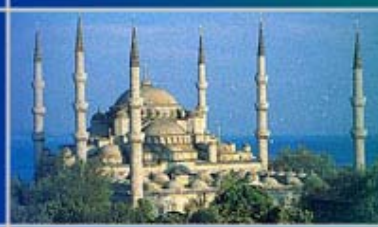




Sixth Annual IIASA-DPRI Forum
Integrated Disaster Risk Management

*Risk and Challenges
for Business and Industry*



ISTANBUL
METROPOLITAN
MUNICIPALITY



THE WORLD BANK

REPORT ON

**SESSION 1: Collaborative CEDIM – KOERI – IMM Research
Project on Disaster Risk in Megacity Istanbul**

by

GOKCE TONUUK

PARALLEL SESSION
Monday 16:30 – 18:00

chaired by

Ute WERNER and Jochen Zchau

1. Engineering aspect

•Oguz Ozel

Overview of Disaster Mitigation & Site Effect Studies in Istanbul

•Sandra Richwalski

Site effect studies in Istanbul

•Hannes Taubenboeck

The capabilities of high resolution satellite imagery and GIS to identify urban vulnerability in its spatial distribution

2. Economical aspect

•Dietmar Borst/Reinhard Mechler

Assessing economic impacts in a megacity: the case of Istanbul

•Kivanc Inelmen

Small Hotels' Vulnerability, Risk Perceptions and Risk Transfer in Istanbul

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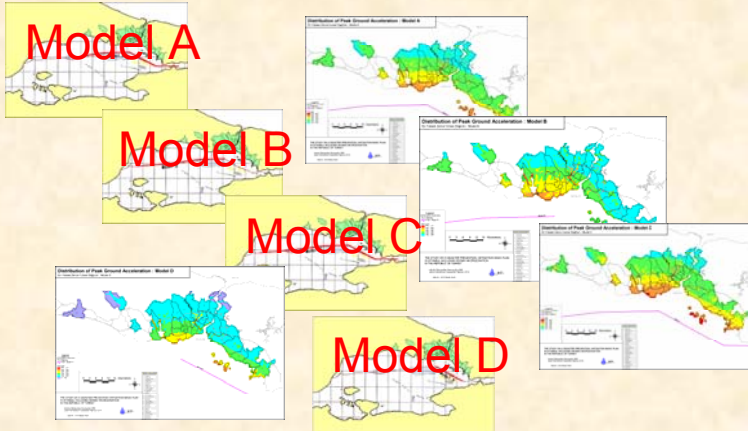
Small Hotels' Vulnerability, Risk Perceptions and Risk Transfer in Istanbul

Main projects for Istanbul threatened by Main Marmara Fault, after Koceeli Earthquake, on the need for extensive response planning based on detailed risk analysis of likely seismic hazard:

Disaster prevention / mitigation basic plan

Istanbul Metropolitan Municipality (IMM) & Japan International Corporation Agency (JICA)

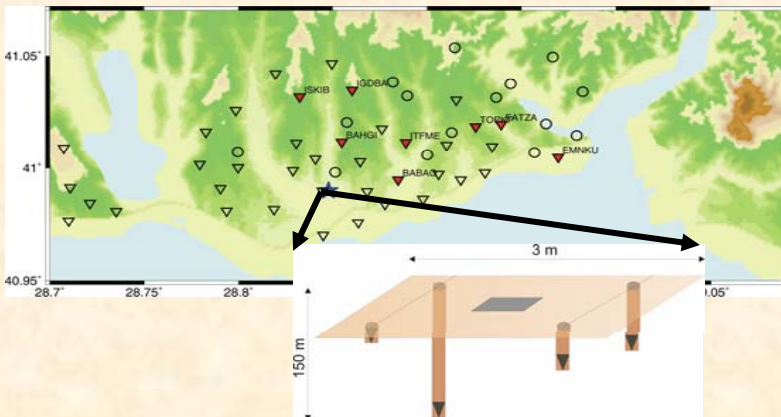
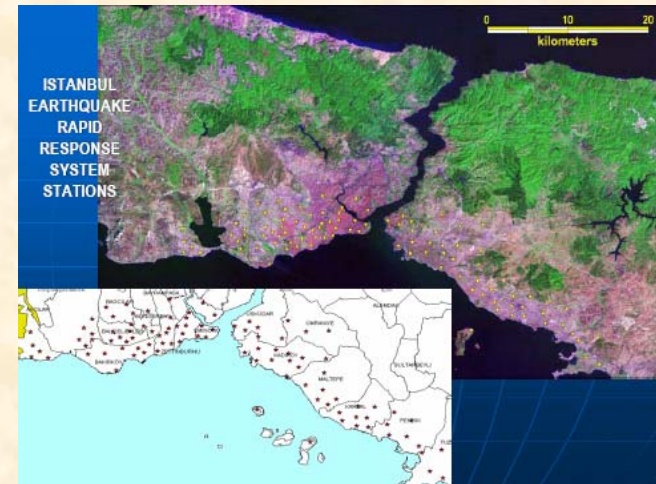
to develop seismic microzonation maps which will serve as the basis for disaster prevention and mitigation plan for Istanbul city



