Geotechnical Array Facilities in Istanbul, Turkey

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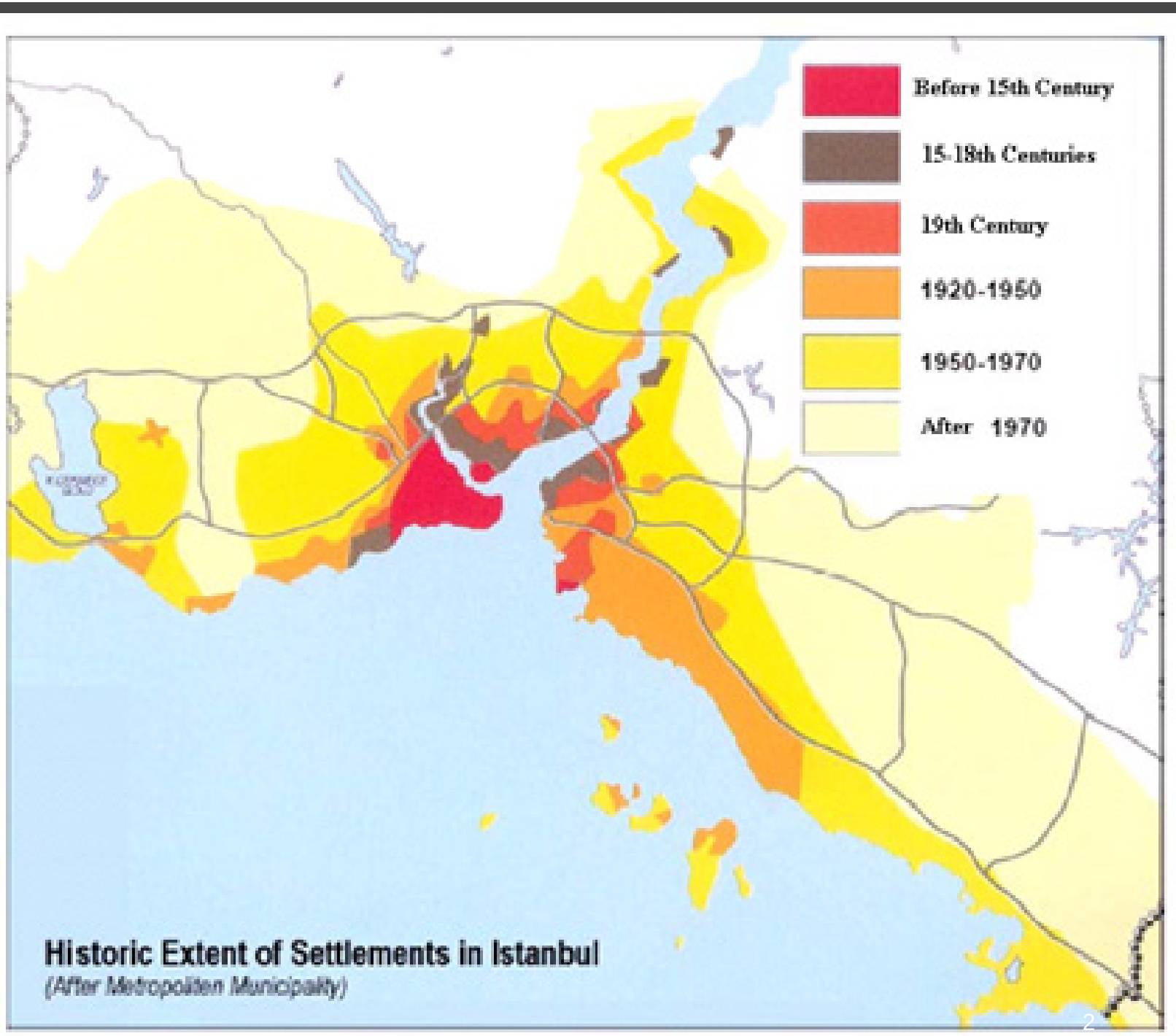
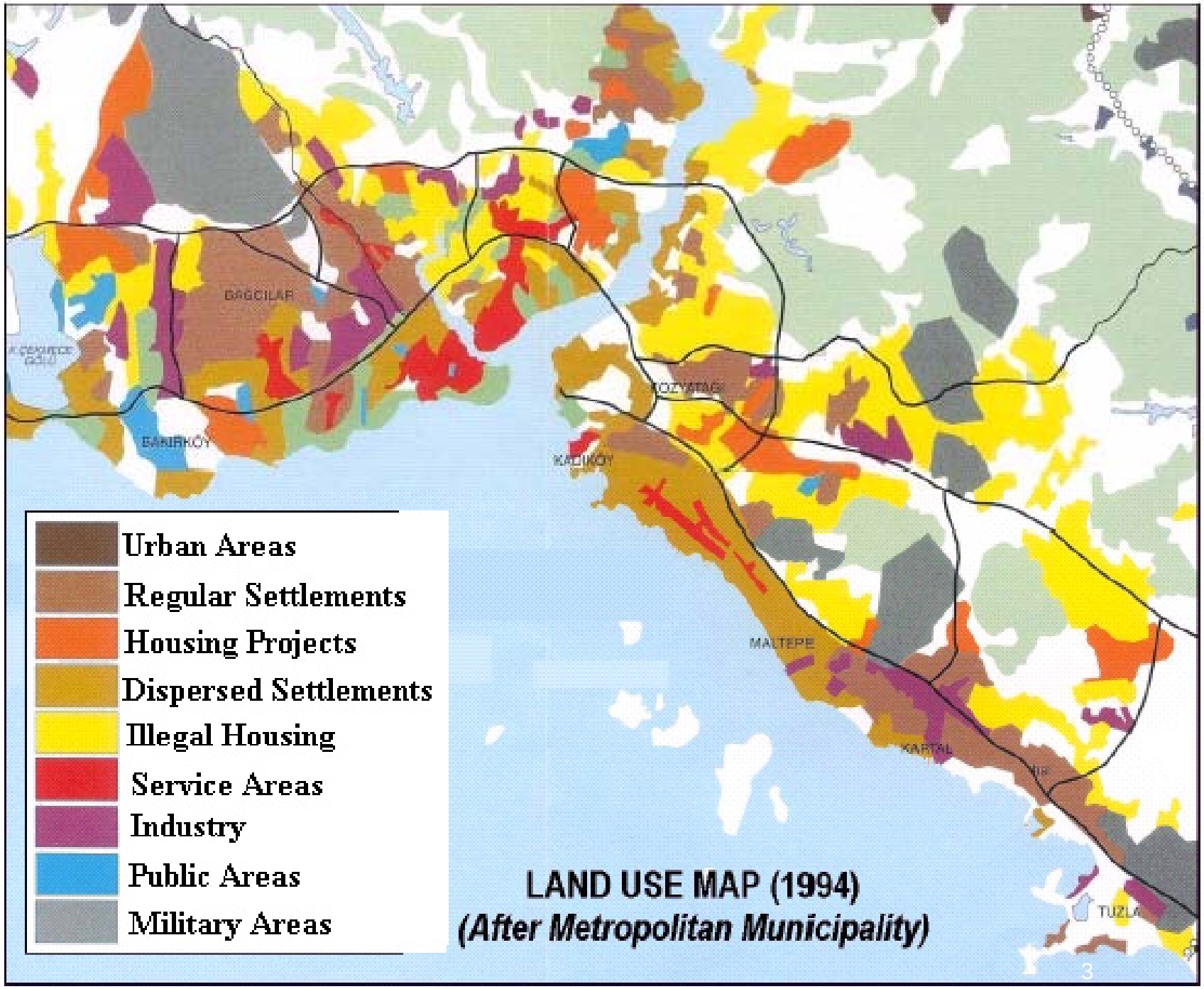
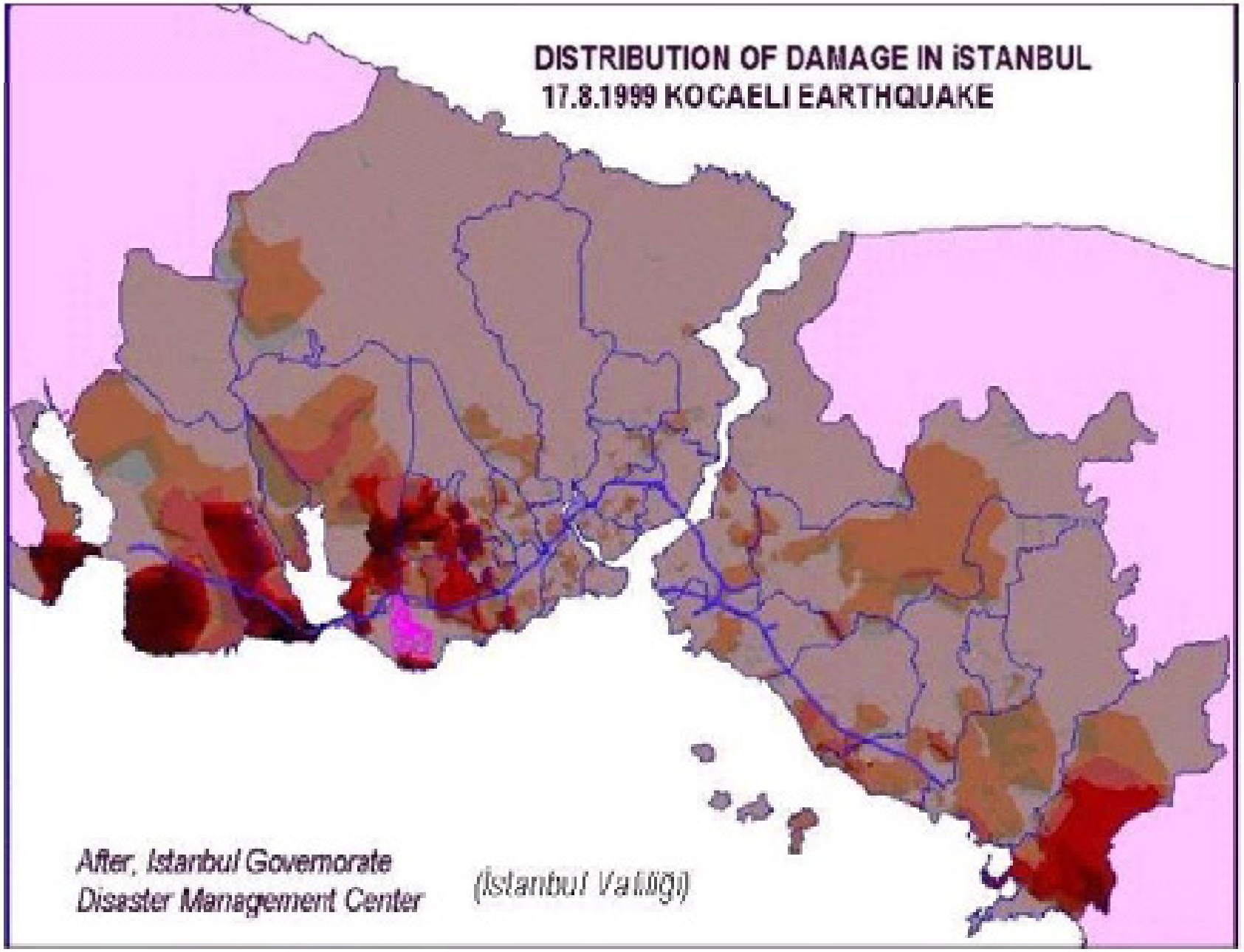


