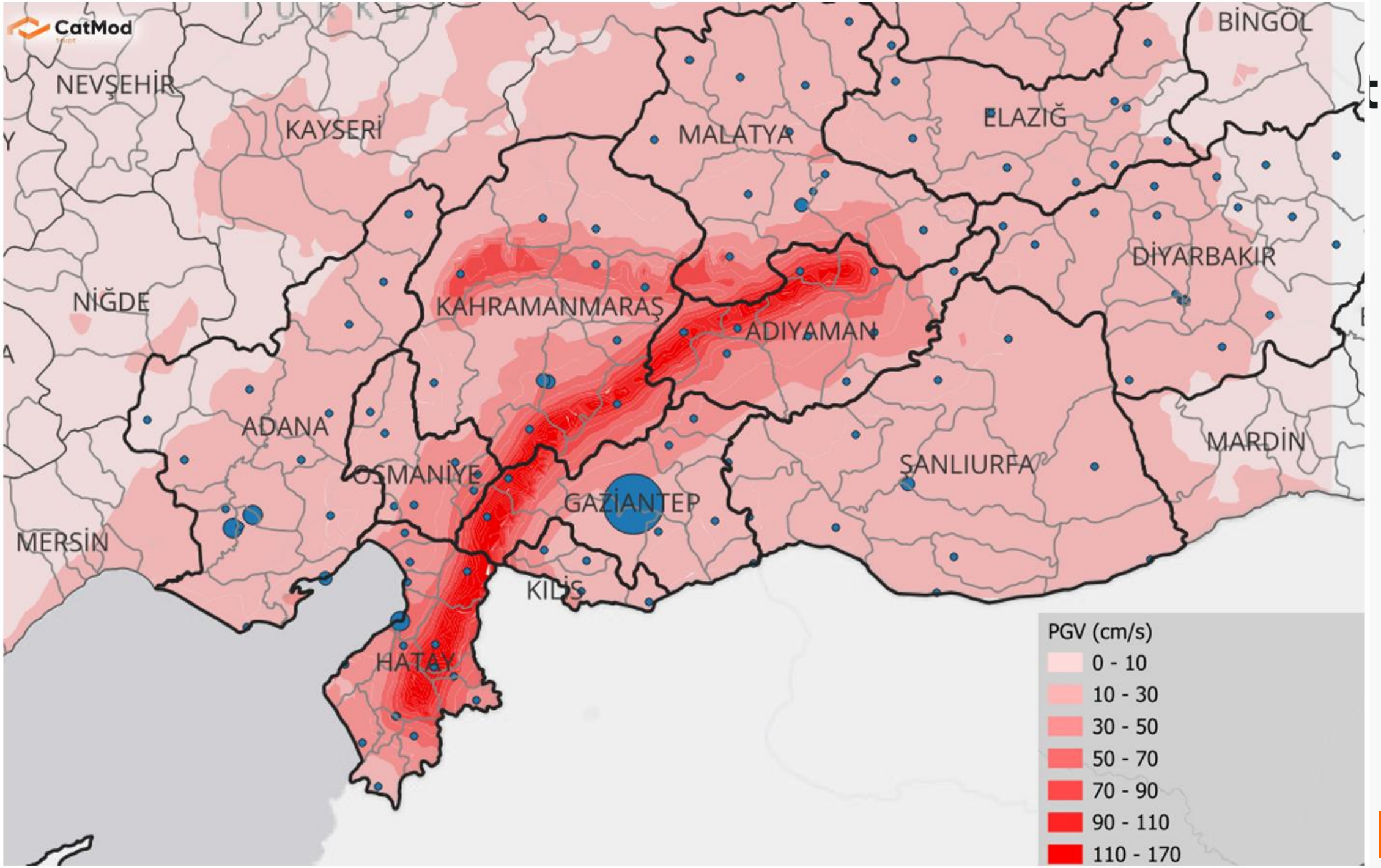
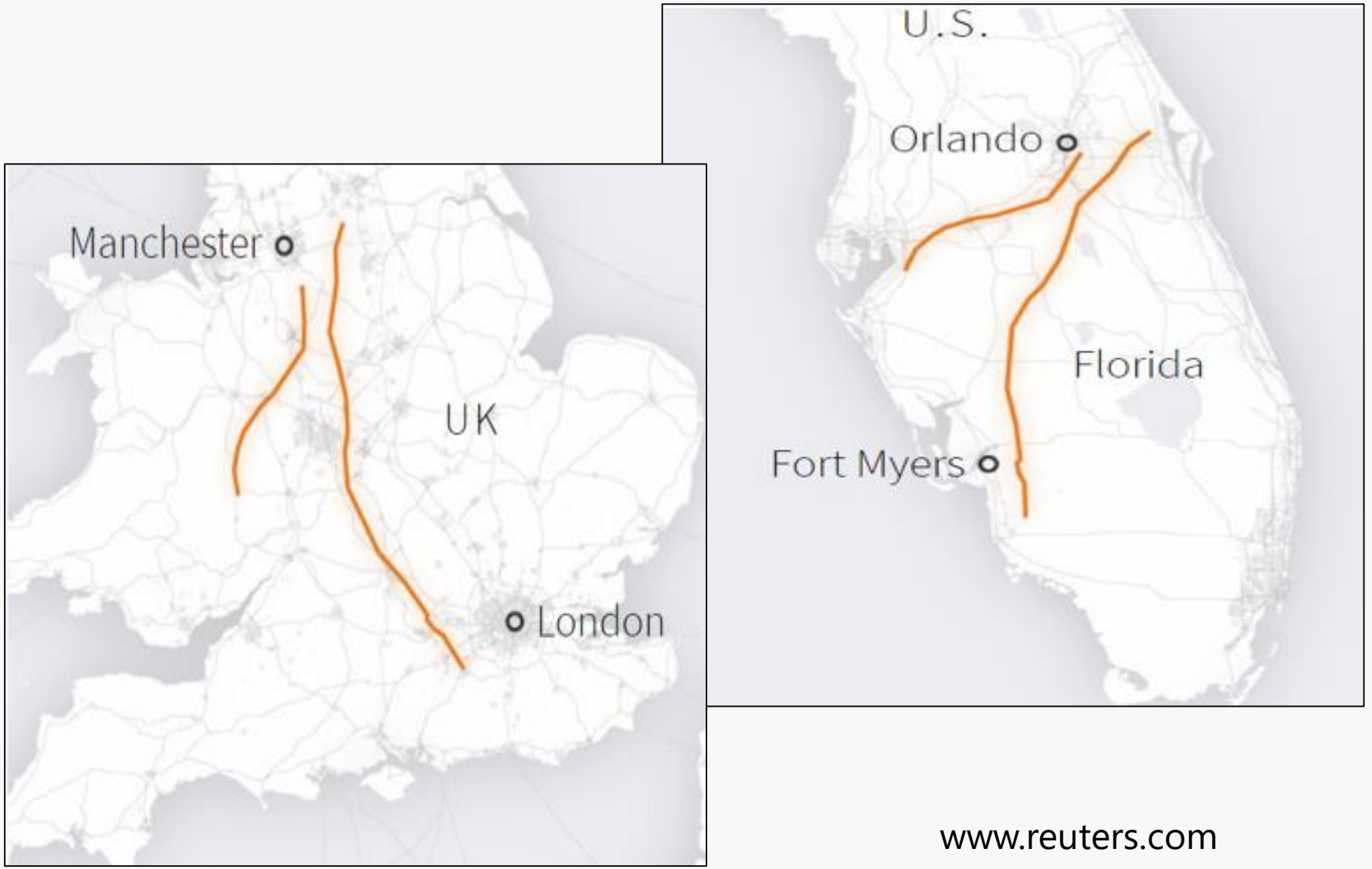
Erdem Karabostan

