

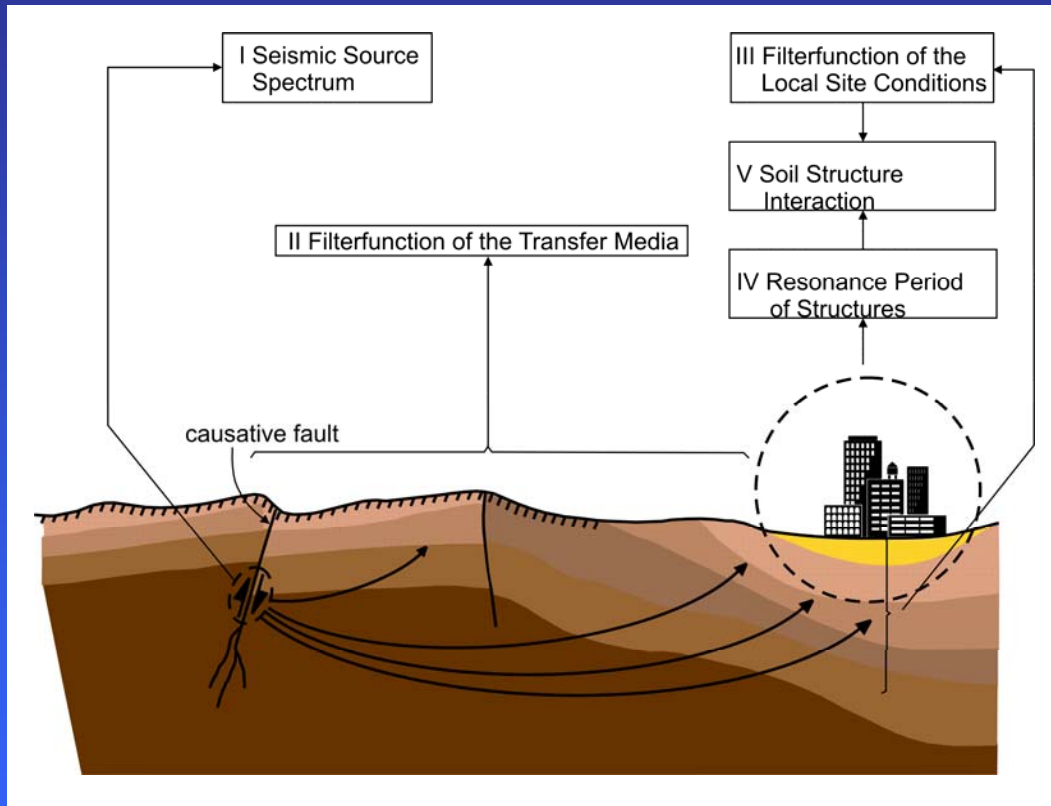


Site effects in Istanbul

Sandra M. Richwalski (CEDIM)
Stefano Parolai & Jochen Zschau (GFZ)
Eser Durukal, Oğuz Özel, Gülüm Birgören,
Atilla Ansal & Mustafa Erdik (BOUN/KOERI)



More than site effects



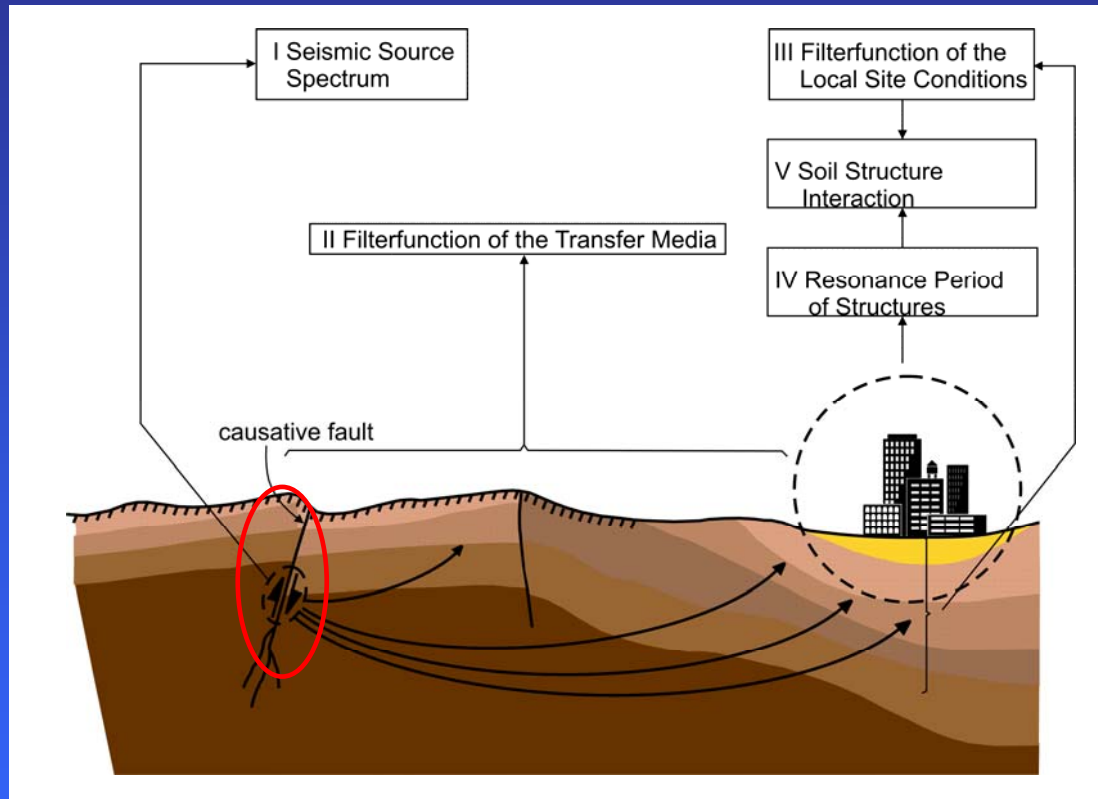
1. Source Parameters*
2. Propagation*
3. Site effects
4. Modelling**