Rapid Response and Early Warning system (IERREWS)

B.U. Kandilli Observatory and Earthquake Res. Ins. (KOERI)

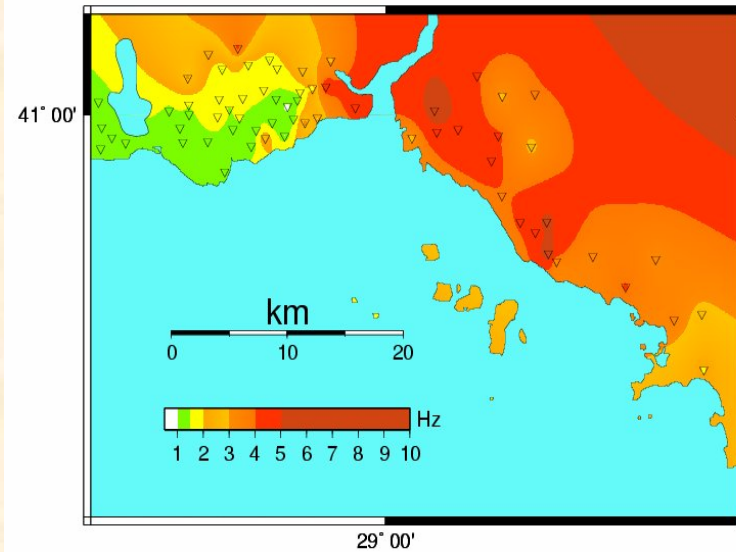
as part of the preparations for the future earthquake in Istanbul - the data from this dense urban network is used to provide rapid post-earthquake loss information.



Megacity Project

Geoforschungs Zentrum-Potsdam (GFZ) & B.U. Kandilli Observatory and Earthquake Res. Ins. & Istanbul Metropolitan Municipality

to improve the knowledge about the influence of local geology in the city on the expected earthquake ground motion



The distribution of resonant frequencies

A complimentary project funded by Bogazici University implemented at the IERRS sites:

to study the distribution of the fundamental frequencies beneath these stations using microtremors and small magnitude events recordings.

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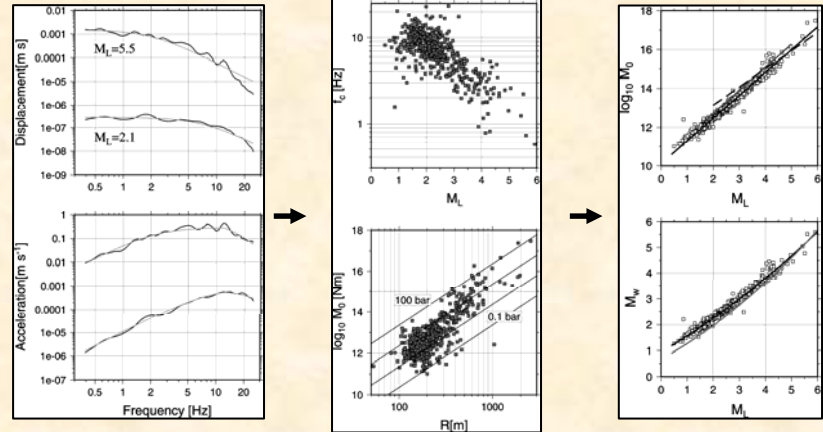
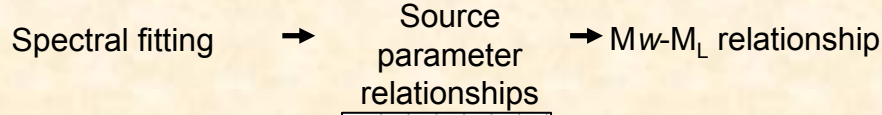
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SOURCE STUDIES