April 2025

t-rupt

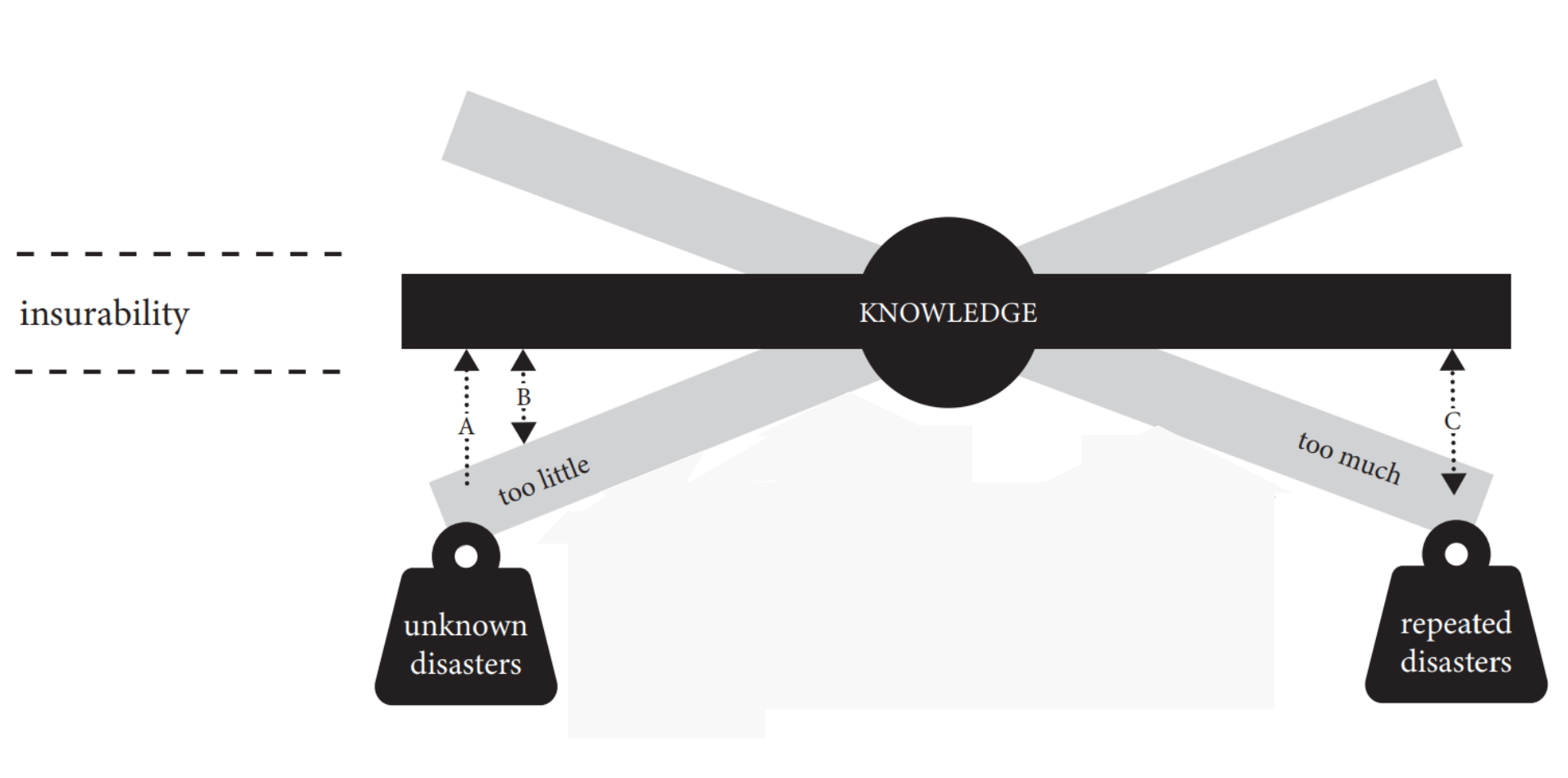

CatMod
NEVŞEHİR
KAYSERİ
MALATYA
ELAZIĞ
BİNGÖL
DİYARBAKIR
NİĞDE
KAHRAMANMARAŞ
ADIYAMAN
ADANA
OSMANİYE
GAZİANTEP
ŞANLIURFA
MARDİN
MERSİN
KİLİS
HATAY
PGV (cm/s)
0 - 10
10 - 30
30 - 50
50 - 70
70 - 90
90 - 110
110 - 170