*Cooperation with Dino Bindi, INGV

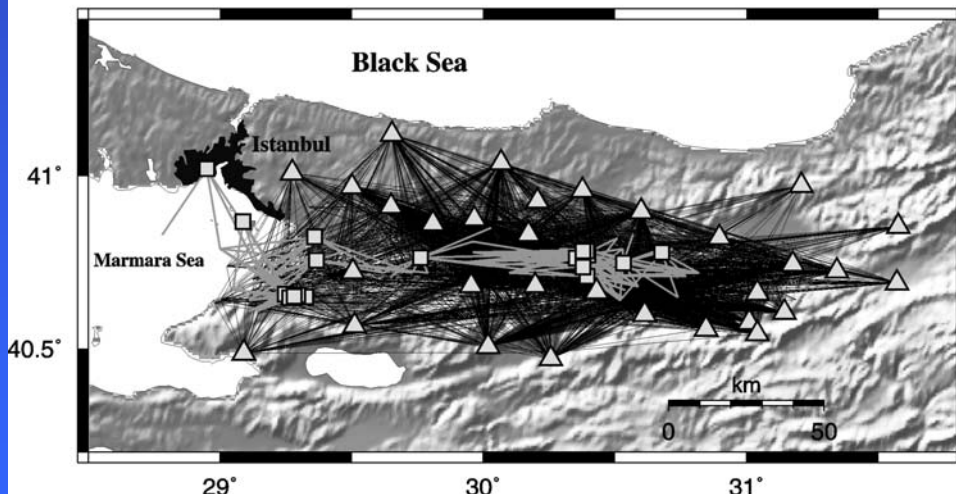
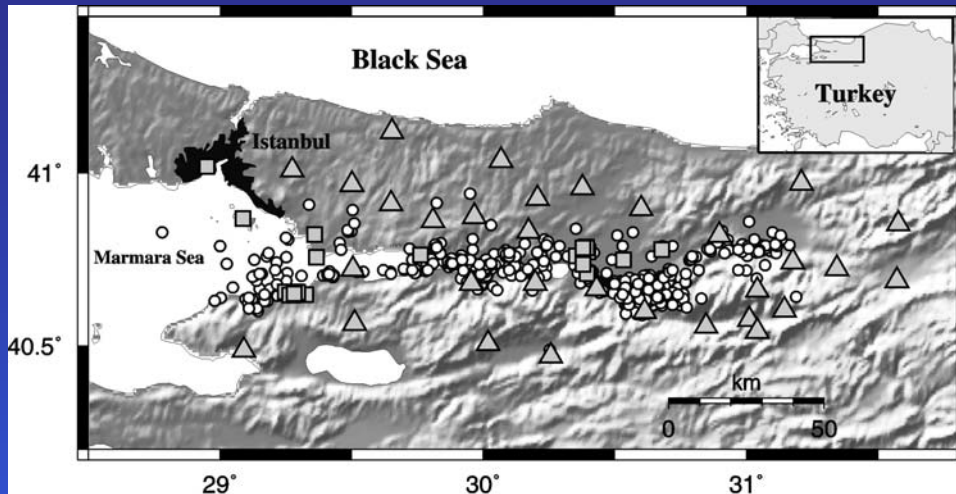
**Cooperation with GPI, Karlsruhe



Source studies



Source studies



Reliable magnitude estimates
necessary for hazard assessment:
-Saturation problem
-Weak versus strong motion data