(Cooperation with INGV)

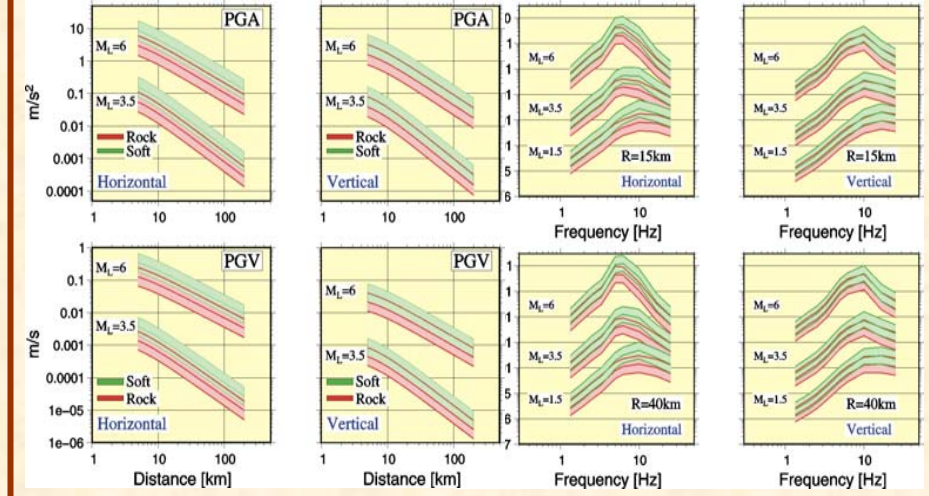


PROPAGATION STUDIES

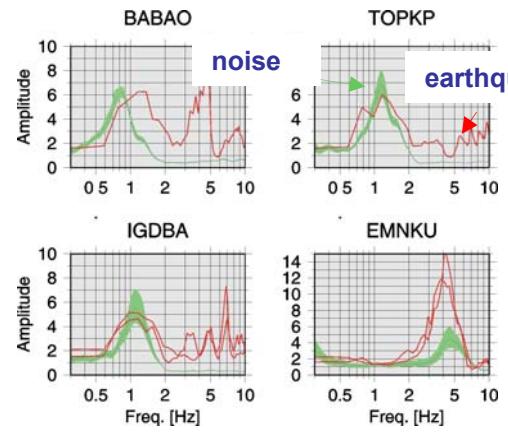
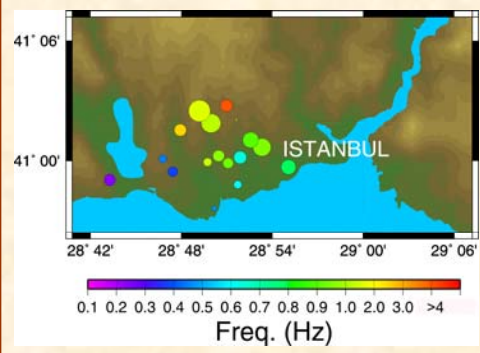
(Cooperation with INGV)

PGA and PGV

SA



SITE EFFECT STUDIES



AIM: to improve the knowledge about the influence of local geology in the city on the expected earthquake ground motion.

