information
THE STRUCTURE

Population and Building Stock

Grid size can be selected depend on user’s investigation choose

Units
Administrative borders, Building and Population Information in Neighborhood Details
DATABASES

Vs 30 information produced by Earthquake Department from Turkey Geological Map (1/25000)

Vs30 informations based on ground information on earthquake observation stations
ACTIVE FAULT MAP OF TURKEY
ANALYSES STAGES

1st Stage
- Preliminary Results

2nd Stage
- Moderate Results

3rd Stage
- Advanced Results
STAGE 1
PRELIMINARY RESULTS

1st Stage

Earthquake Epicentral Parameters and Magnitude

Attenuation Relationships

Ground Motion Parameters
Vs = 760 m/sec

Soil Amplification
Vs 30

PGA, PGV, Intensity Maps

Automatically generated within 20-30 sec

Point Source
STAGE 1
PRELIMINARY RESULTS

Intensity Map

PGA Map

PGV Map
STAGE 2 MODERATE RESULTS

1st Stage
- Earthquake Epicentral Parameters and Magnitude

2nd Stage
- Fault Type, Length, Azimuth
- Attenuation Relationships
  - Ground Motion Parameters
    - $V_s = 760 \text{ m/sec}$
  - Soil Amplification
    - $V_s 30$
- PGA, PGV, Intensity Map
STAGE 2
MODERATE RESULTS
STAGE 3
ADVANCED RESULTS

1st Stage
- Earthquake Epicentral Parameters and Magnitude

2nd Stage
- Fault Type, Length, Azimuth
  - Attenuation Relationships
  - Ground Motion Parameters $V_s = 760$ m/sec

3rd Stage
- Recorded Ground Motion
  - Recorded Ground Motion Parameters ($V_s = 760$ m/s)
  - Soil Amplification ($V_s 30$)
  - Calibration of Ground Motion Parameter Maps

PGA, PGV, Intensity Maps
Turkey’s Weak Motion Network
Turkey’s Strong Motion Network

TÜRKİYE KUVVETLİ YER HAREKETİ GÖZLEM AĞI (OCAK-2017)
THE NATIONAL STRONG MOTION NETWORK OF TURKEY (JANUARY-2017)

LEGEND
- CMG-3TD (329)
- GMS/Box (217)
- GSR (8)
- SAR (Acebox) (128)
- Active Faults (MPR)

[Map of Turkey with locations marked, including Black Sea, Mediterranean Sea, Aegean Sea, and Afad logo]
SCREEN SHOT of THE MAIN MENU
Screen Shot of Operational Parameters Menu
Screen Shot of DataBase Parameters Menu
Screen Shot of Analyses Options Menu

**Magnitude Conversion Mw=a+b/M**
- Ms, (a): 2.91
- Ms, (b): 0.54
- Ml, (a): 2.66
- Ml, (b): 1.57

**Magnitude-Fault Length, M=a+b/Log10(L)**
- Ms, (a): 5.23
- Ms, (b): 1.16
- Ml, (a): 4.4815
- Ml, (b): 2.1481

**Analyses Methodology**
- Soil Amplification Methodology: NEHRP 1997
- Interpolation Method: Radial

**Station Record Processor**
- Base Line Correction: checked
- Filtering: checked
- Highpass (Hz): 0.1
- Lowpass (Hz): 20
- Interpolation Radius: 10
- Power: 2

**Analyses Range**
- Max Range from the Faultline: 432
- Min Intensity for Hazard Analyses: 3
- Min Intensity for Building Damages: 6
- Min Intensity for Fatality Losses: 7
- Min Intensity for Lifeline Losses: 7

**Results Output Units**
- PGA: gal (omitted)
- PGV: cm/sec

**Gridding System**
- Grid Size (Event): 0.02
- Grid Size (Scenario): 0.02

**Event / Scenario**
- Run
MENU’S

Screen Shot of Pre-Post Processing Tools Menu
Screen Shot of Attenuation Relationship Menu
Screen Shot of Structure & Lifelines Vulnerabilities Menu
Screen Shot of Event and Scenario Run Menu
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<th>County</th>
<th>Number of Buildings</th>
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<th>Medium Damage</th>
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<th>Complete</th>
<th>Complete Effected Total Population</th>
<th>Total Population</th>
<th>Outpatient Treatment</th>
<th>Minor Injuries</th>
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SYSTEM OUTPUTS

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Show All Features
MOBILE APPLICATION
CONCLUSION

- Simple Interface – Easy to Use
- Automatic and Manual Solutions
- Stations Integration
- Creating Scenerio Earthquakes
- Flexible and Developable
- Open Source Code
- Flexibility in Fragility and attenuation relationships
- Updated databases frequently
- Speed Analysis
THANKS FOR LISTENING

Republic of Turkey Prime Ministry
Disaster and Emergency
Management Presidency
Earthquake Department
deprem.gov.tr

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AFAD Expert
can.cetin@afad.gov.tr