KAHRAMANMARAŞ EQ's - 450 km rupture

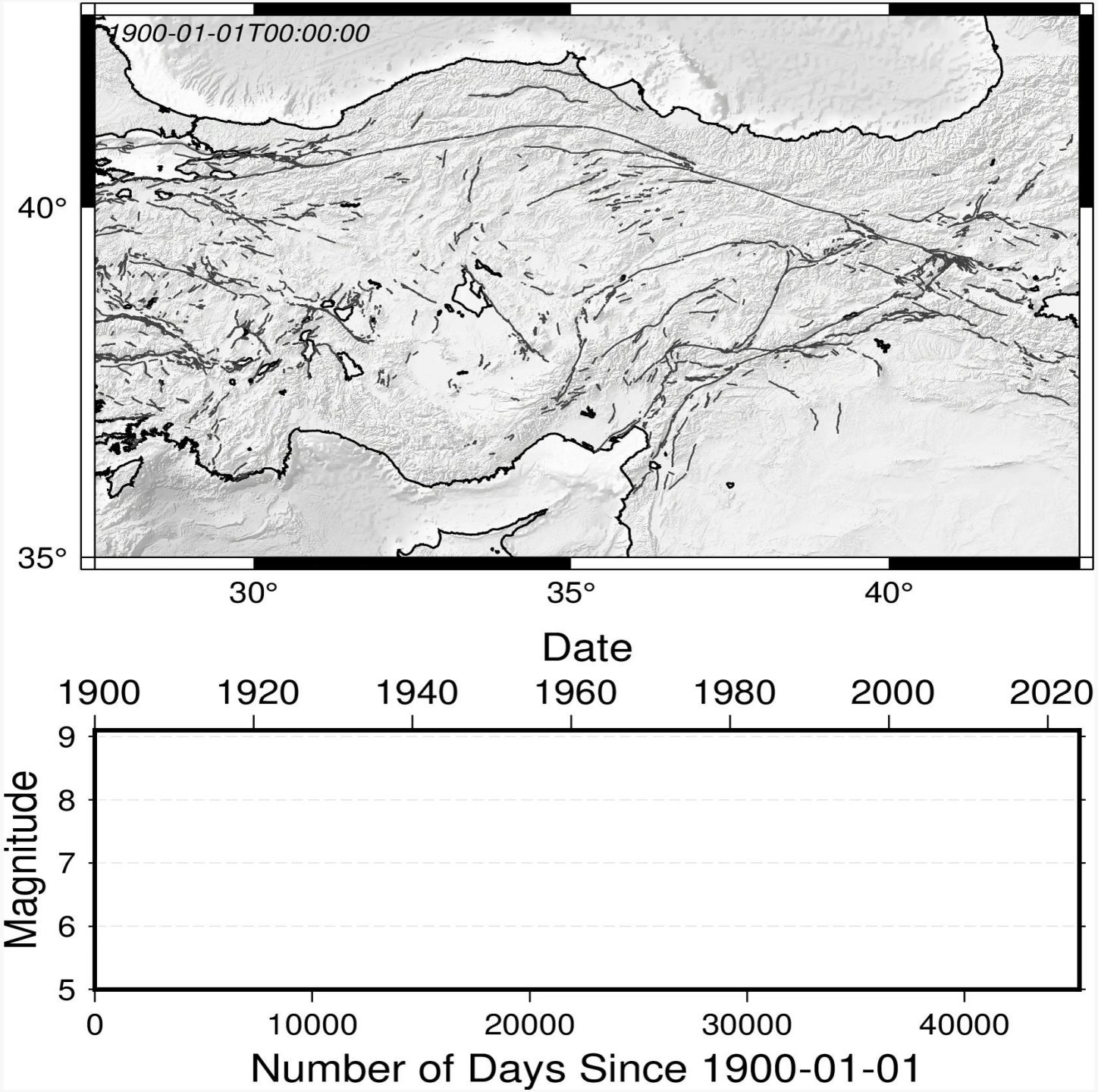


www.reuters.com

The Knowledge Paradox



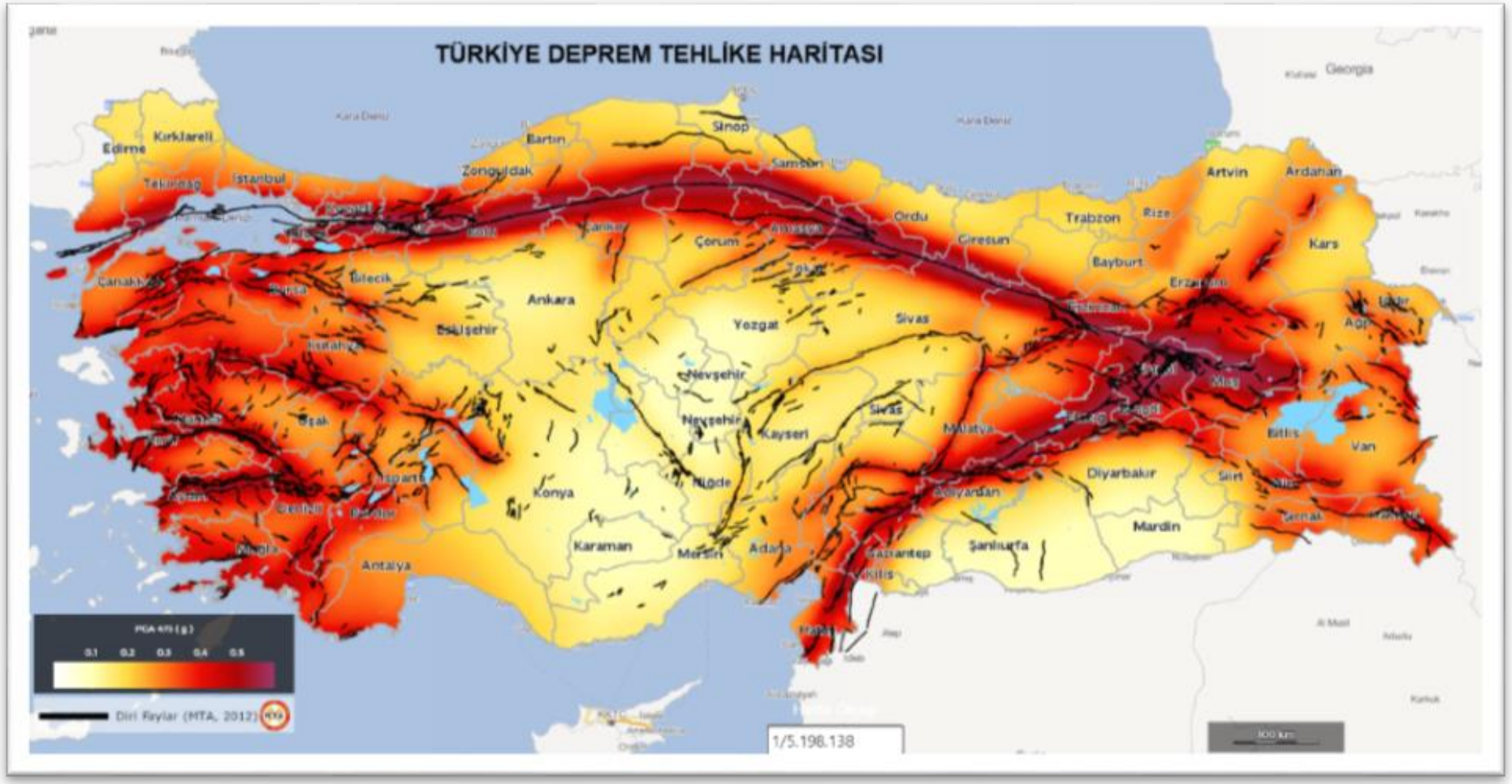
* Disaster Insurance Reimagined, Jarzabkowski et al