Vertical Array

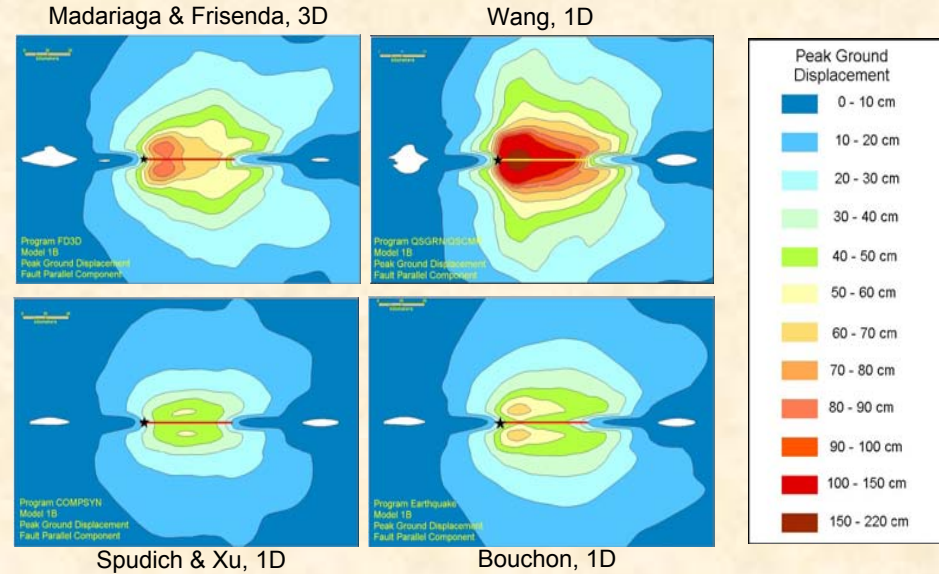
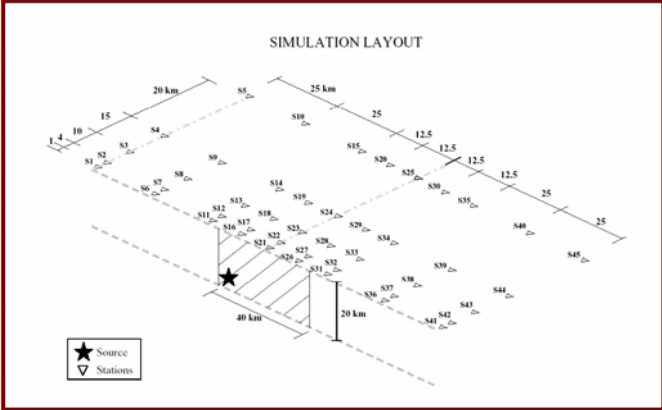
- Comparison of actual and theoretical site response
- Studying non-linearity

Microarray measurements

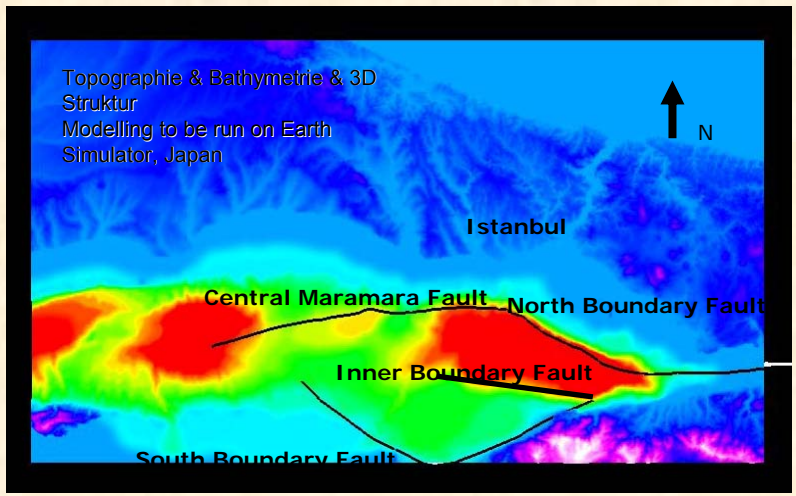
- Estimation of S-wave velocity using micro-array recordings of seismic noise

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!