▲ GFZ velocimetric stations

■ KOERI accelerometric stations

528 events

54 stations

hypocentral distance: 10 to 190 km

Source studies

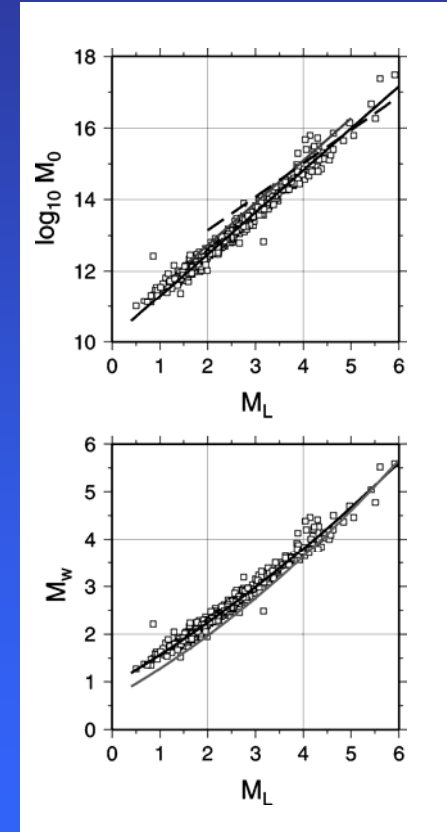
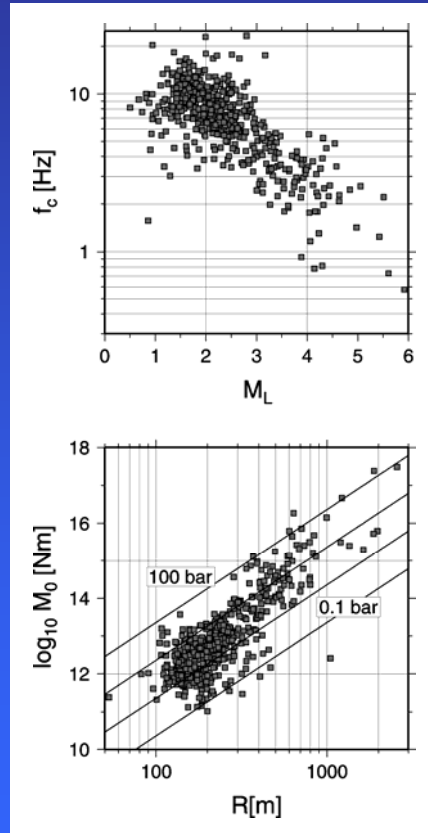
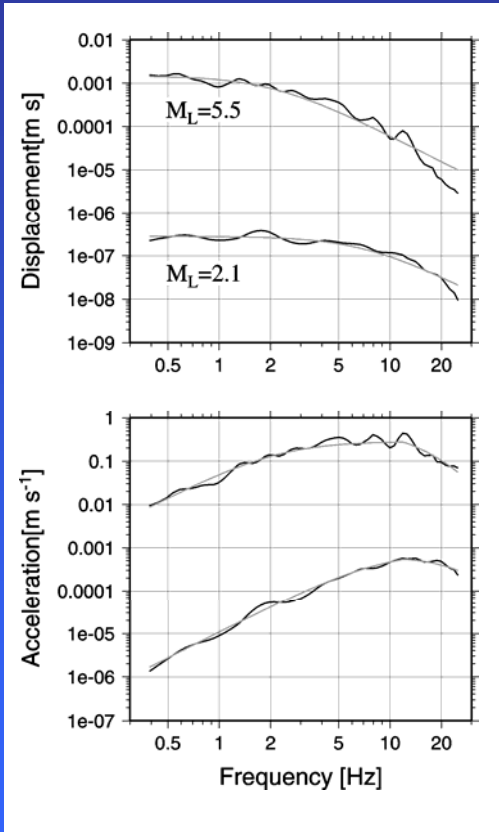
Spectral fitting