1900-01-01T00:00:00
40°
35°
30°
35°
40°
Date
1900
1920
1940
1960
1980
2000
2020
Magnitude
9
8
7
6
5
0
10000
20000
30000
40000
Number of Days Since 1900-01-01

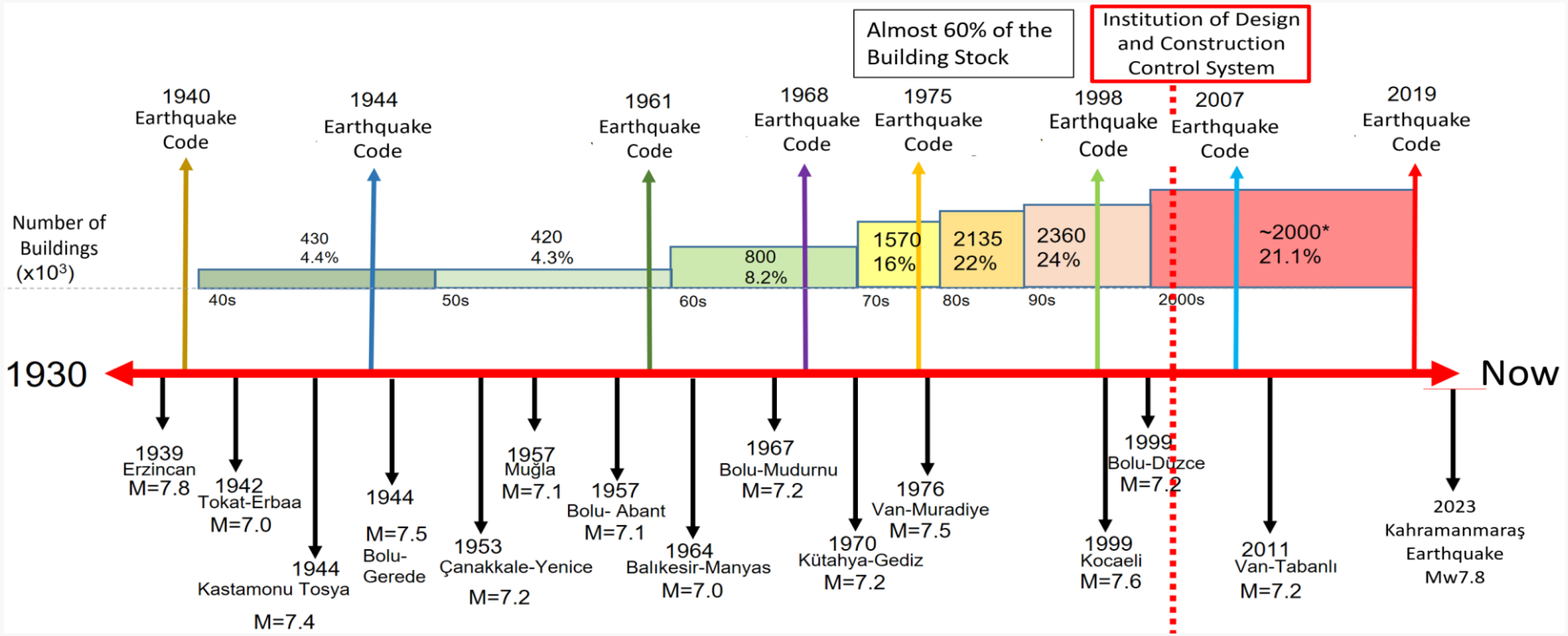
t-rupt

*USGS

Turkey is Earthquake Prone



BUILDING CODES TÜRKİYE



LOW CODE

HIGH CODE

A Brief Timeline...

2019:

- Türk Reasürans established.
- Underwriting commenced for 2020.