3D-FD modelling (Cooperation with GPI, Karlsruhe)



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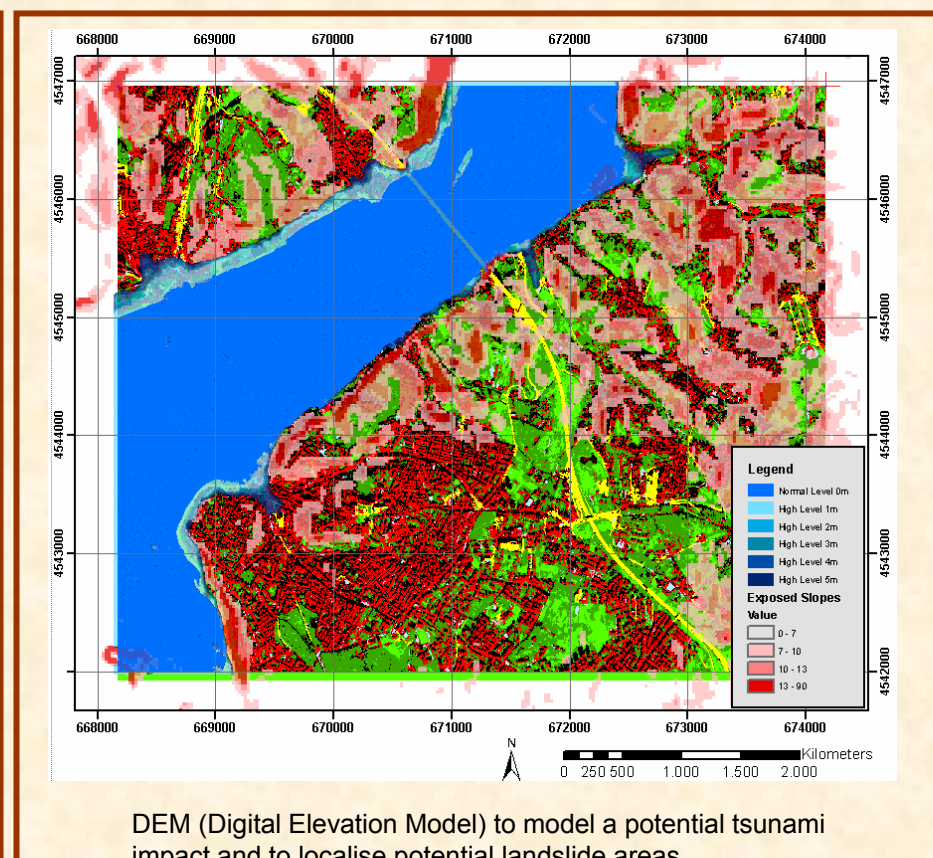