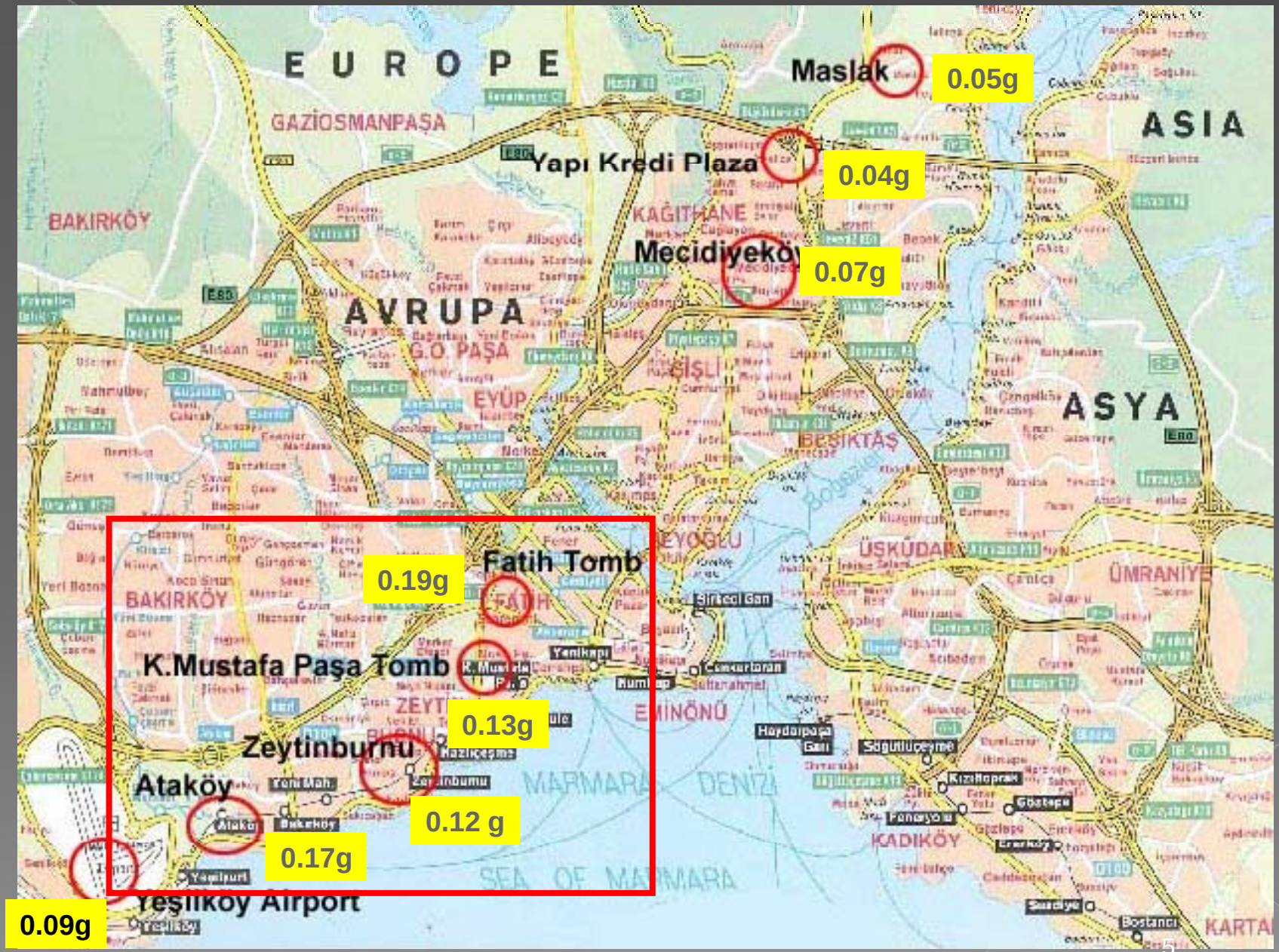
Historic Extent of Settlements in Istanbul

(After Metropolitan Municipality)


BAGCILAR
BAKIRKÖY
KADIKÖY
MALTEPE
KARTAL
TUZLA
Urban Areas
Regular Settlements
Housing Projects
Dispersed Settlements
Illegal Housing
Service Areas
Industry
Public Areas
Military Areas
LAND USE MAP (1994)
(After Metropolitan Municipality)

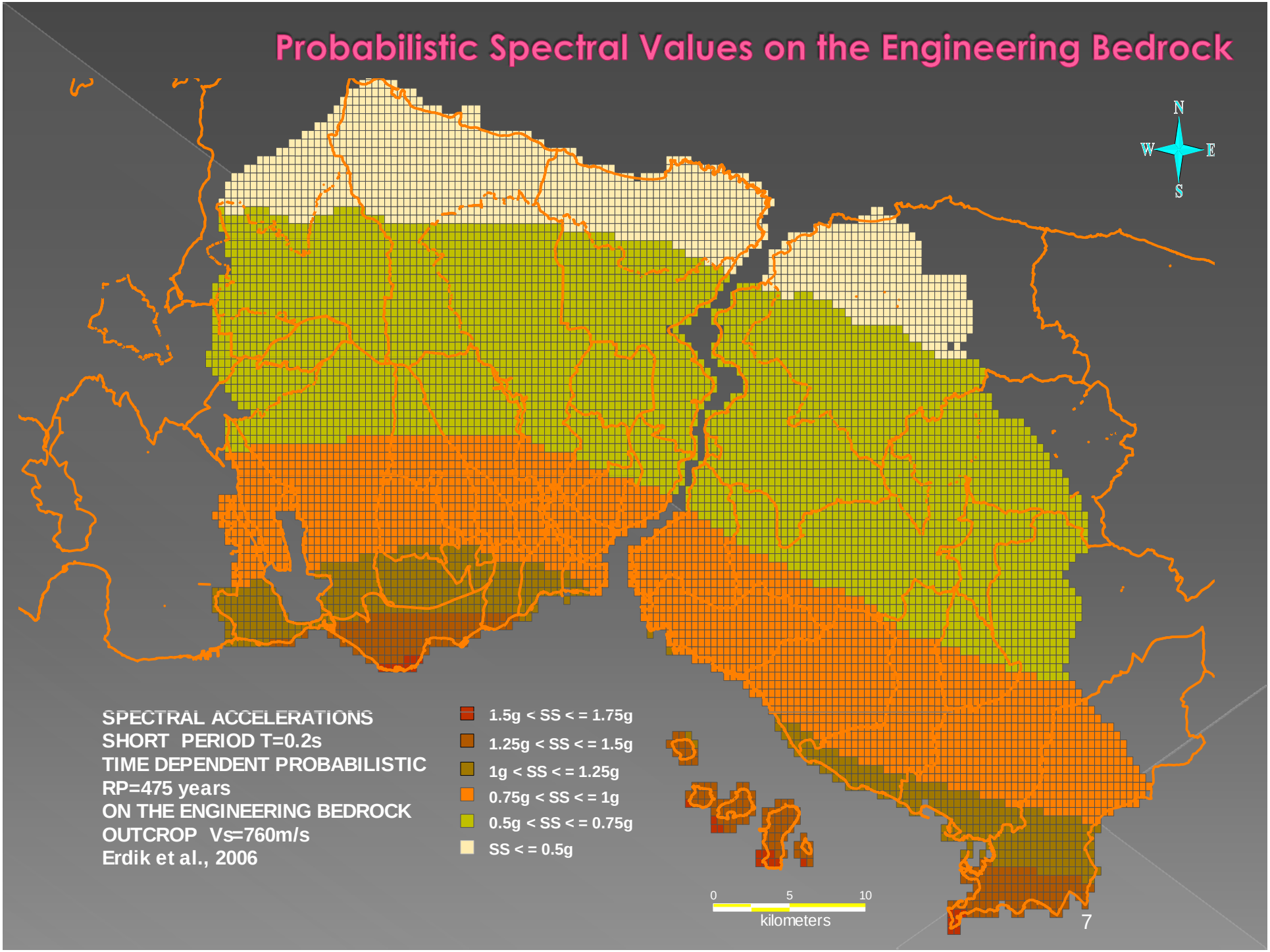

DISTRIBUTION OF DAMAGE IN İSTANBUL
17.8.1999 KOCAELI EARTHQUAKE
After, Istanbul Governorate
Disaster Management Center
(İstanbul Valiliği)

August 17, 1999 Kocaeli Earthquake Istanbul Records



Fault segmentation model

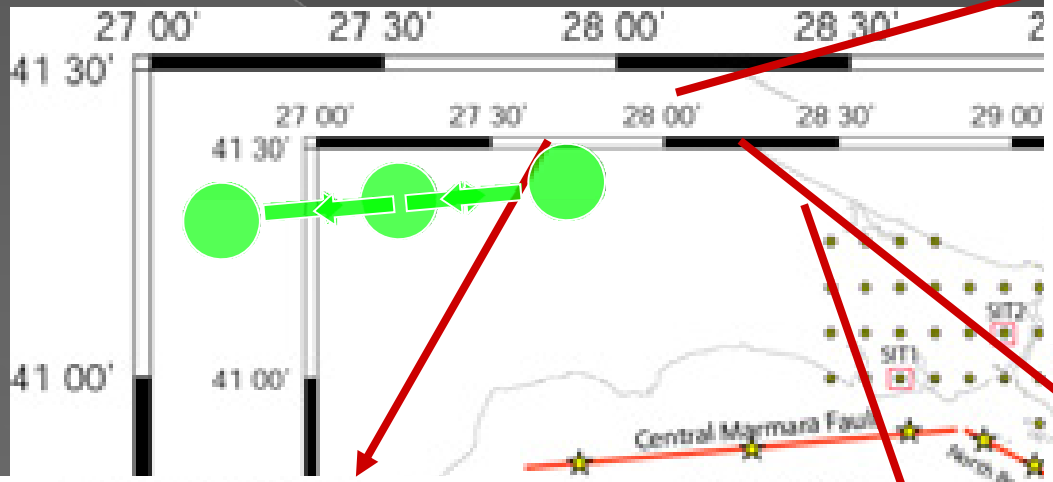
Probabilistic Spectral Values on the Engineering Bedrock