2020:

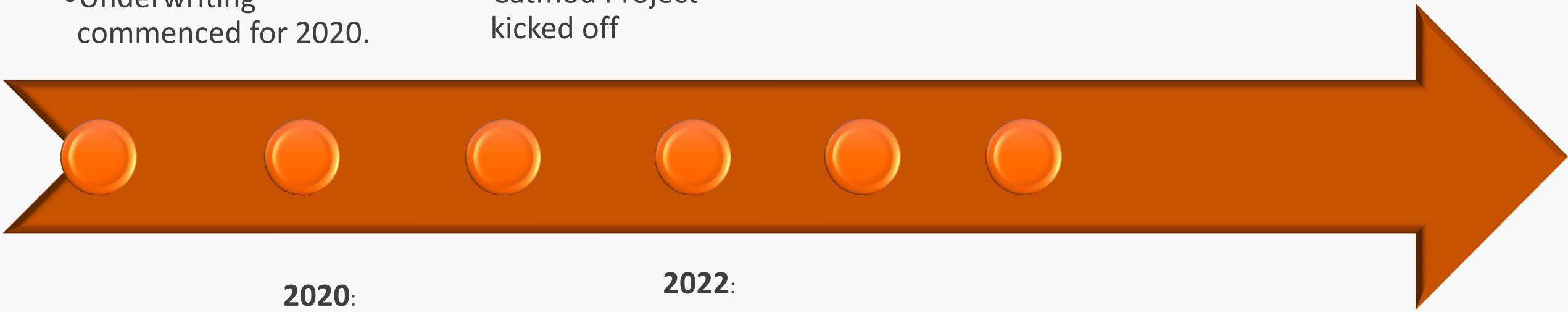
- Türk Reasürans undertakes technical operations of TCIP.
- Later followed SRMC.

2021:

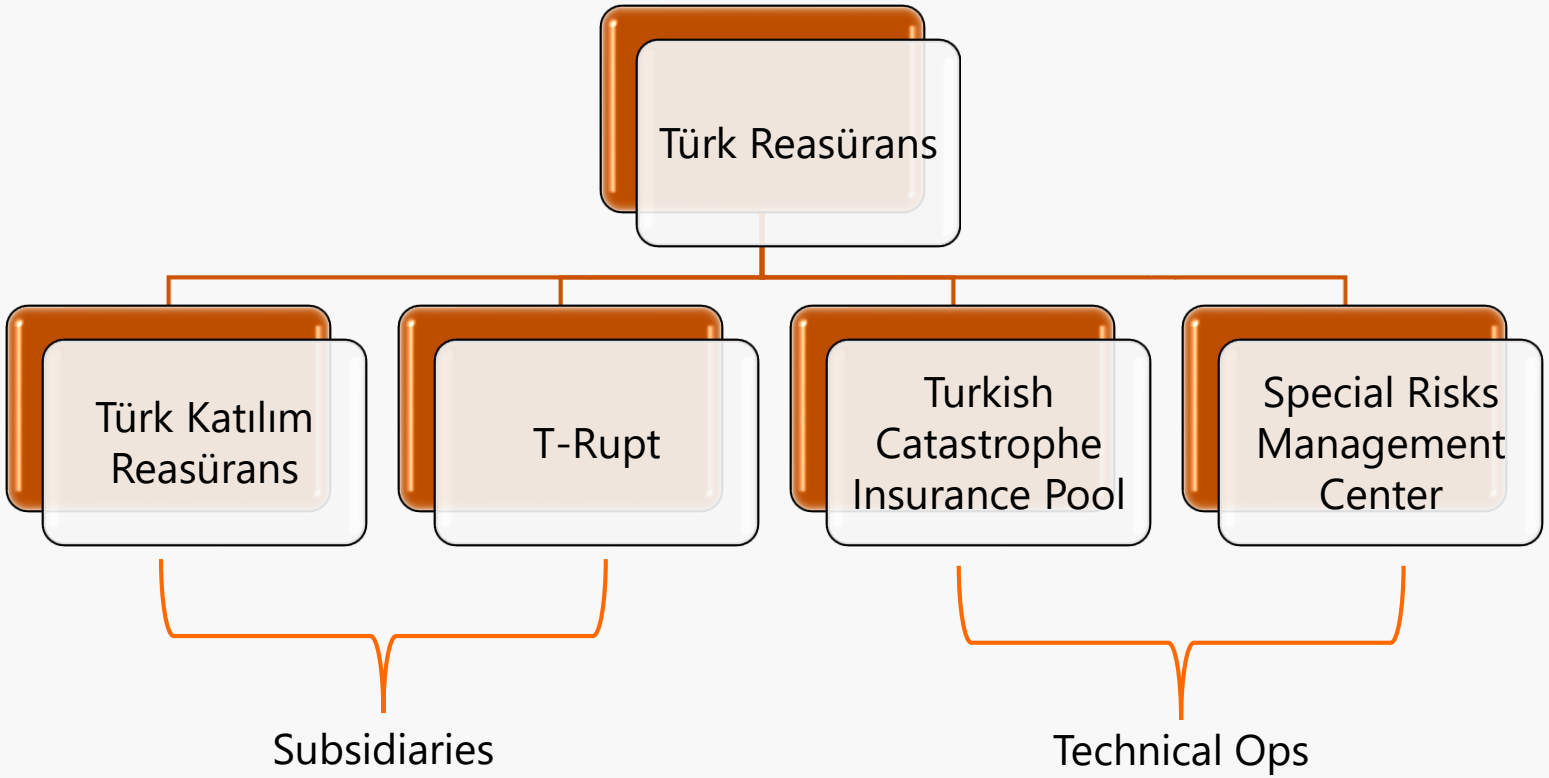
- Modelling Dept established
- Catmod Project kicked off

2022:

- T-Rupt incorporated.
- Modelling and IT from Türk Reasürans carved out.



By Year End 2022…



Cat Modelling
- Türk Reasürans
- Türk Katılım Reasürans
- TCIP

Core Administrative Systems
- Türk Reasürans
- Türk Katılım Reasürans
- SRMC

IT Managed Services
- Türk Reasürans
- Türk Katılım Reasürans

A Brief Timeline...

2019:

- Türk Reasürans established.
- Underwriting commenced for 2020.

2020:

- Türk Reasürans undertakes technical operations of TCIP.
- Later followed SRMC.

2021:

- Modelling Dept established
- Catmod Project kicked off

2022:

- T-Rupt incorporated.
- Modelling and IT from Türk Reasürans carved out.

2023:

- Catmod v1.0 launched.
- Kahramanmaraş EQs.
- Modelling for 25 domestic insurers.
- First clients outside Turkey.

2024:

- Risk Model revisited, vulnerability curves calibrated.
- Fatality and Injury Model announced.
- First non-insurance client and single risk modelling.
- Monthly model runs for TCIP.