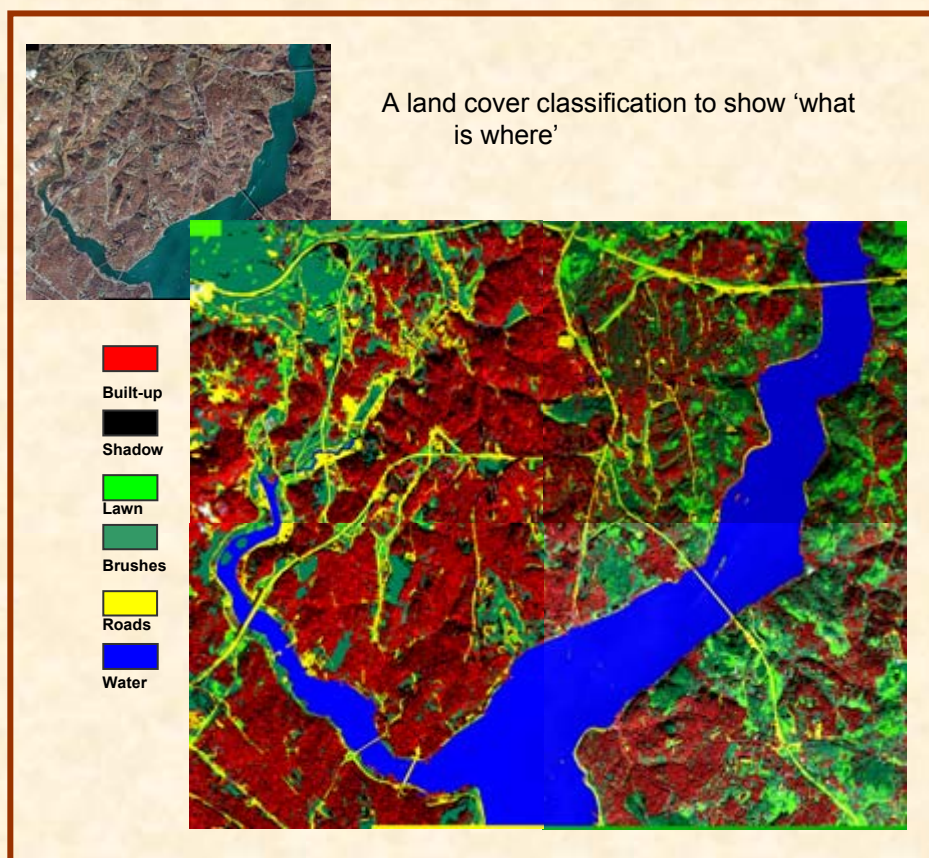
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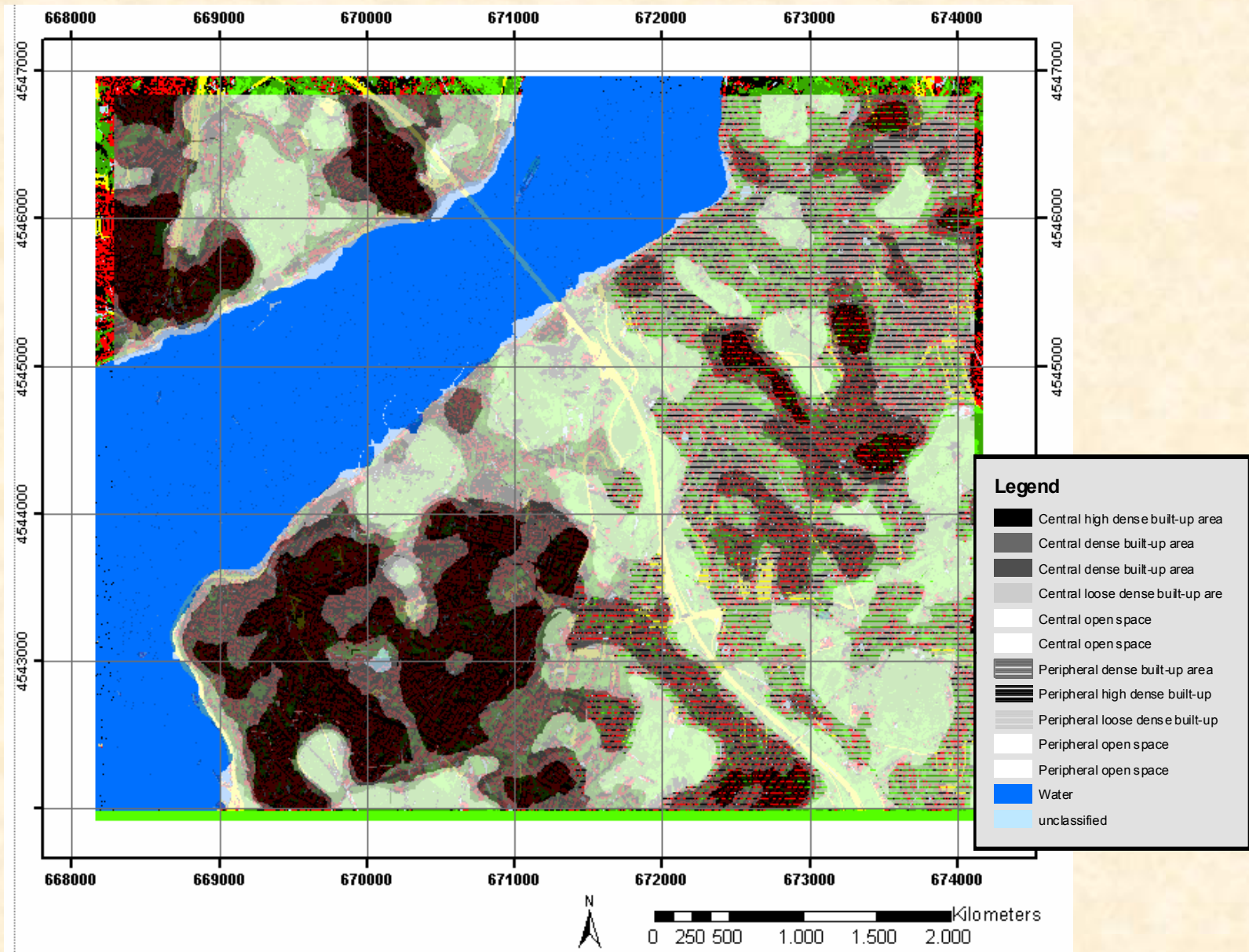