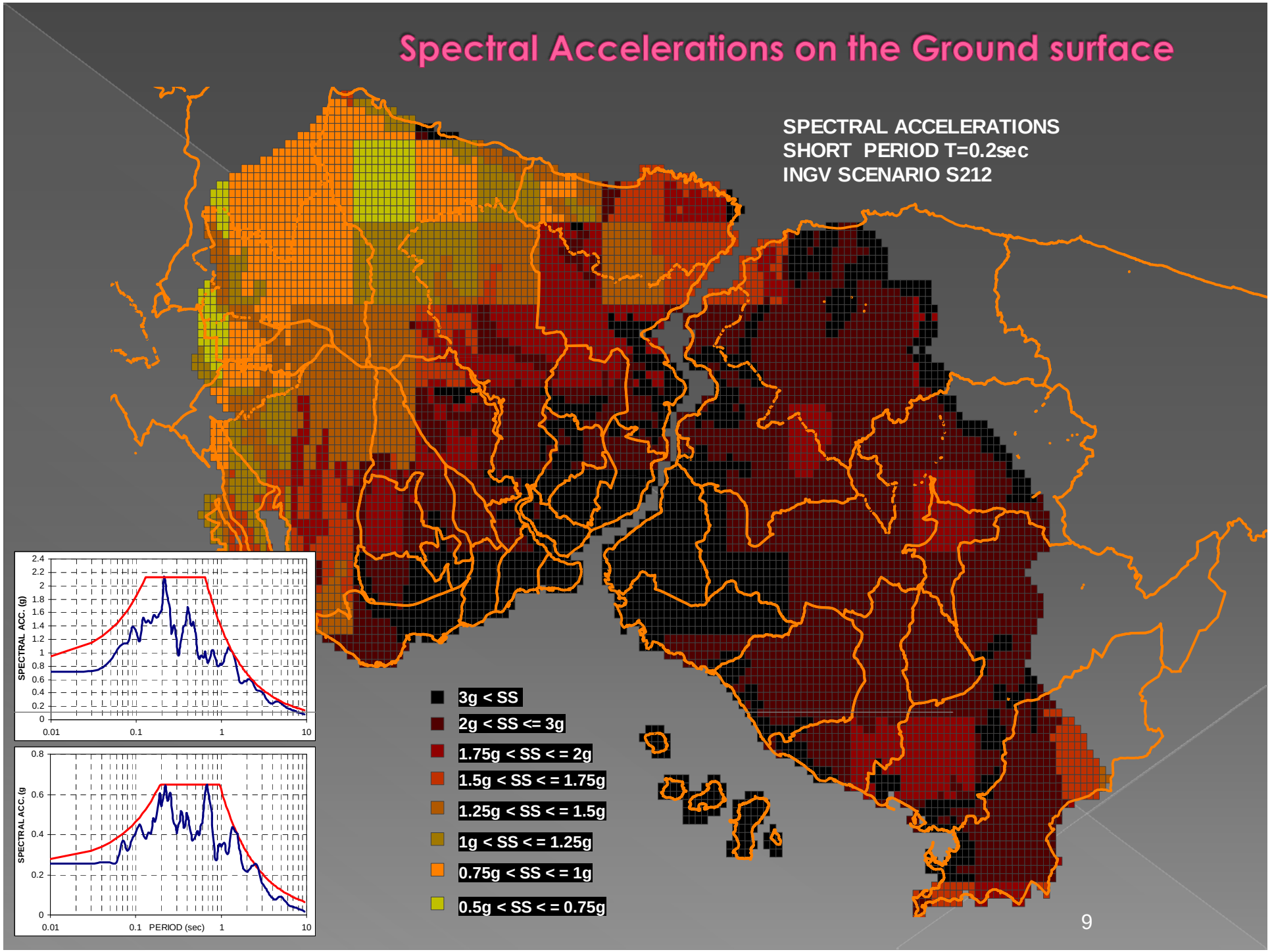
INGV Deterministic Scenarios

S113

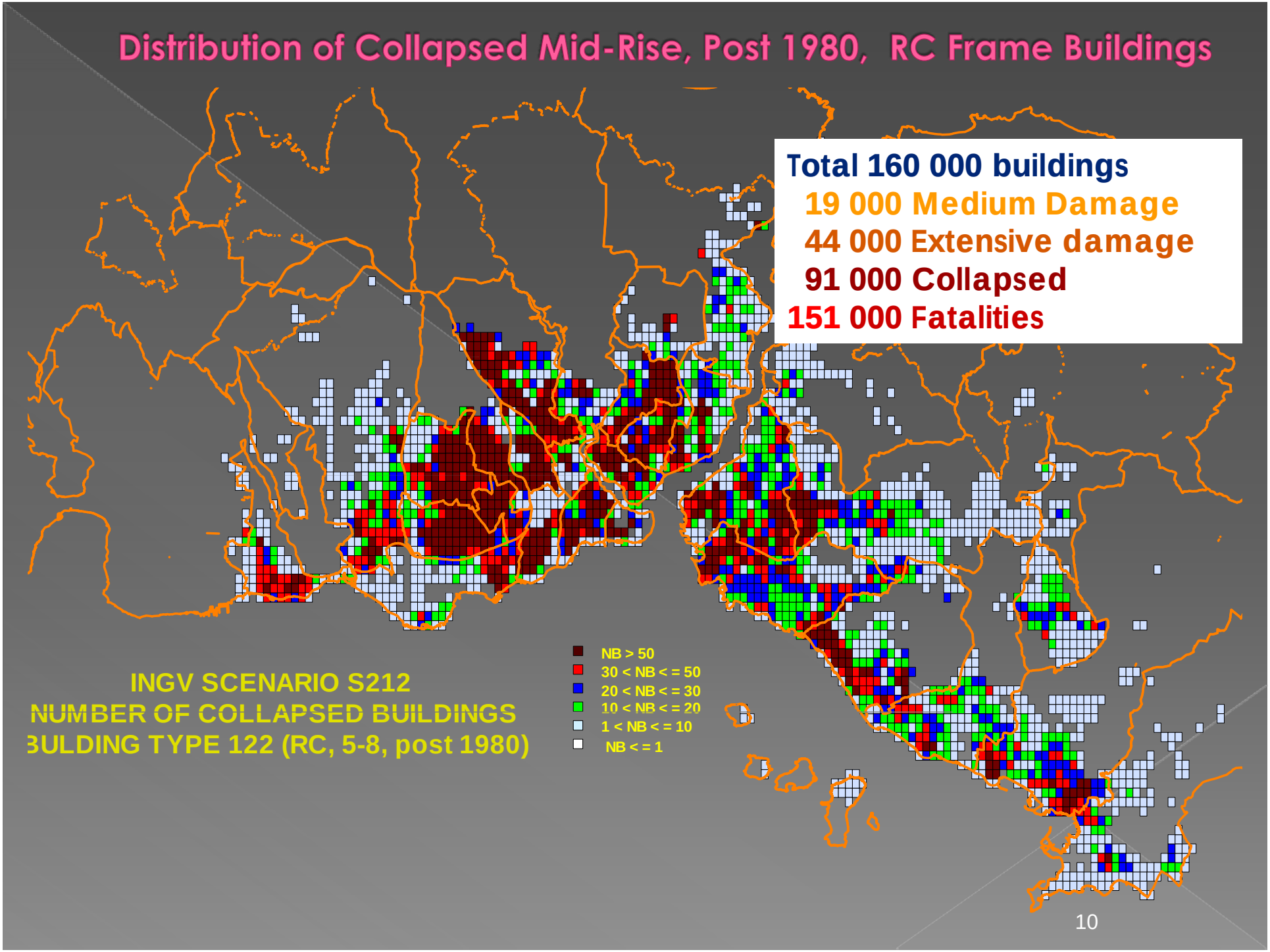
3 different SLIP DISTRIBUTIONS and 3 different NUCLEATION POINTS
(Asperity model: slip distribution, computed with the k-squared method)



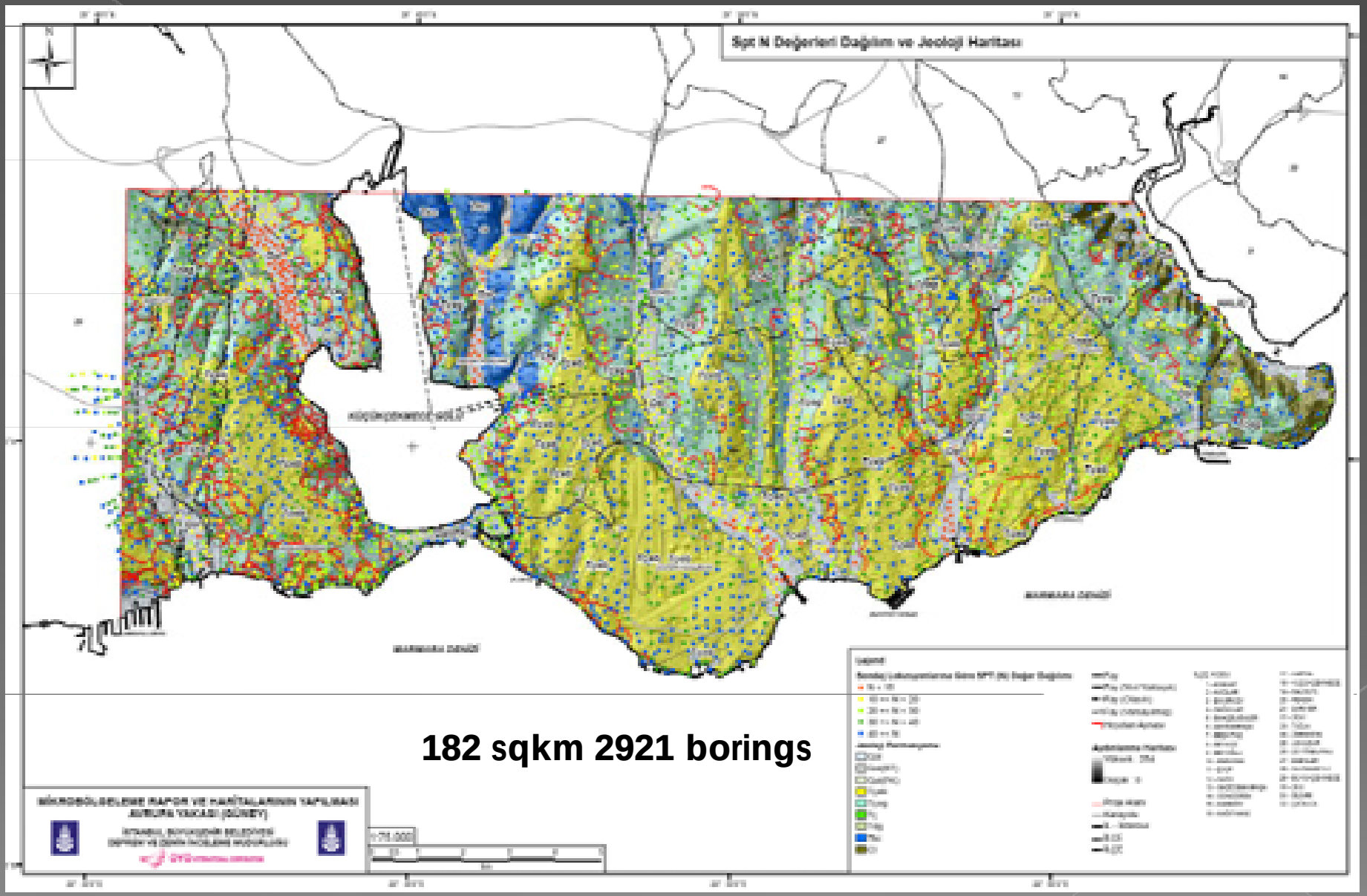
Spectral Accelerations on the Ground surface