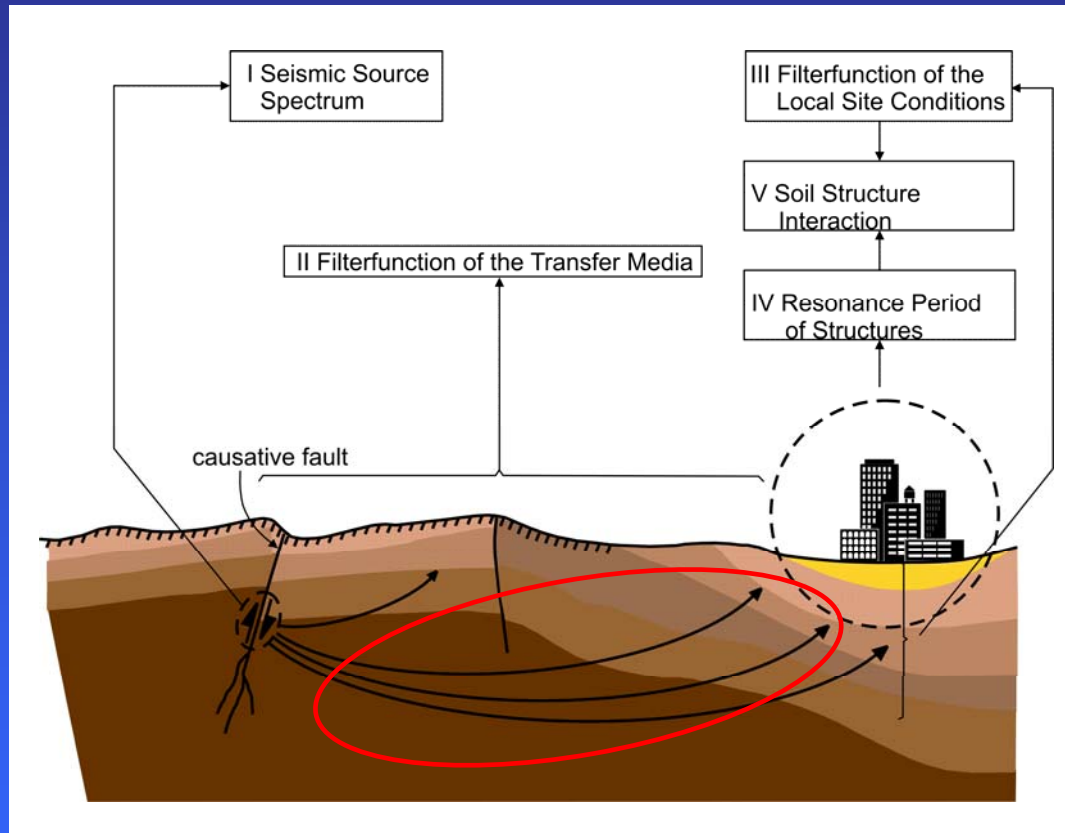
Source parameter relationships



M_w-M_L relationship



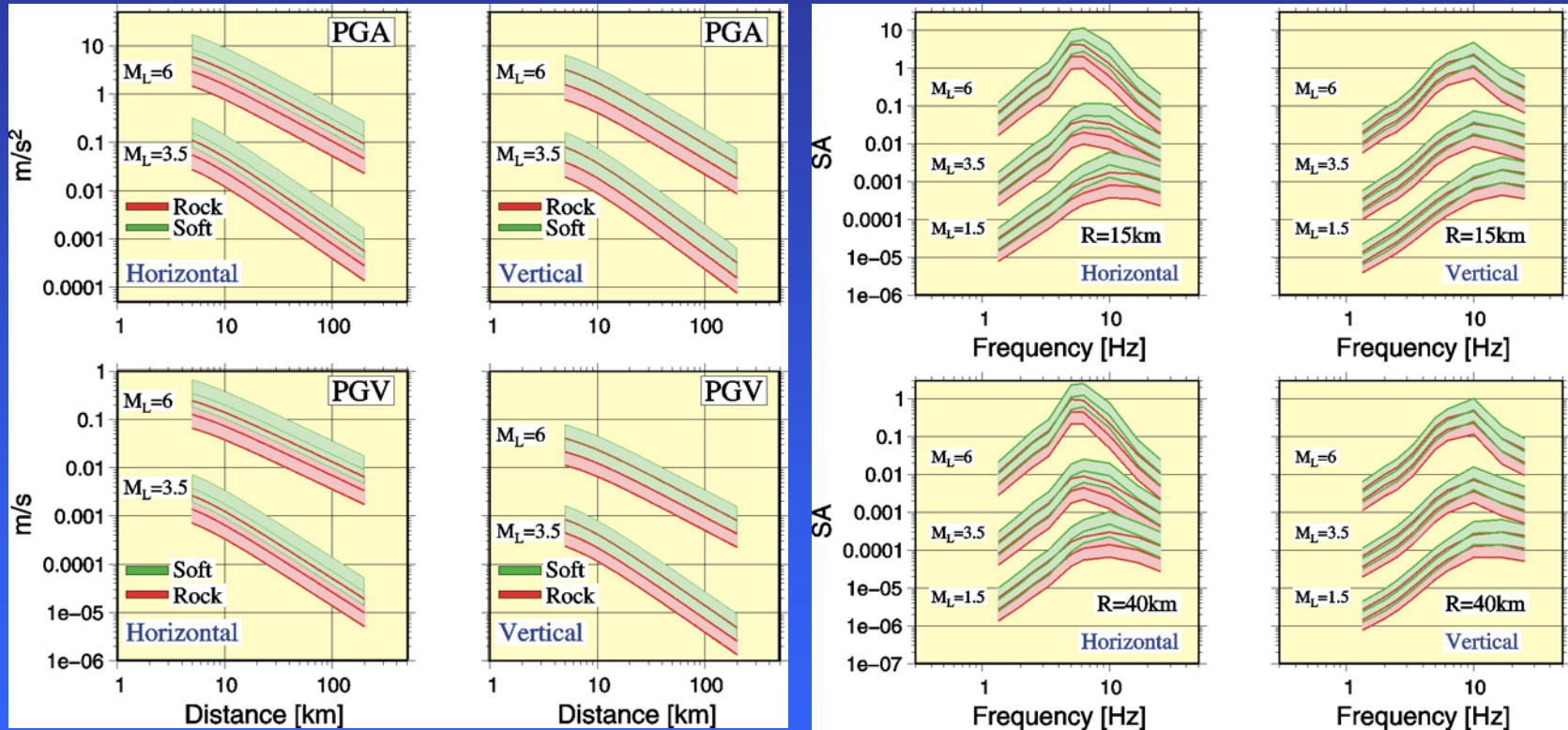
Propagation studies



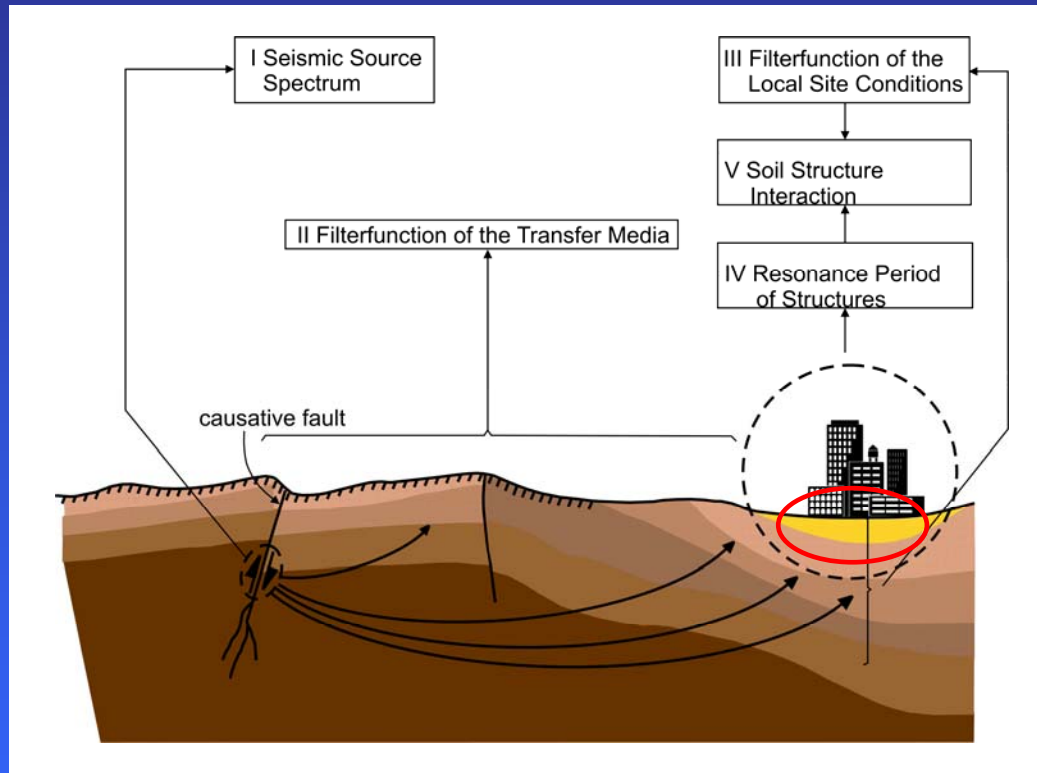
Propagation studies