Four Disciplines

Scenario Based Modelling & Stress Testing

Examines specific, earthquake scenarios to understand their potential impacts.

Stochastic modeling

Utilizes statistics and probability theory to simulate a wide range of possible loss outcomes.

Single Risk Modeling

Modelling for single risks and/or risk portfolios at a single location.

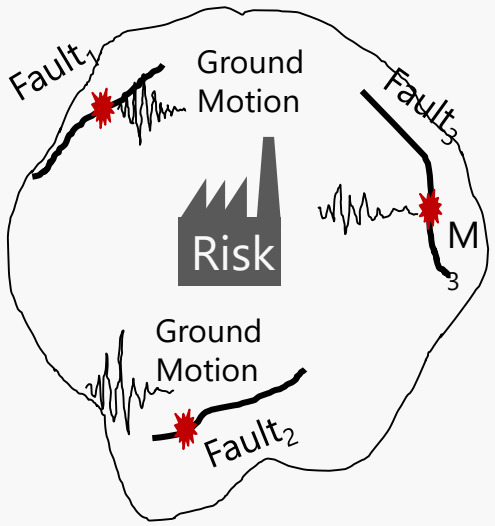
Post-Cat Analysis

Forecasts post-earthquake insurance impacts, detailing losses and number of claims files / damaged assets.

Catastrophic Earthquake Modelling:

t-rupt

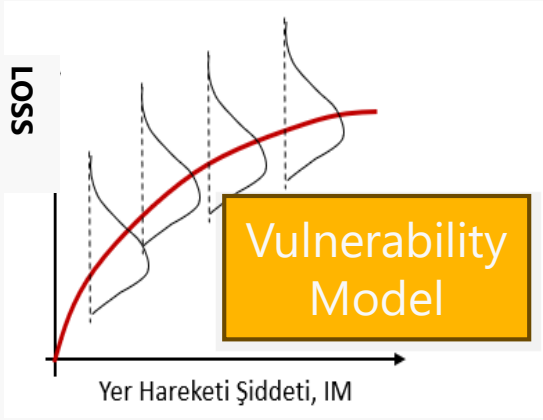
Hazard Model



1

Ground motion intensities produced by the seismic sources in proximity with the insured portfolio.

Risk Model



Ground Motion İntensity

2

Ground up loss inflicted upon the portflio by the ground motion.

Finance Model

CAT

Treaty/FAC

Deductible / Retention

3

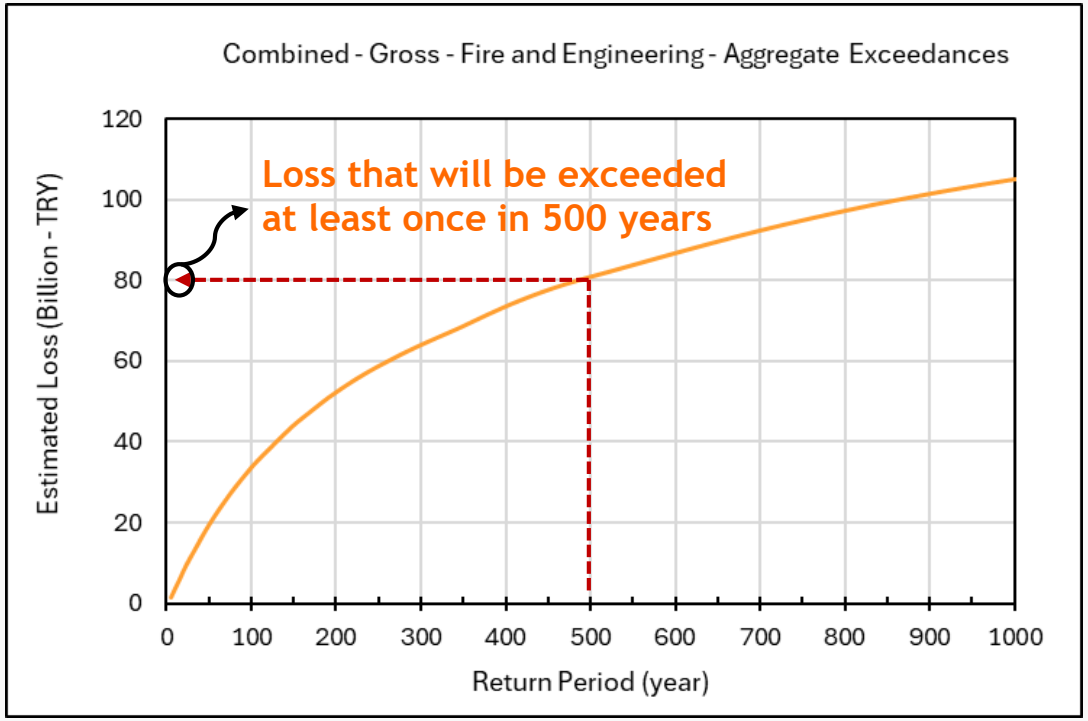
Financial loss upon policies and agreements as well as **net loss** for the (re)insurer)

Stochastic Modeling

Stochastic catalog-based earthquake loss modeling simulates the seismic activity of the entire country through a stochastic catalog, which is then used for calculating the loss of a portfolio geographically distributed over the country.

The loss results are given in terms of annual exceedance probability curves (EP curves) in terms of occurrence (maximum in a year) and aggregate (total in a year) exceedance.