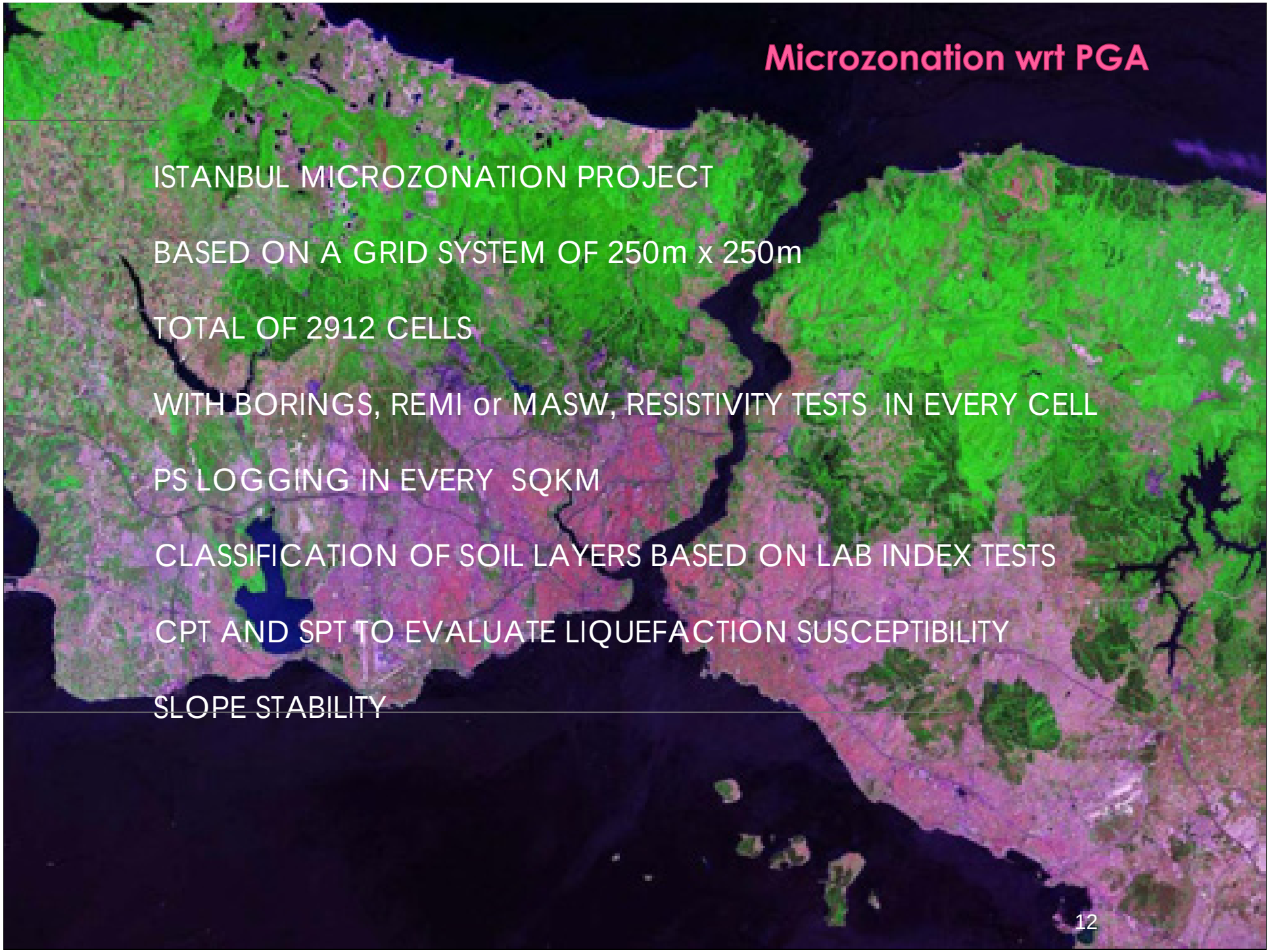


Distribution of Collapsed Mid-Rise, Post 1980, RC Frame Buildings



2006 Istanbul Microzonation Project- Variation of SPT blow counts





Microzonation wrt PGA

ISTANBUL MICROZONATION PROJECT

BASED ON A GRID SYSTEM OF 250m x 250m

TOTAL OF 2912 CELLS

WITH BORINGS, REMI or MASW, RESISTIVITY TESTS IN EVERY CELL

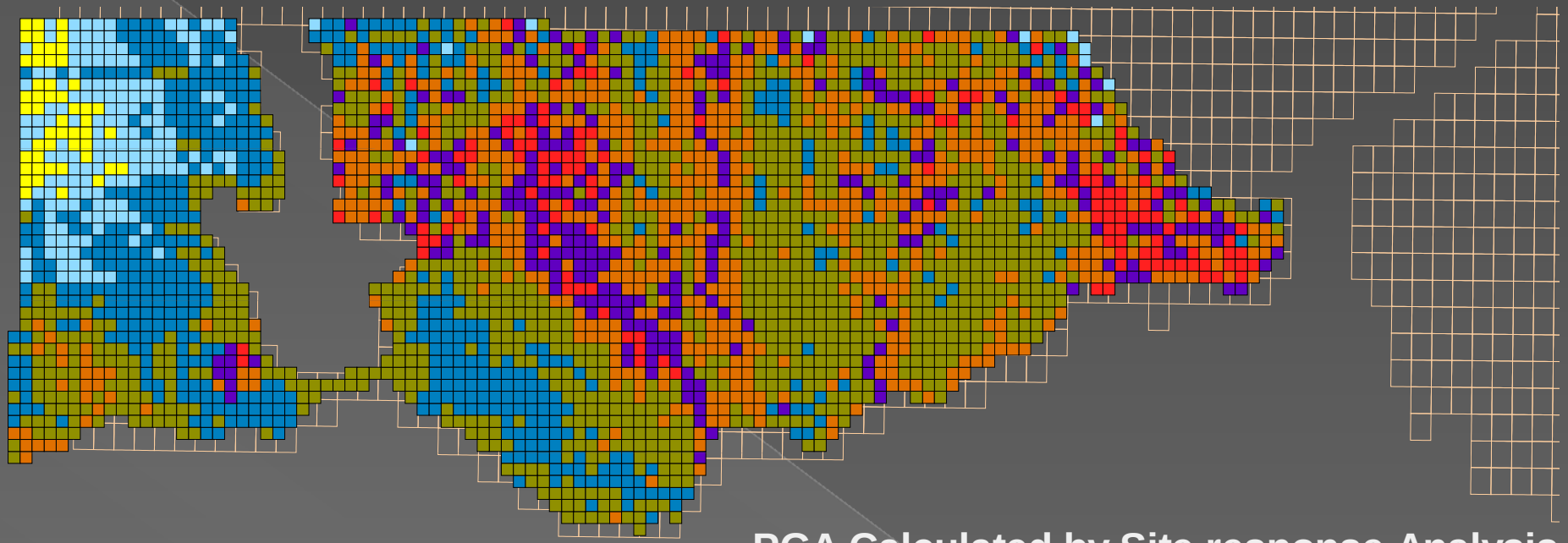
PS LOGGING IN EVERY SQKM

CLASSIFICATION OF SOIL LAYERS BASED ON LAB INDEX TESTS

CPT AND SPT TO EVALUATE LIQUEFACTION SUSCEPTIBILITY

SLOPE STABILITY

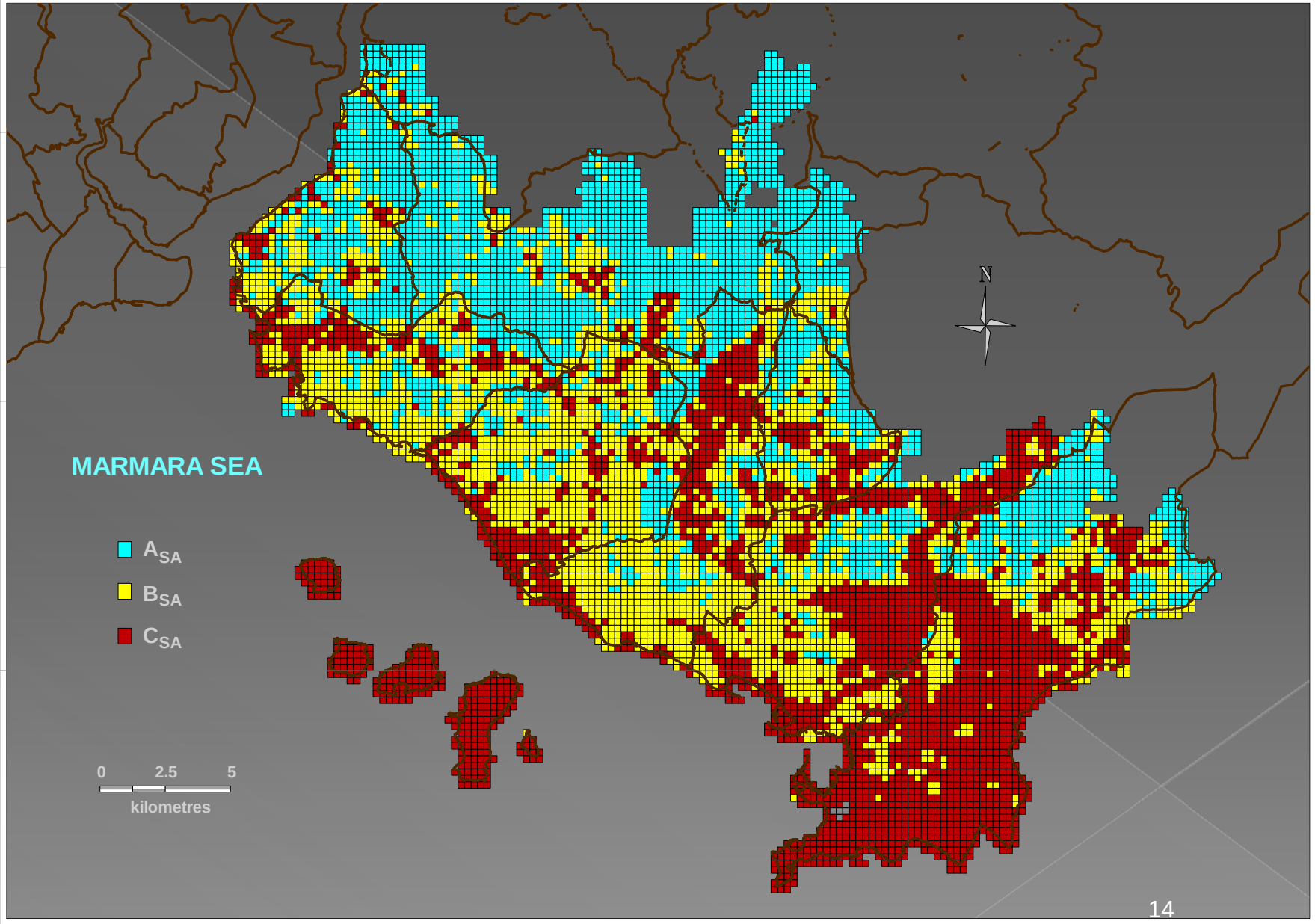
Microzonation wrt PGA



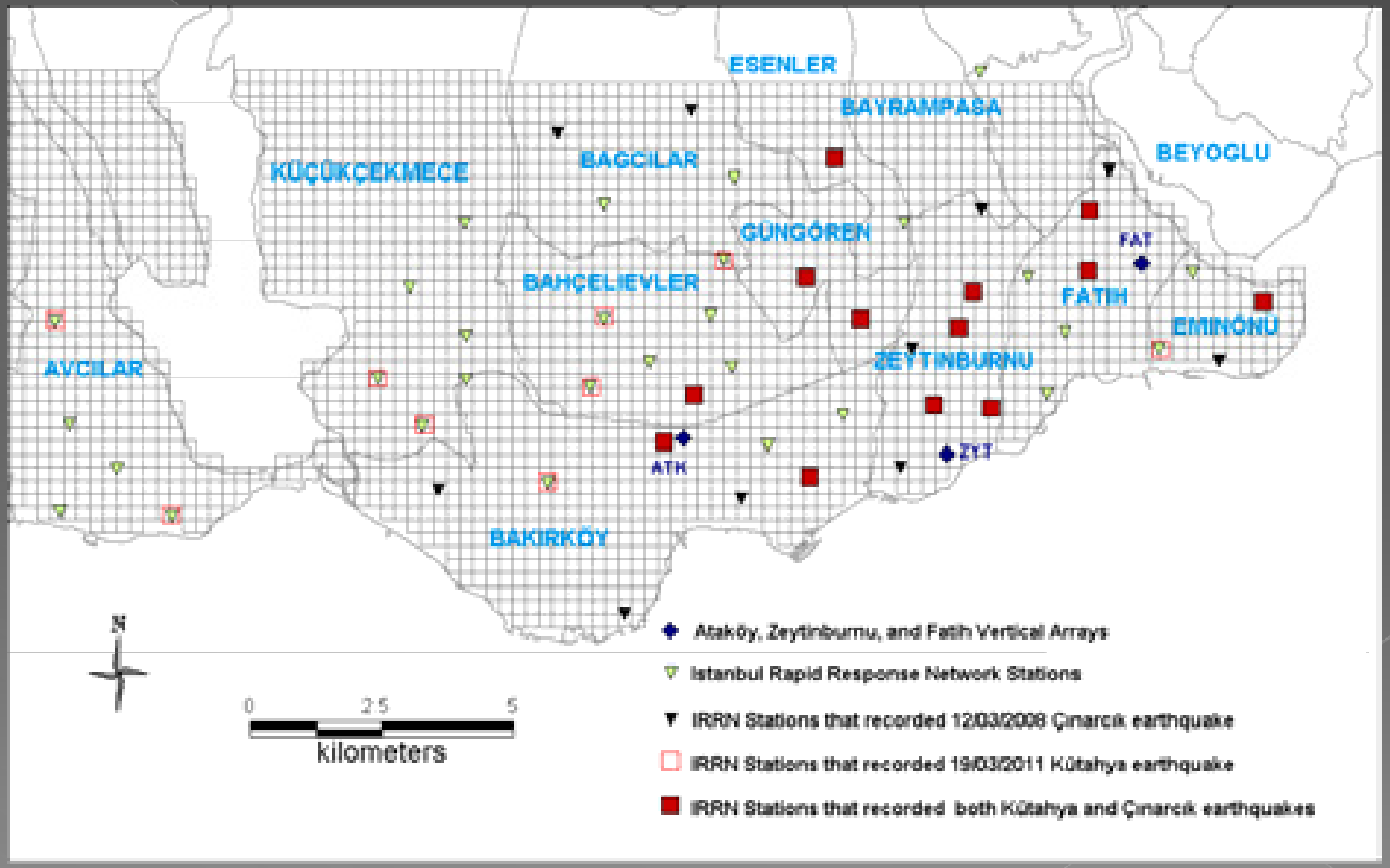
PGA Calculated by Site response Analysis

- 0.5g <= PGA < 0.6g
- PGA >0.8g
- 0.4g <= PGA < 0.5g
- 0.7g <= PGA < 0.8g
- 0.3g <= PGA < 0.4g
- 0.6g <= PGA < 0.7g
- PGA <0.3g

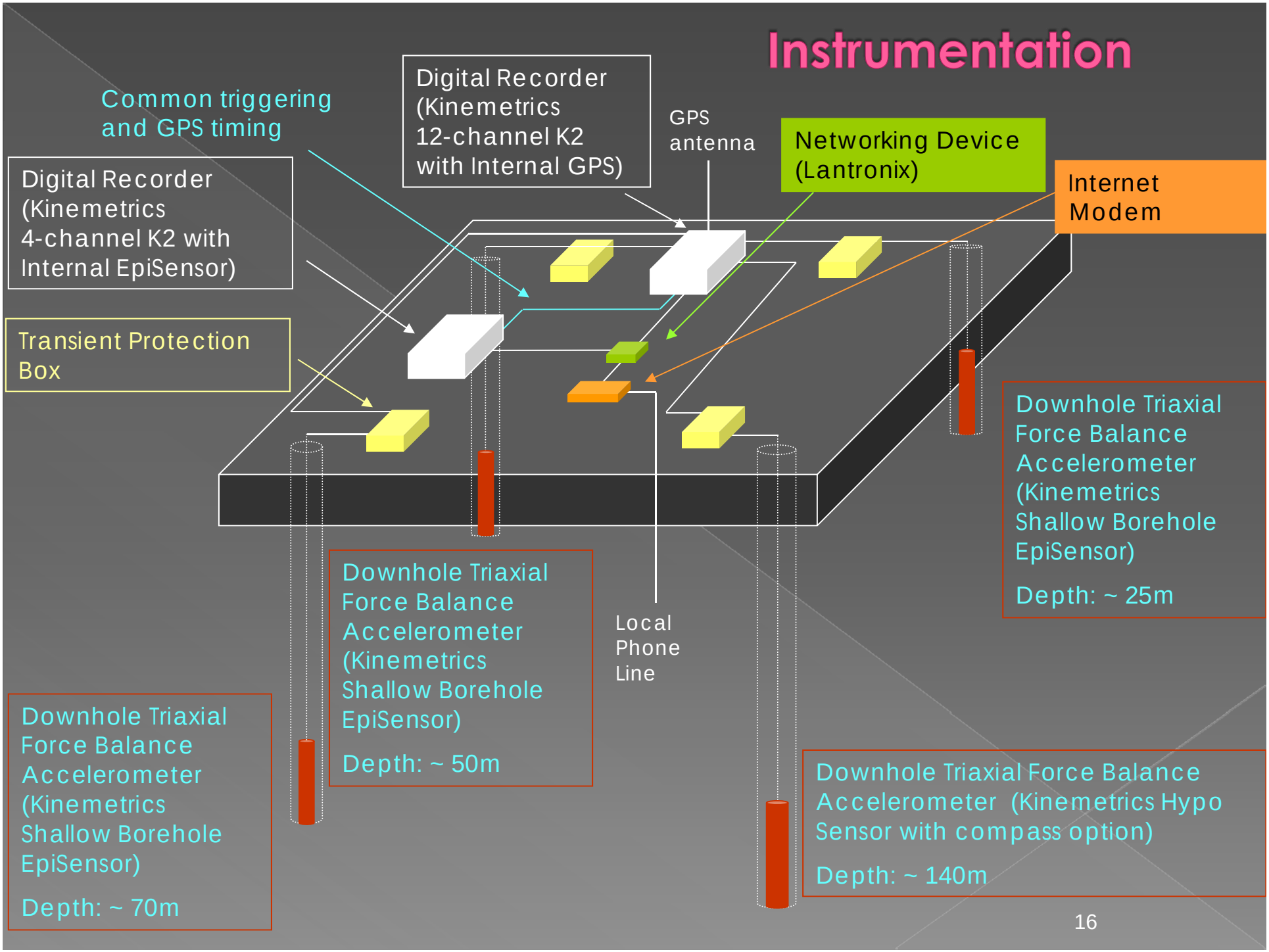
SA_{avg} on the ground surface on the Asian side