Peak ground acceleration
and peak ground velocity

Spectral Acceleration

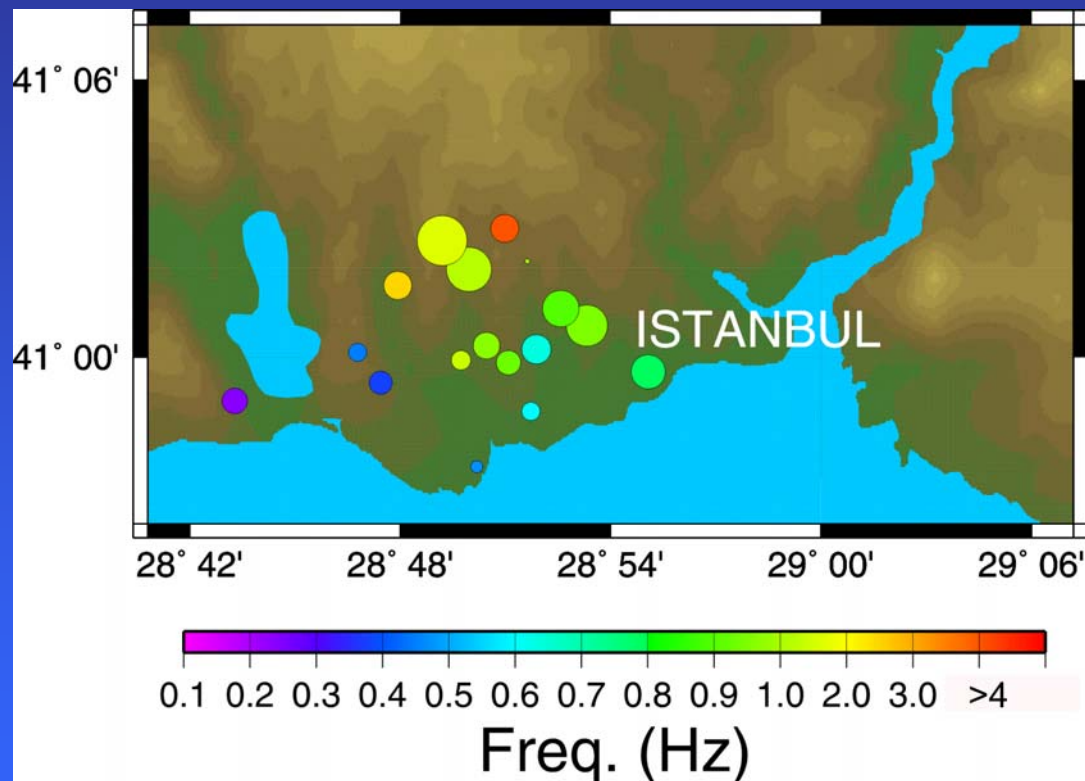


Site effect studies

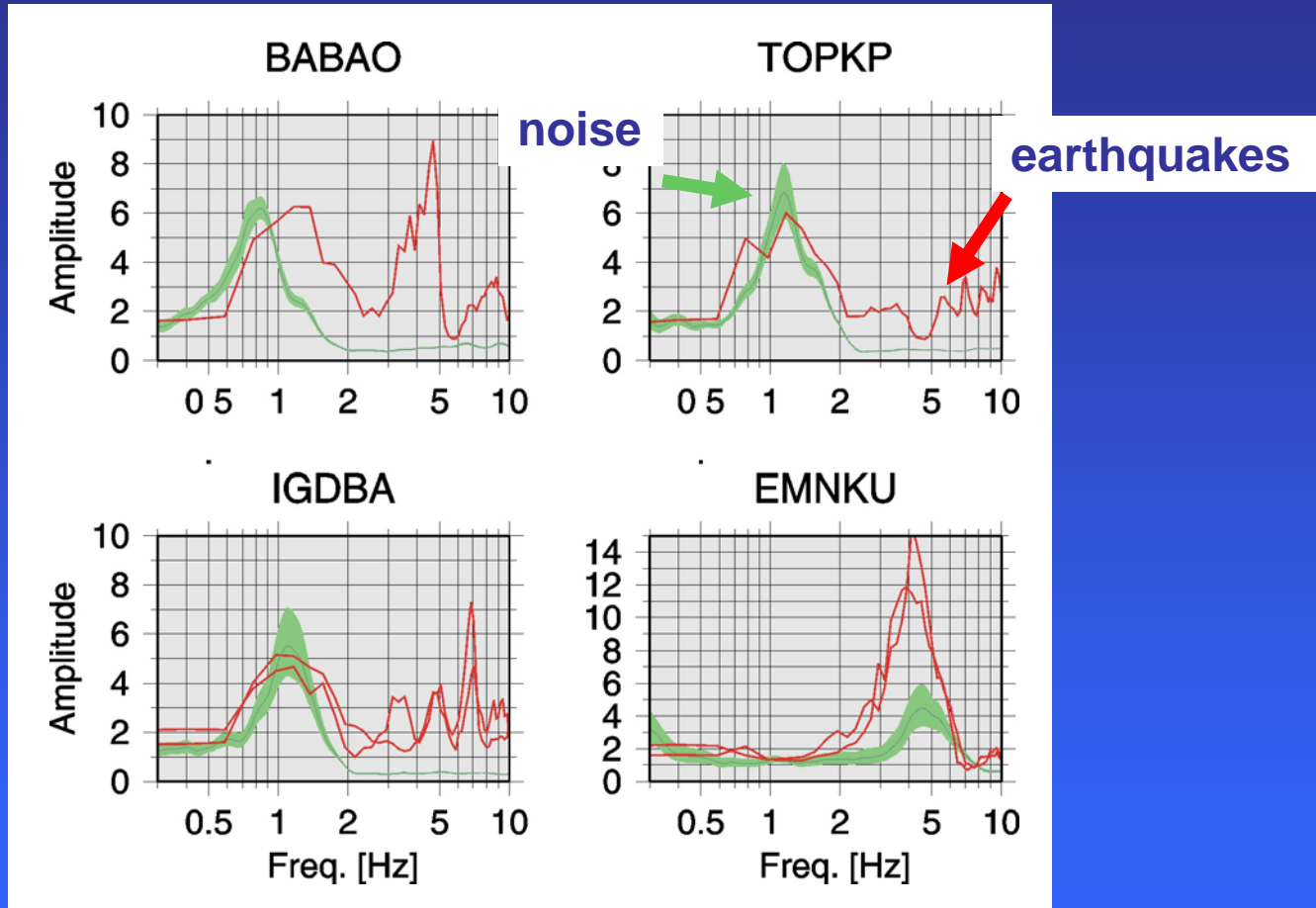


Site effect studies