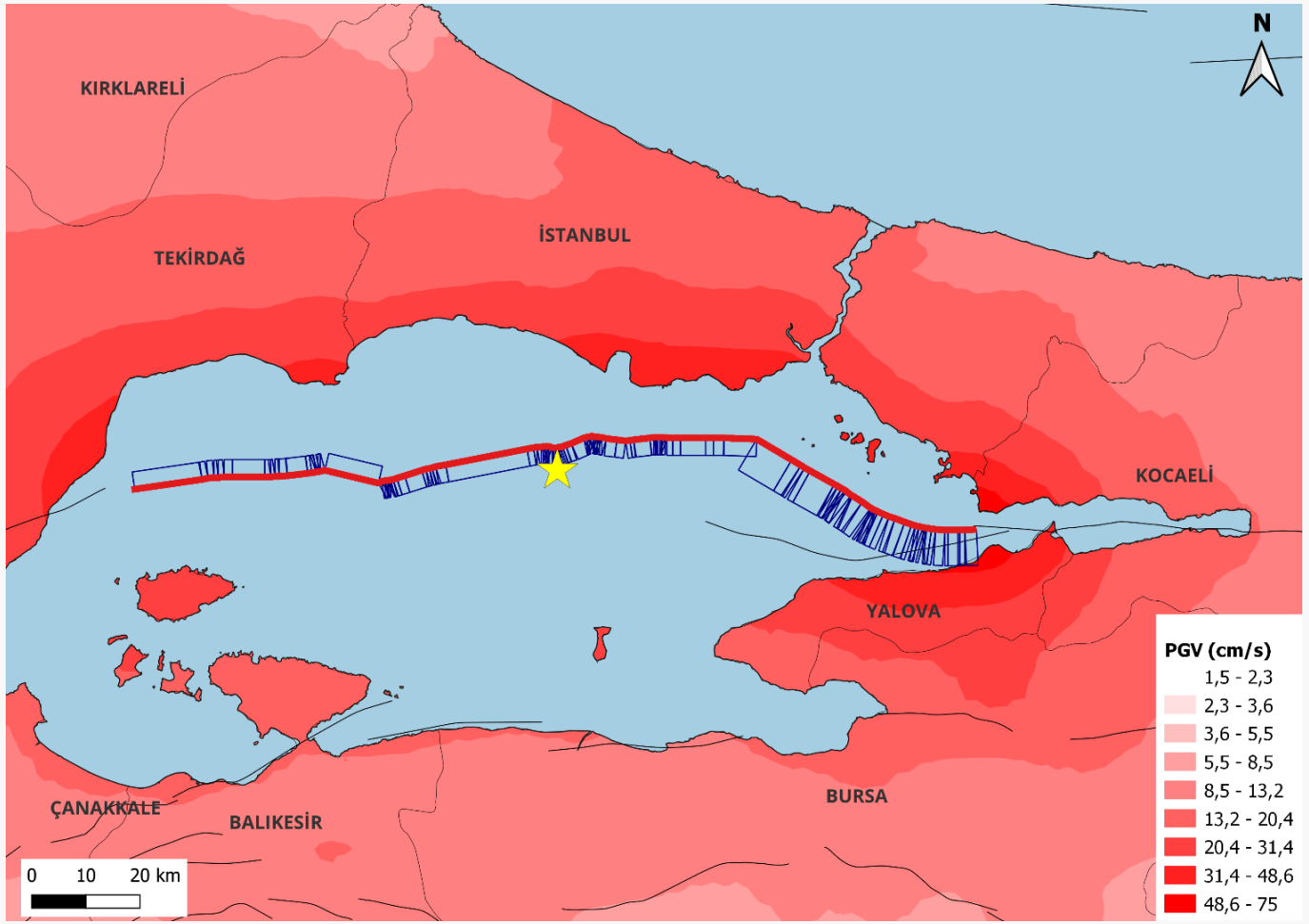
- CatMod uses its Hazard Model and Vulnerability Library in loss calculations.



Scenario Based Modelling & Stress Testing

A snapshot of T-Rupt's Marmara Sea scenarios with magnitudes greater than 7.0;

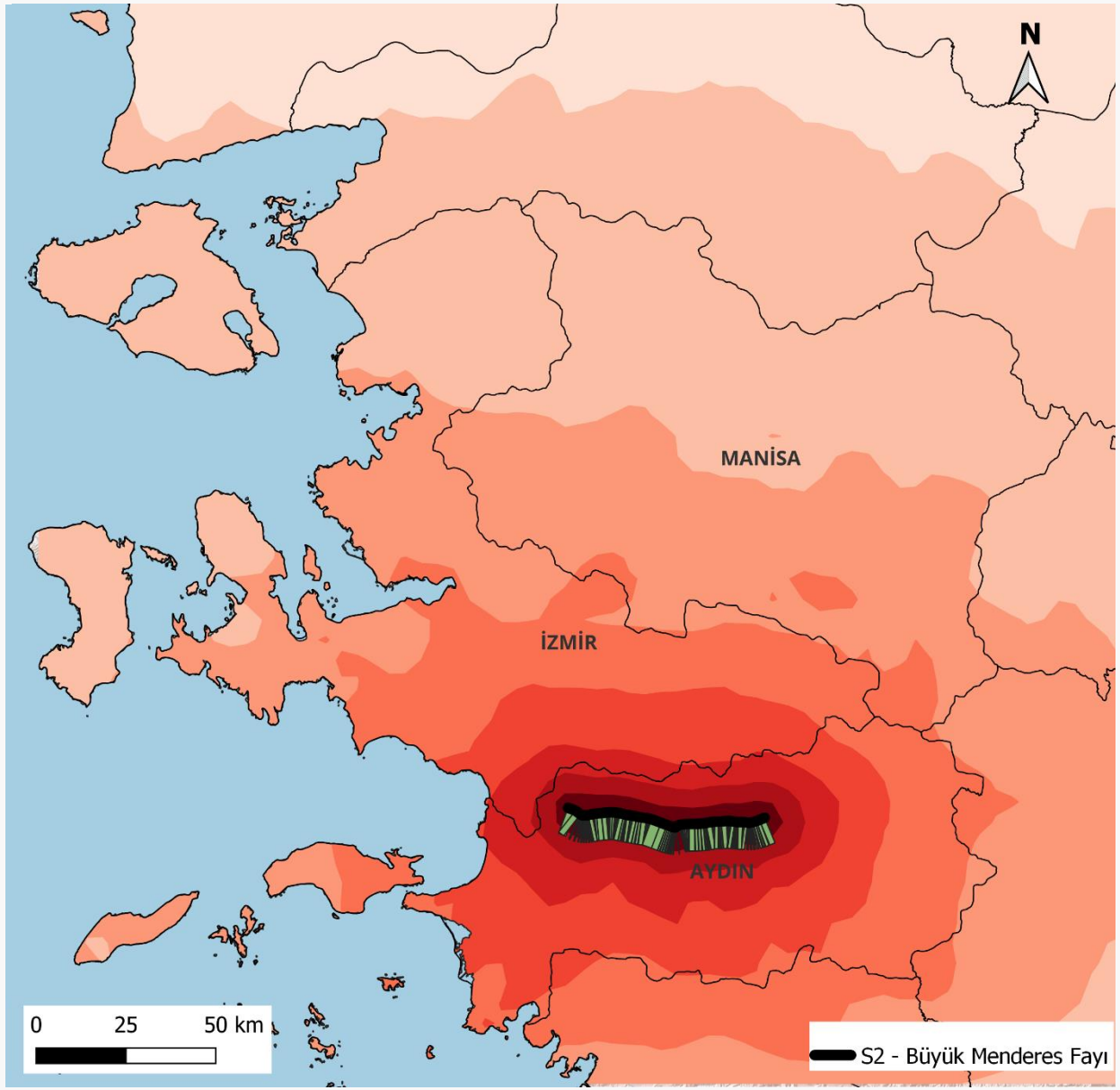
- Ground-up, Gross, Net-Pre Cat and Net-post Cat losses
- Scenarios that focus on the expected Marmara Sea Earthquake likely to affect the greater Istanbul area.
- Time dependent.