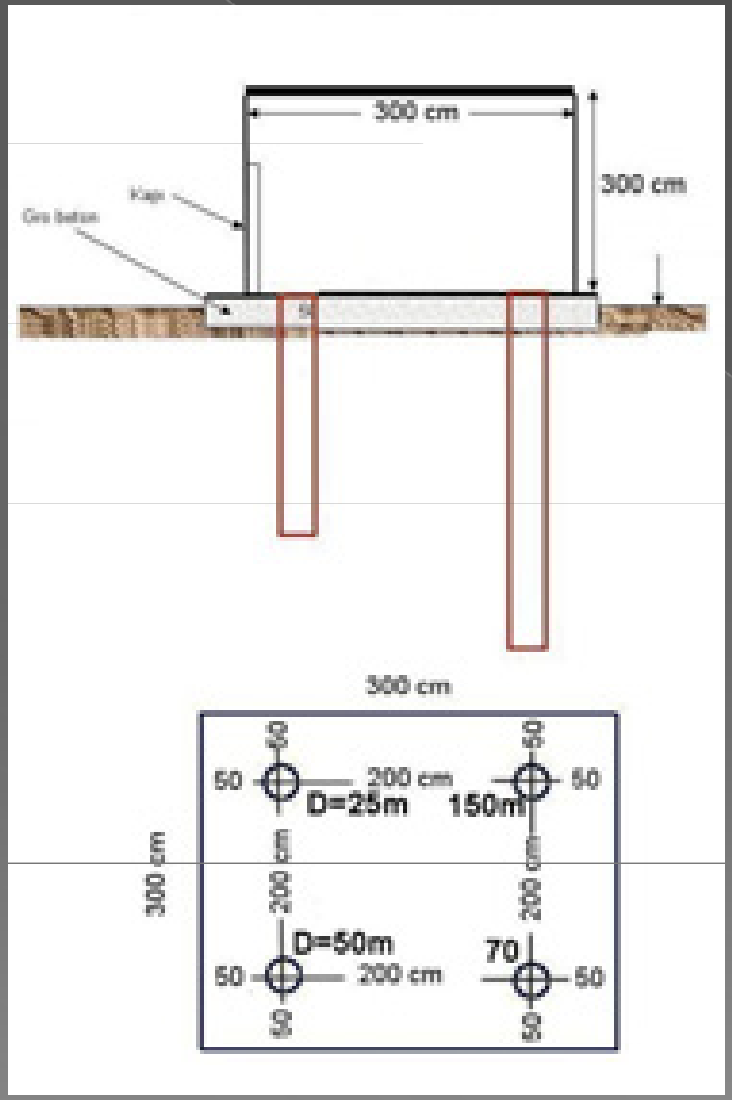
Istanbul Strong Motion Rapid Response Network