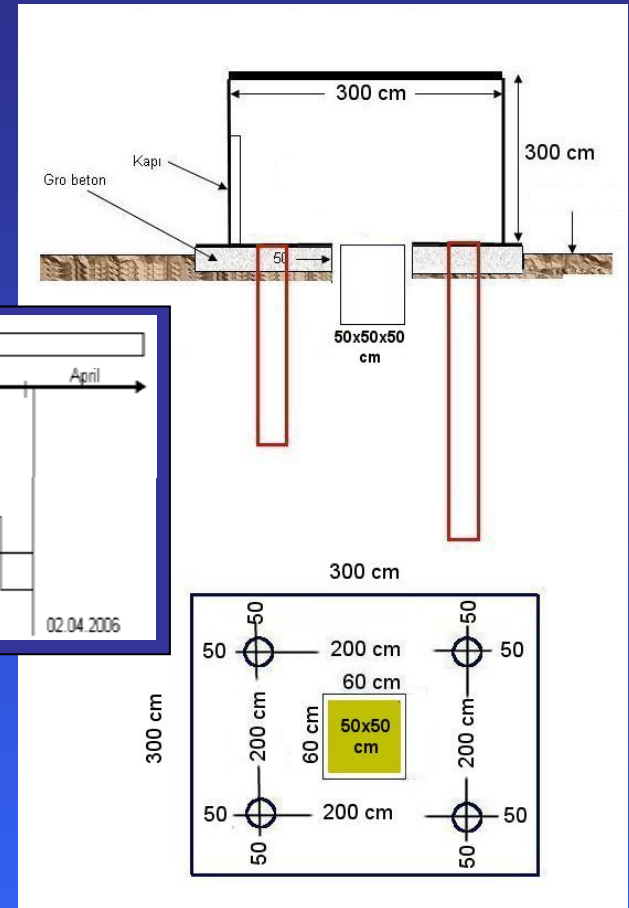
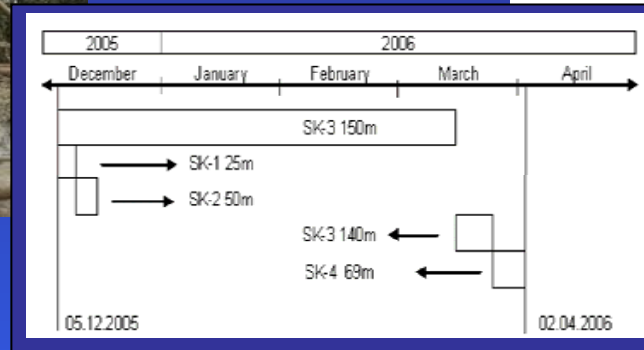
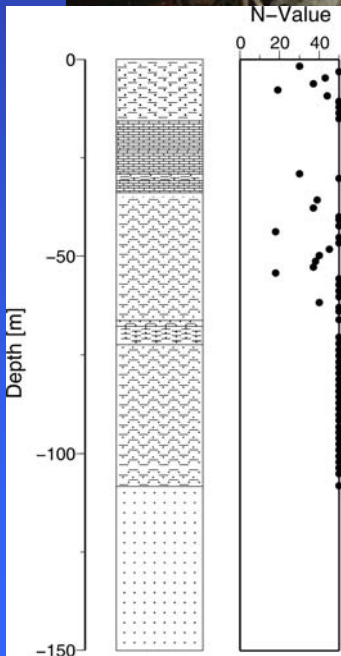
Estimation of the resonance frequency at the Istanbul Earthquake Rapid Response System (IERRS)