Single Risk Modelling

Modelling for single risks and/or risk portfolios at a single location.

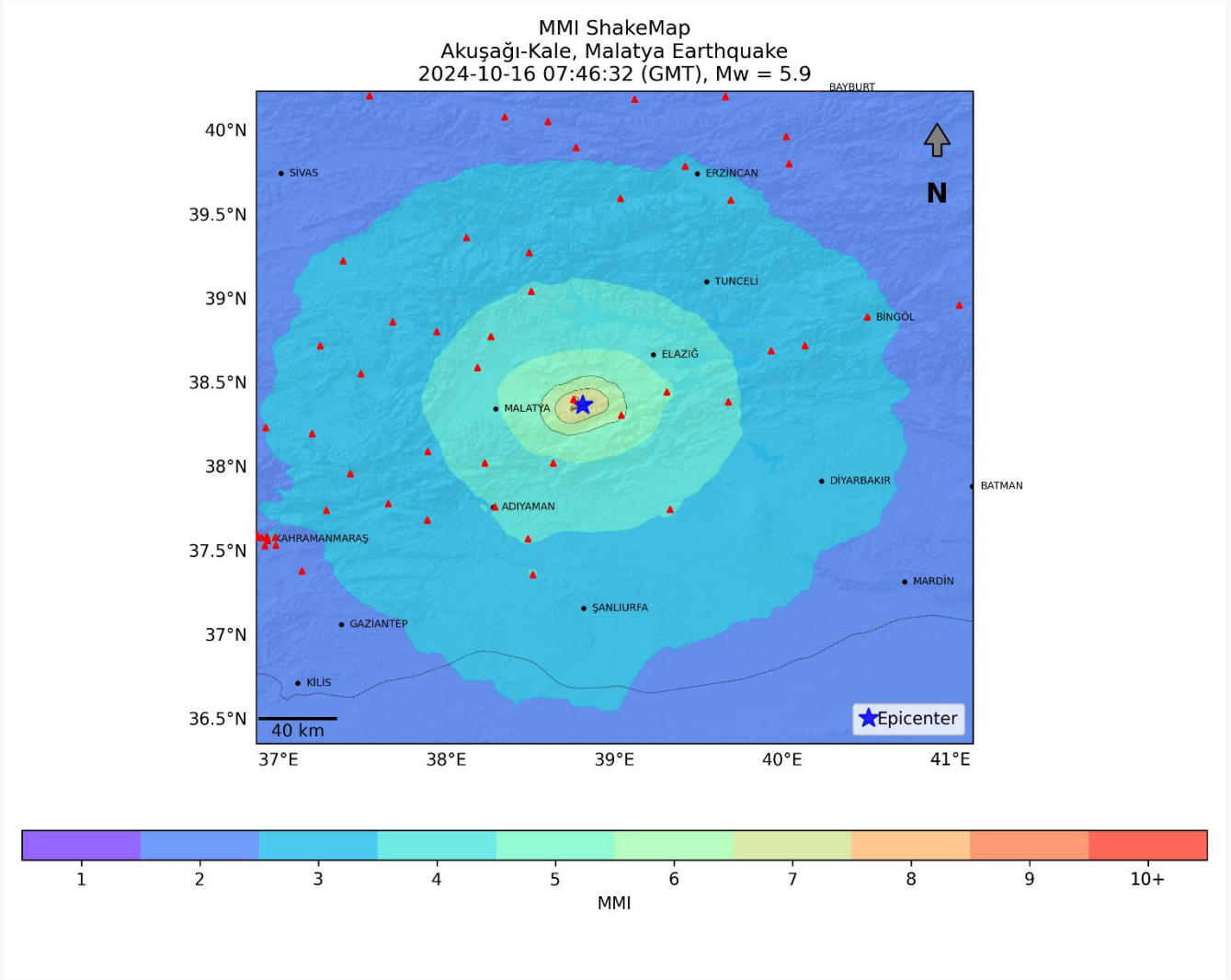
- Scenario-based loss yields the loss distribution of a portfolio distributed over a localized region.
- Our team models major earthquakes, considering regional seismotectonic to predict the maximum possible loss specific to a given portfolio.
- Time dependent modeling.



Post-Cat Analysis

Forecasts post-earthquake insurance impacts, detailing loss amounts and number of claims.

- Creating the footprint of the earthquake by mimicking the rupture and by populating the ground motion fields for locations affected by the earthquake.
- We continously follow the actual loss results to revisit vulnerability curves.



16.10.2024 Malatya Kale Earthquake (M5,9)

Modelled (18.10.2024)	
No. Of Paid Out Claims	24.011
Total Pay Out	368.353.896 TL

Actual (08.04.2025)	
No. Of Paid Out Claims	22.474
Total Pay Out	383.483.554

Comparison	Difference
No. Of Paid Out Claims	(4,11%)
Total Pay Out	6,40%

t-rupt

RISK:

Deviation from expected value

Thank You!