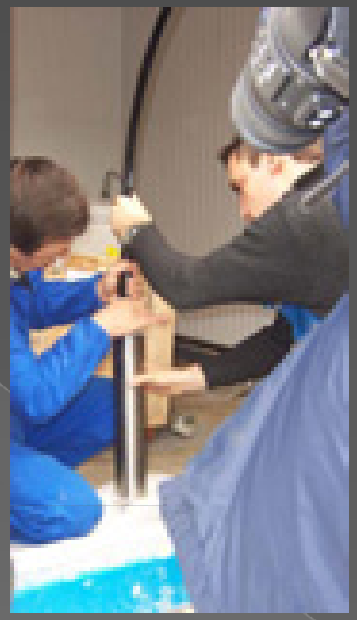


Instrumentation

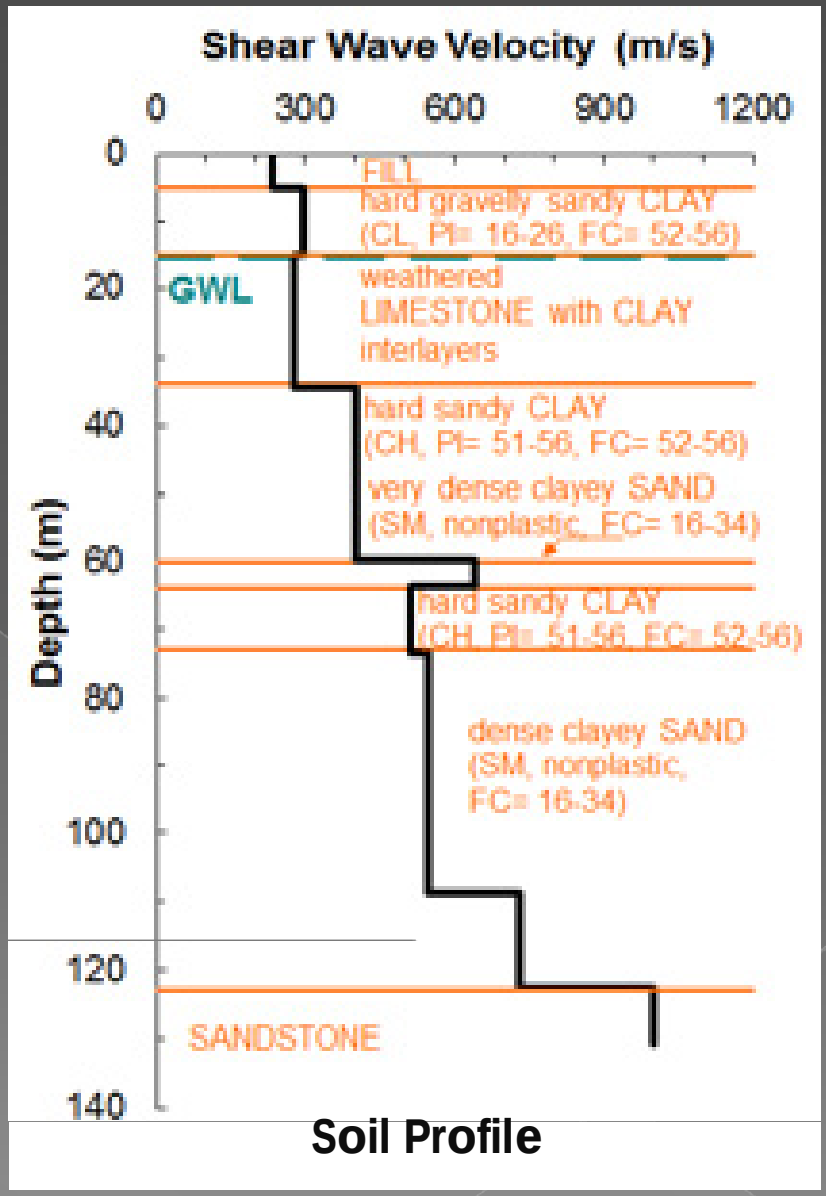


Installation of Ataköy vertical array



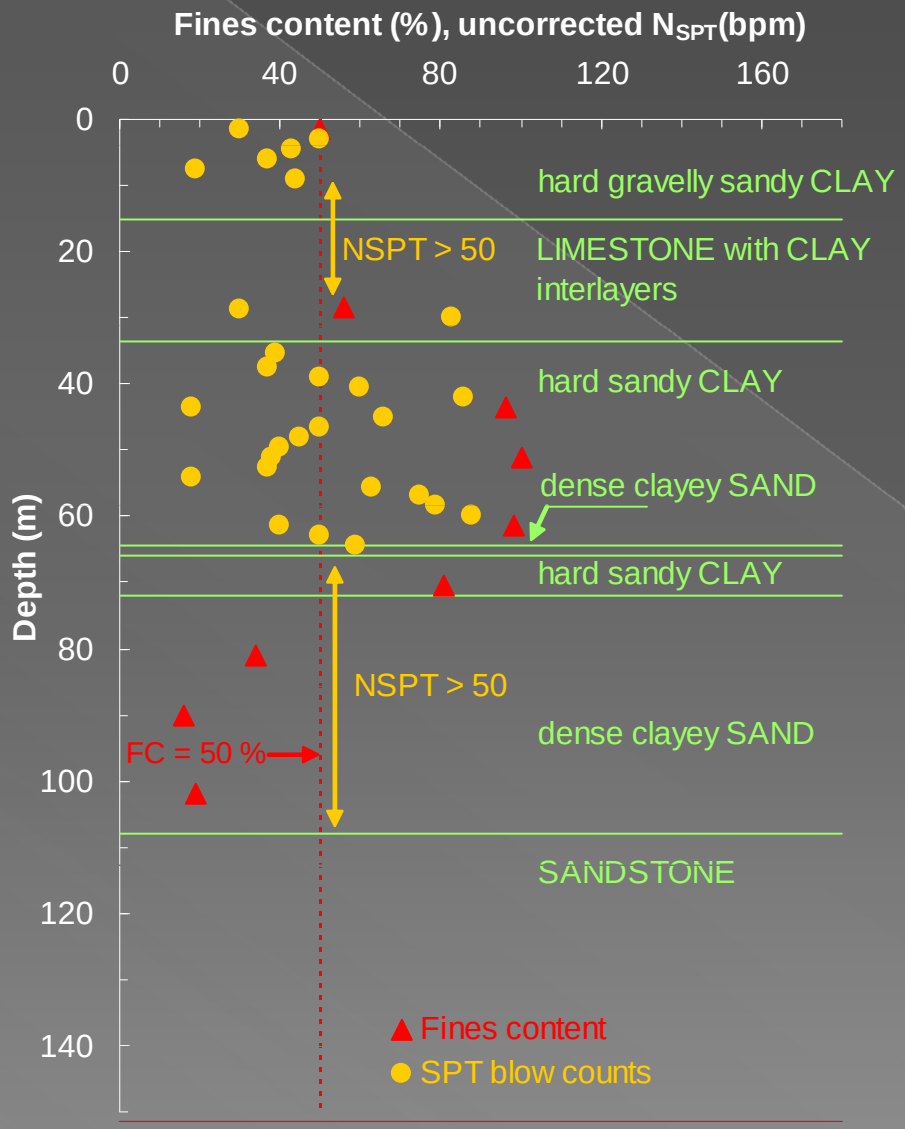


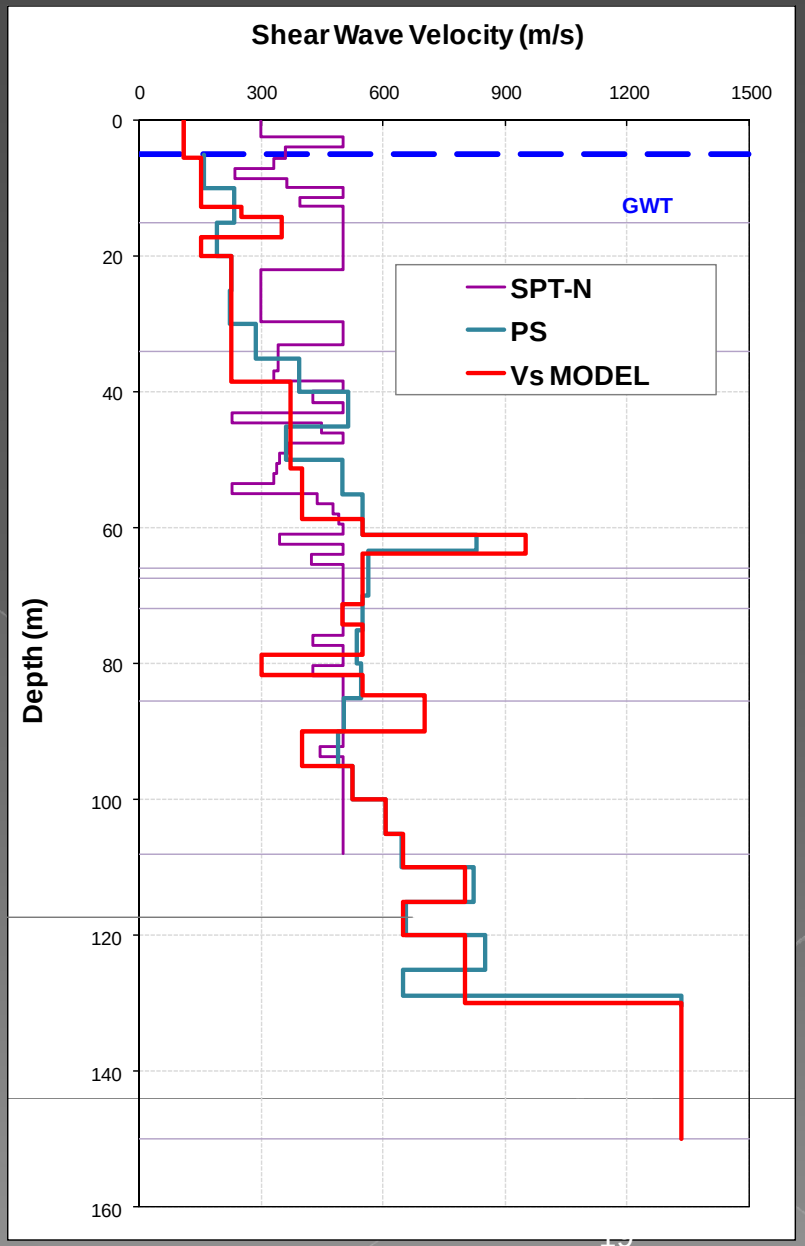
Ataköy Array (ATK)



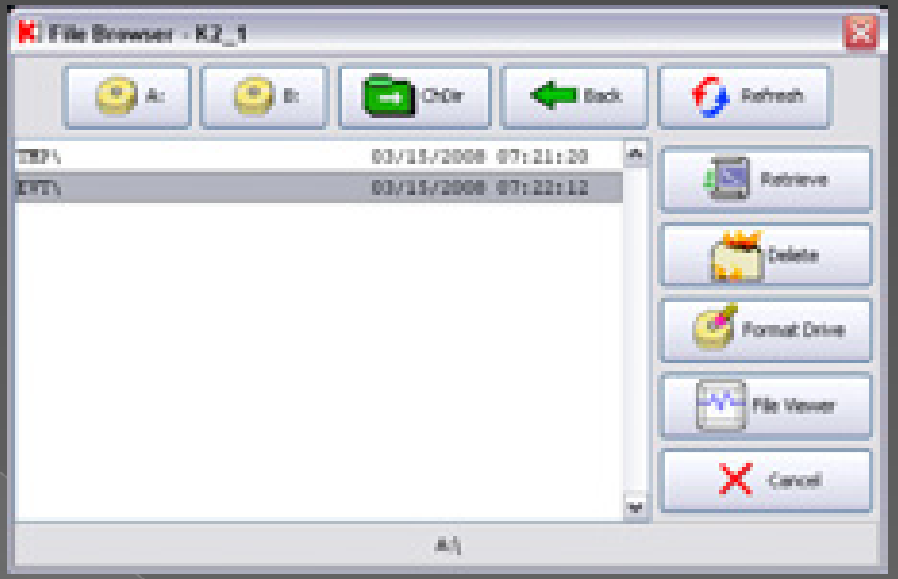
Soil Profile

Geotechnical site conditions



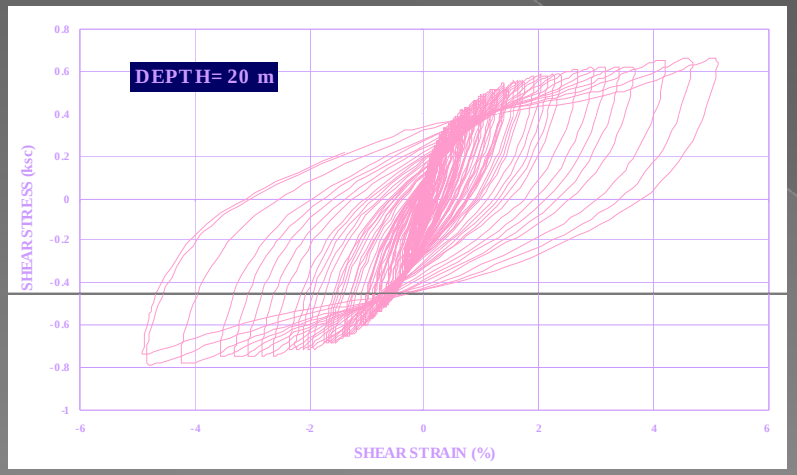


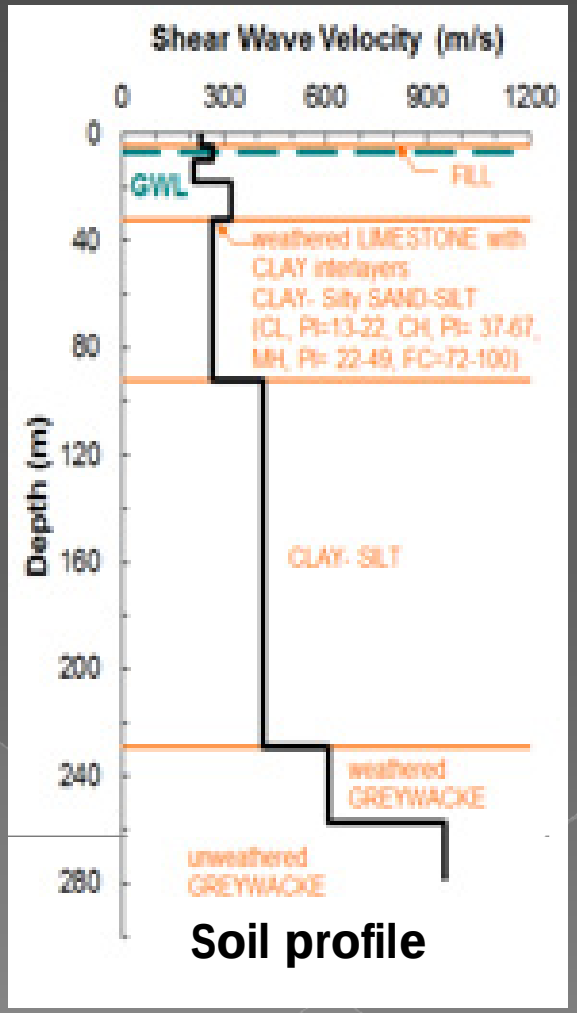
Data Acquisition



- Telephone line with ADSL connection
- Remote connection via TCP/IP and LAN is used retrieve recorded data
- Triggering thresholds are used for recording earthquake data

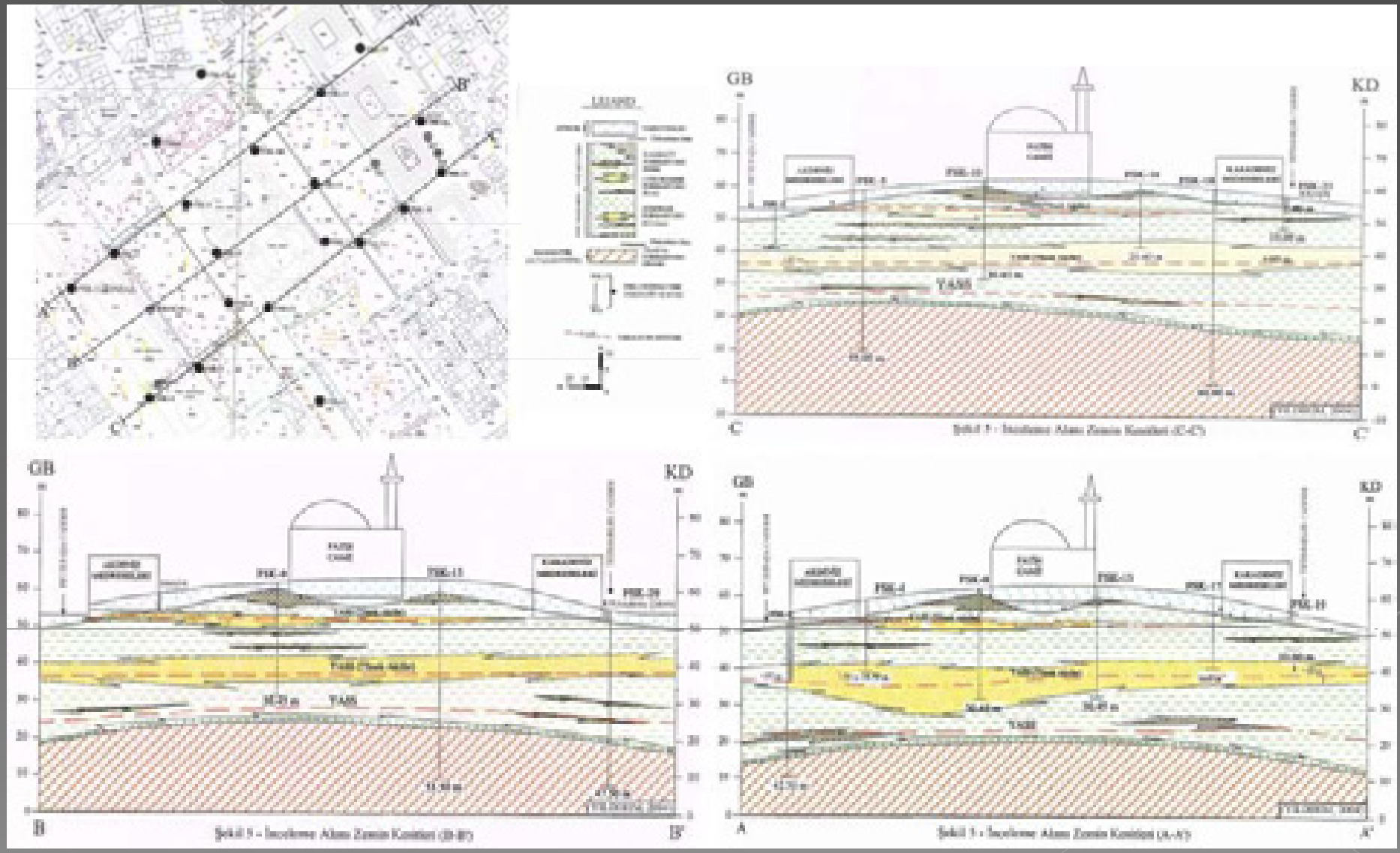
Zeytinburnu Array (ZYT)