Megacity Istanbul: site effects

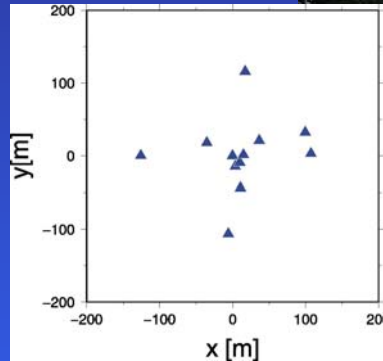


Vertical Array in Ataköy

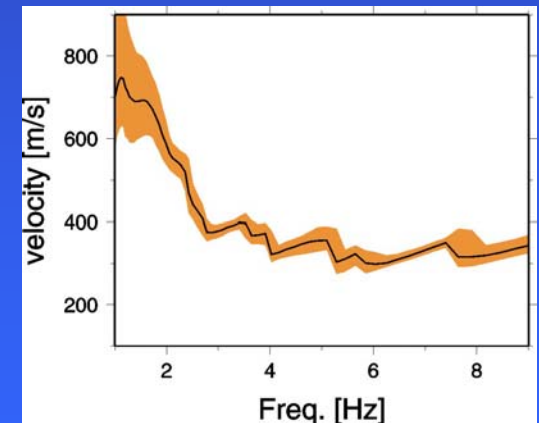


1. Comparison of actual and theoretical site response
2. Studying non-linearity

Micro-array measurements



Estimation of S-wave velocity using micro-array recordings of seismic noise



Benchmark testing of different modelling software

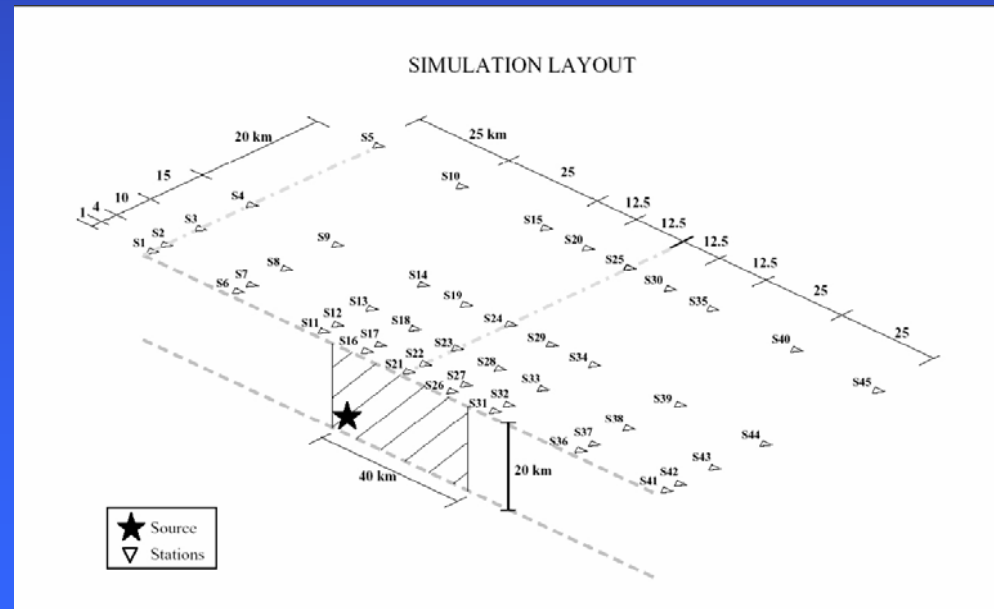
Aim: Investigation of the variability of ground motion using synthetic data

Problem: Variability may also be artificially created by using different modelling software!

Variability is caused by:

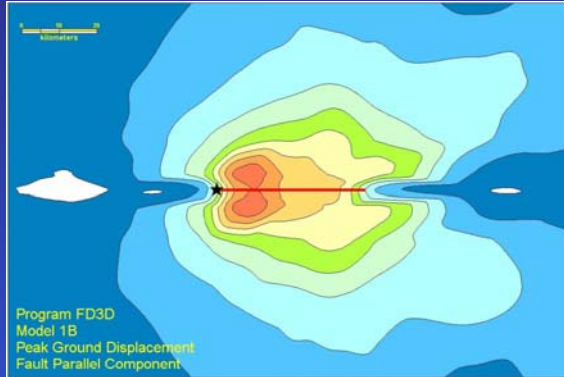
- Assumptions
- Parametrisation
- Quality of software
- Handling

Simple benchmark test

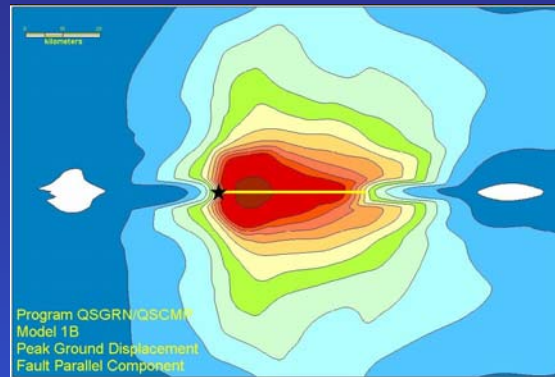


Peak Ground Displacement computed by 4 different programmes

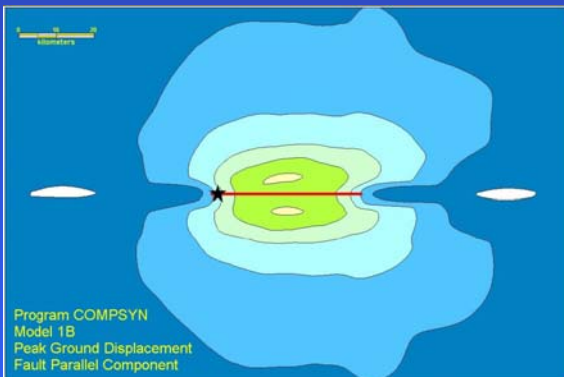
Madariaga & Frisenda, 3D



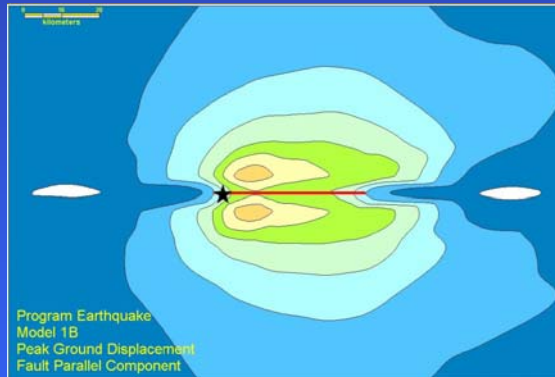
Wang, 1D



Peak Ground Displacement



Spudich & Xu, 1D



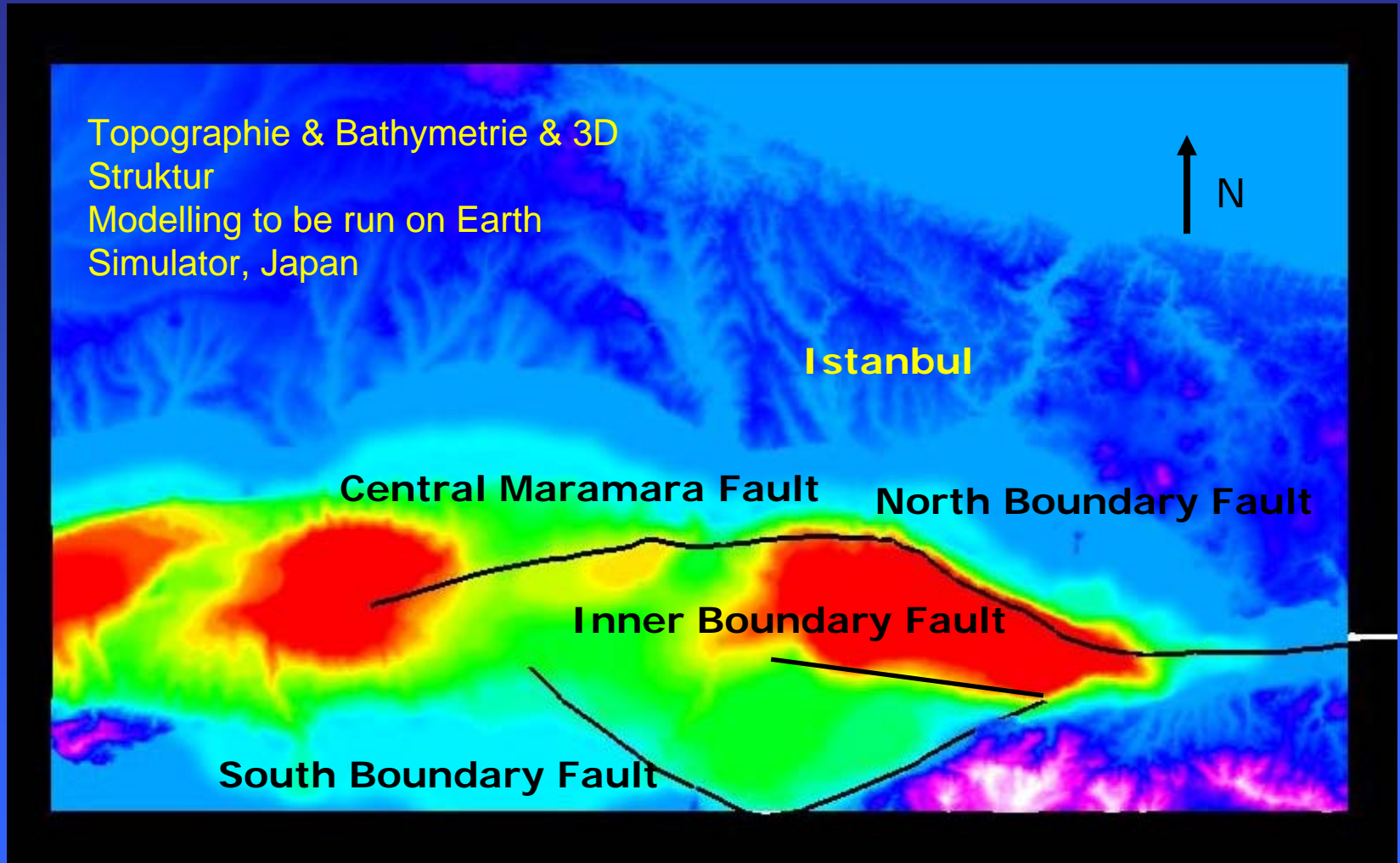
Bouchon, 1D

Obvious differences, causes are presently investigated for.



3D-FD modelling

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BOUN



KOERI



GFZ
POTSDAM