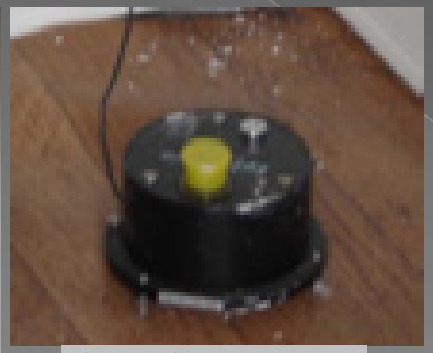
Soil profile

Fatih Vertical Array

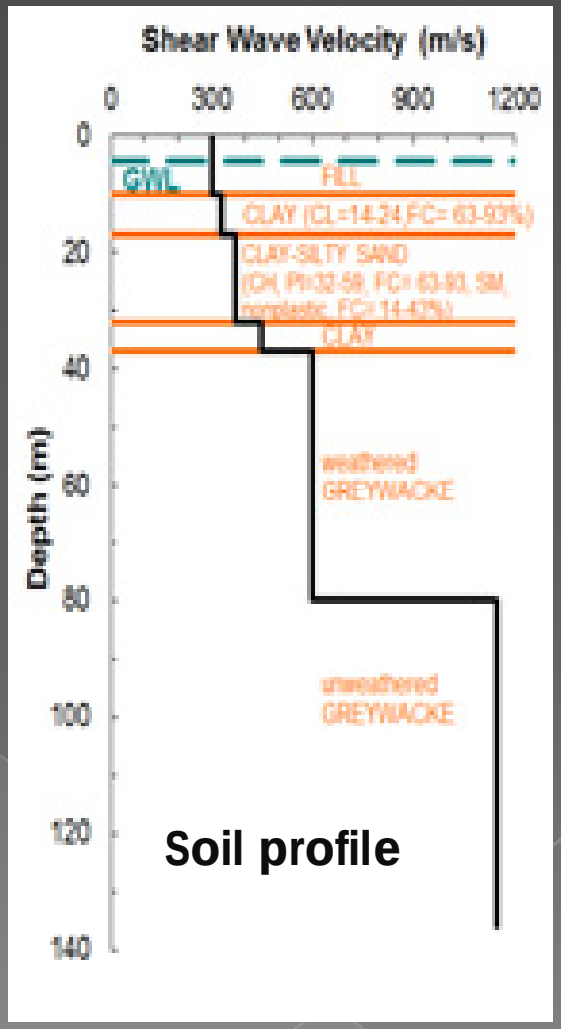


Fatih Array (FTH)

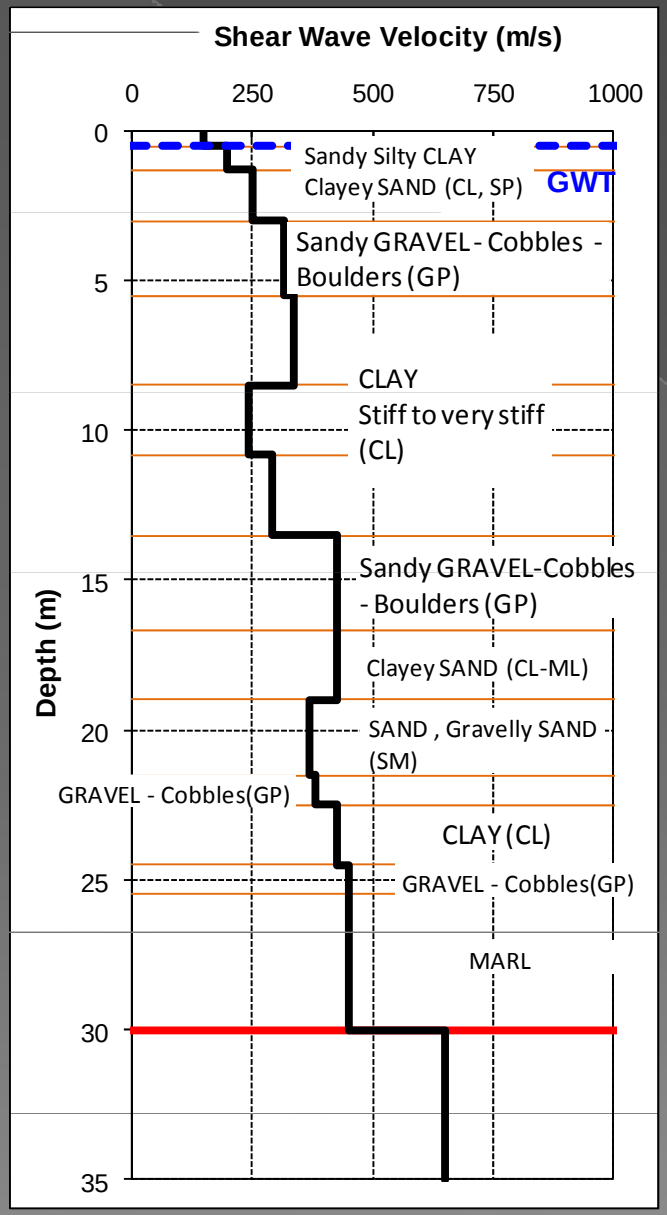
12-ch Kinemetrics Rock Digitizer

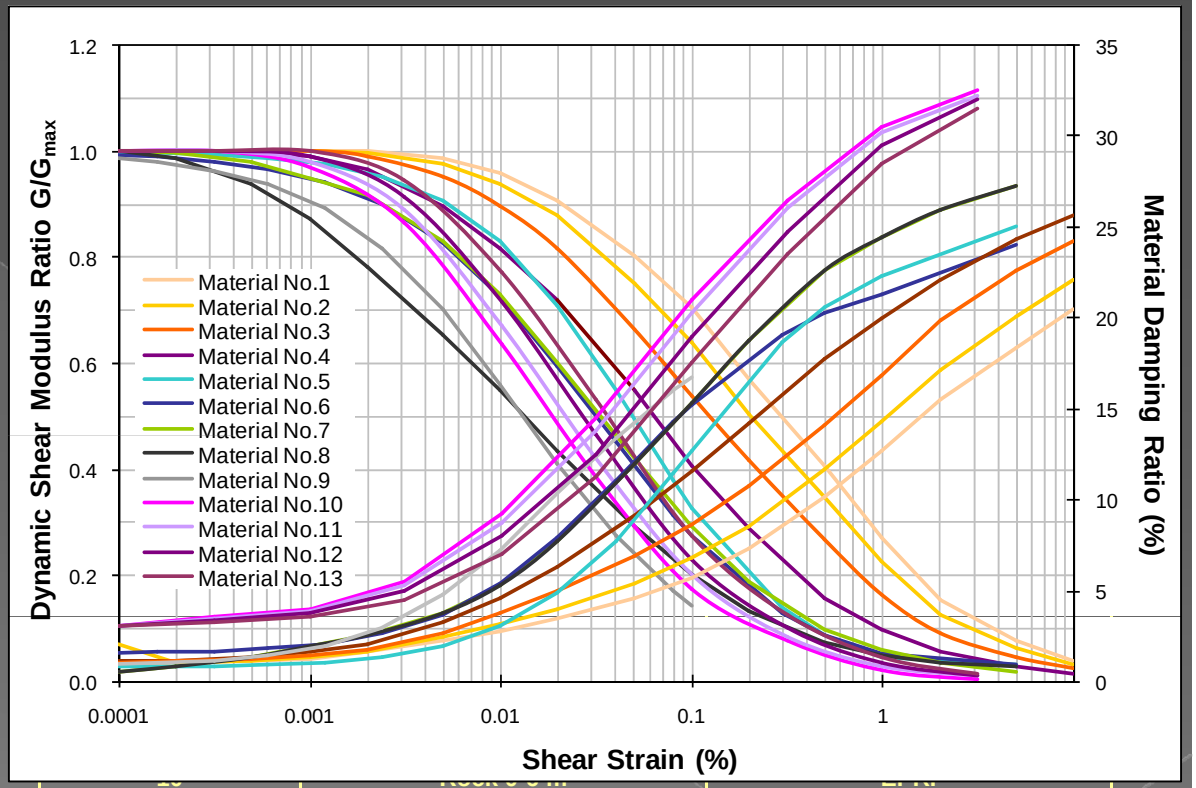


Kinemetrics ES-T



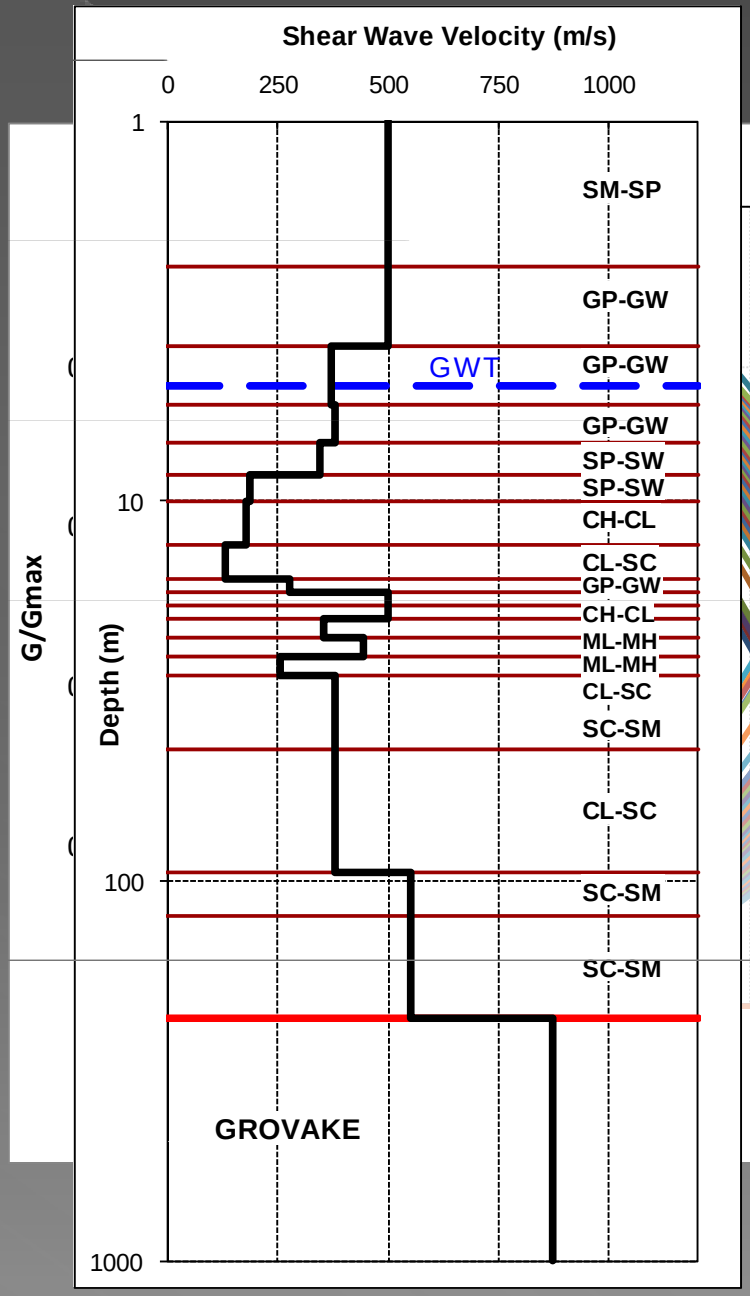
Modulus reduction and damping ratio (1)

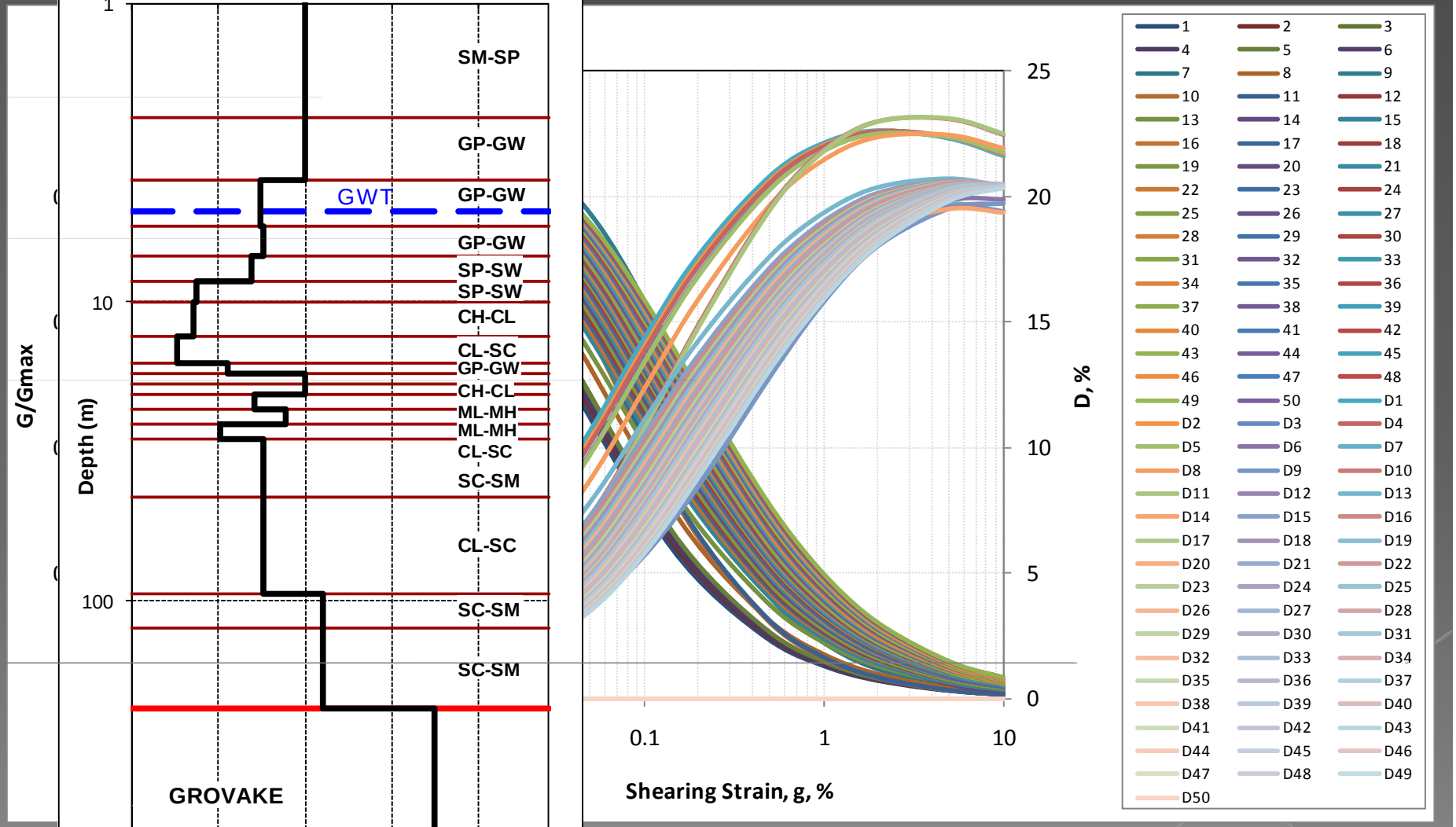




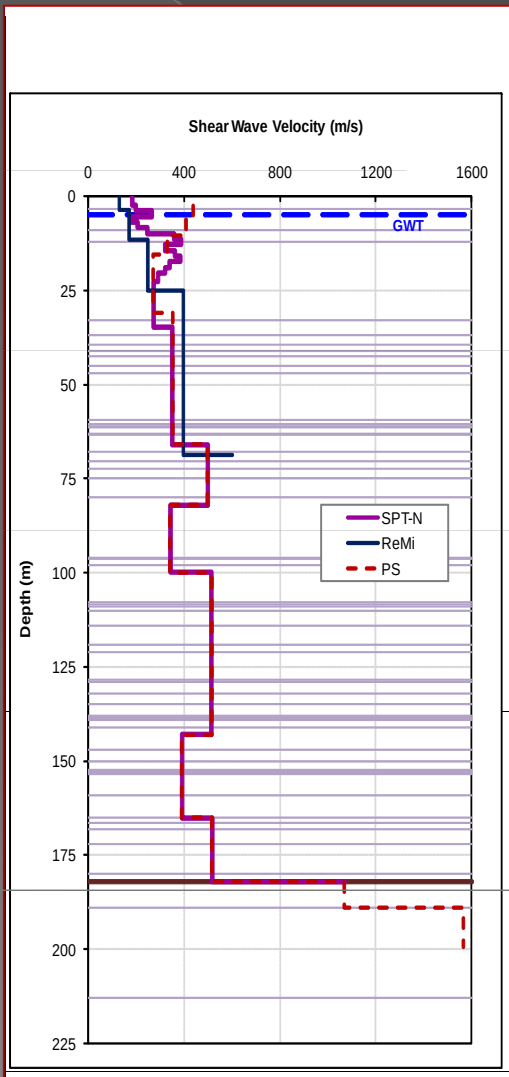
11	Rock 6-16 m	EPRI
12	Rock 16-37 m	EPRI
13	Rock 37-76 m	EPRI

Modulus reduction and damping ratio (2)

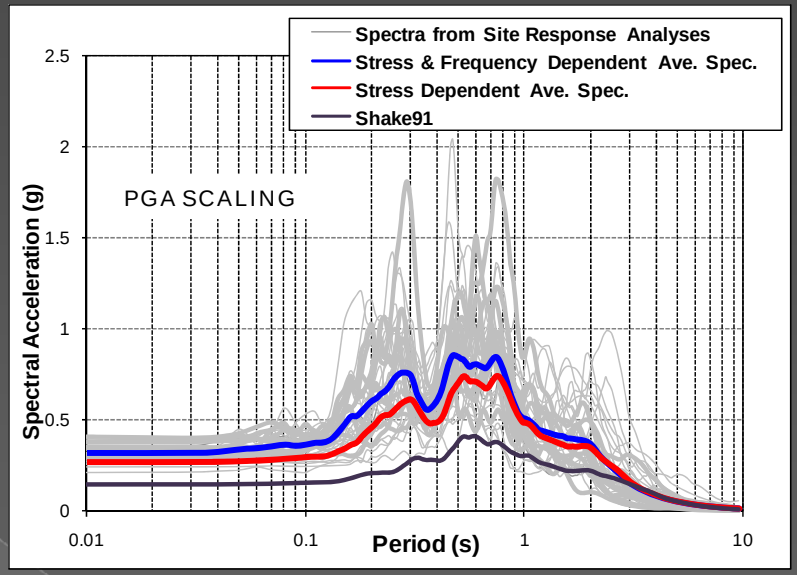


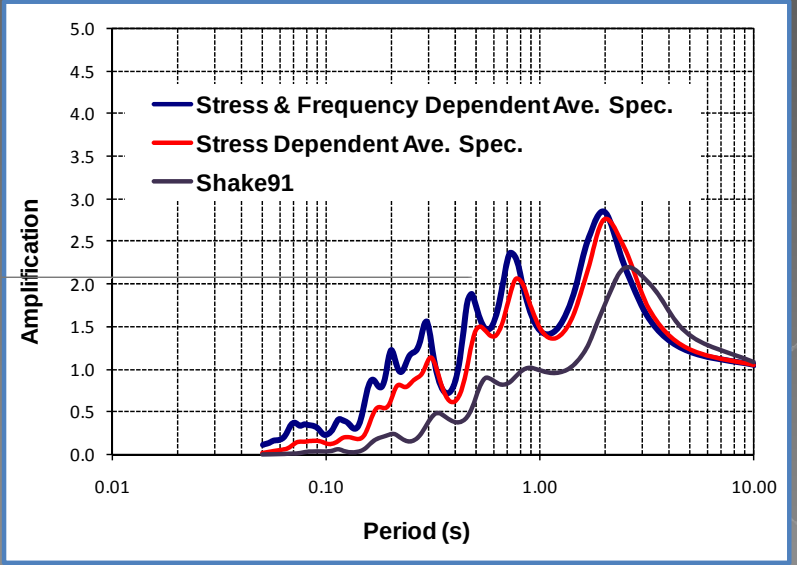


Modifications to SHAKE91 – Case 1

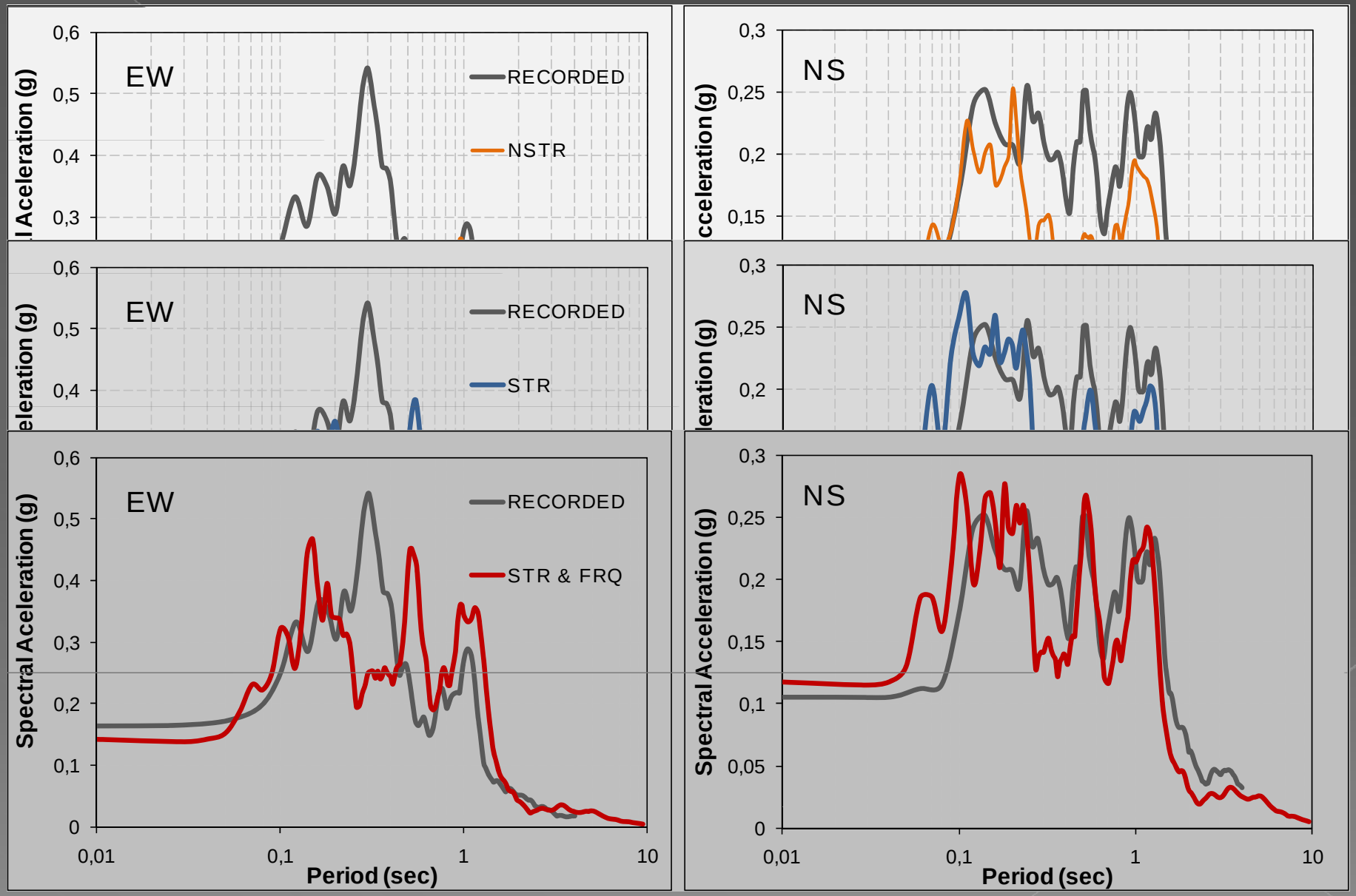


Formation	Top Depth of Layer (m)	Bottom Depth of Layer (m)	Lithology
Fill Material	0	3.5	Fill (GM-GC)
Alluvium	3.5	9	Clay (CH, CL)
Alluvium	9	12	Sand (ML)
Güngören	12	33	Clay (CH, CL)
Gürpınar	33	37	Claystone
Gürpınar	37	39.5	Sandstone
Gürpınar	39.5	41	Clay
Gürpınar	41	42.5	Claystone
Gürpınar	42.5	45	Sand
Gürpınar	45	47	Clay
Gürpınar	47	59.5	Claystone
Gürpınar	59.5	60.5	Sandstone
Gürpınar	60.5	61	Siltstone
Gürpınar	61	61.5	Sandstone
Gürpınar	61.5	63	Sand
Gürpınar	63	63.5	Claystone
Gürpınar	63.5	68	Sand
Gürpınar	68	70.5	Claystone
Gürpınar	70.5	72.5	Sand
Gürpınar	72.5	75	Siltstone
Gürpınar	75	80	Claystone
Gürpınar	80	96	Sand
Gürpınar	96	96.4	Claystone
Gürpınar	96.4	98	Sandstone
Gürpınar	98	108	Claystone
Gürpınar	108	108.5	Sandstone
Gürpınar	108.5	109	Claystone
Gürpınar	109	110	Sandstone
Gürpınar	110	114	Siltstone
Gürpınar	114	119	Sandstone
Gürpınar	119	121	Claystone
Gürpınar	121	128.5	Sand
Gürpınar	128.5	129	Claystone
Gürpınar	129	132	Sand
Gürpınar	132	135	Claystone
Gürpınar	135	138	Sandstone
Gürpınar	138	138.5	Siltstone
Gürpınar	138.5	139	Claystone
Gürpınar	139	141	Sandstone
Gürpınar	141	147	Sand
Gürpınar	147	150	Gravel
Gürpınar	150	152.5	Sand
Gürpınar	152.5	153	Siltstone
Gürpınar	153	153.5	Gravel
Gürpınar	153.5	159	Siltstone
Gürpınar	159	165	Sand
Gürpınar	165	166.5	Gravel
Gürpınar	166.5	168	Sandstone
Gürpınar	168	172	Sand
Gürpınar	172	180	Sand
Gürpınar	180	189	Sandstone
Trakya	189	213	Graywacke





Ataköy 17.8.1999

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