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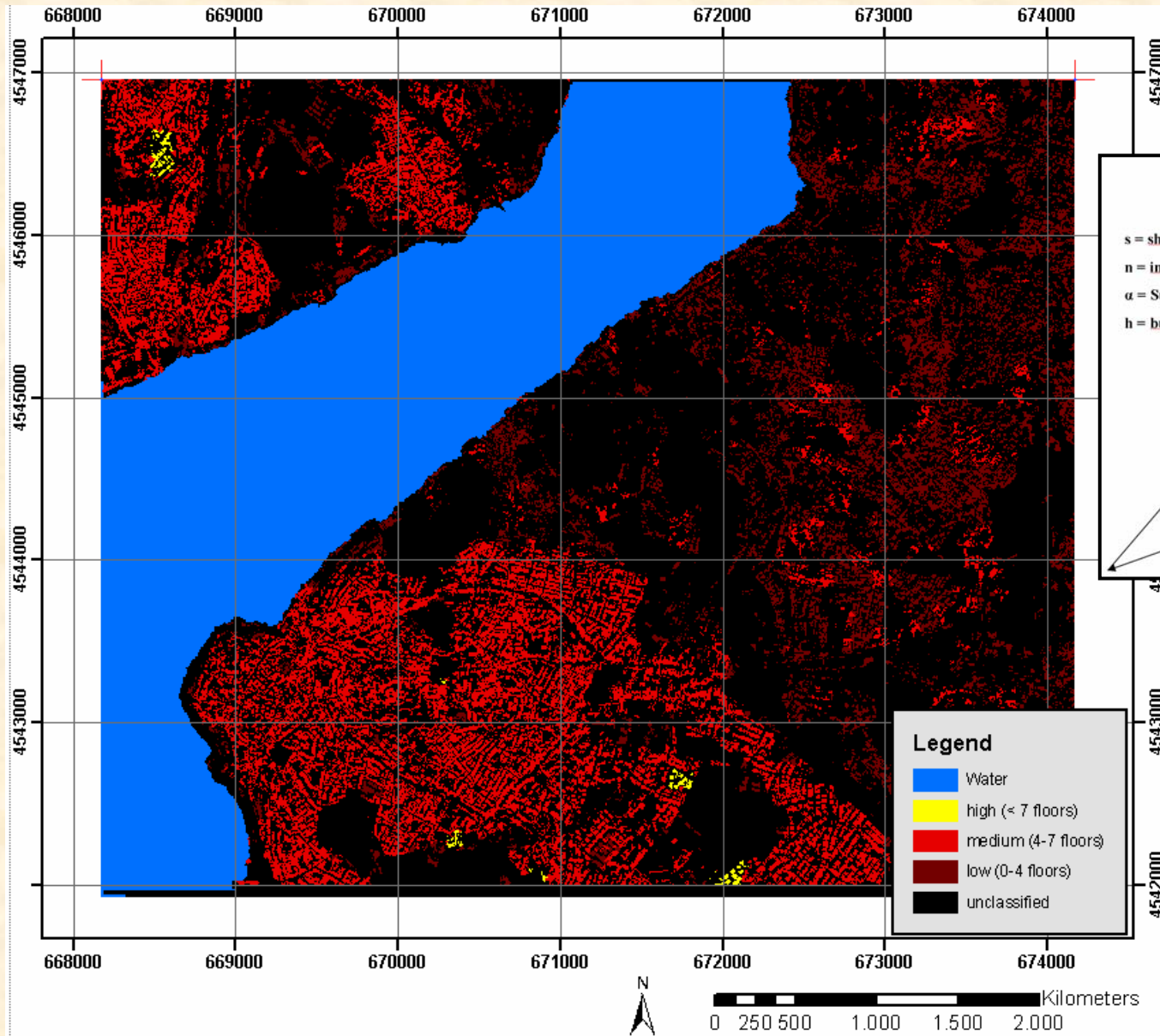
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Presents: the capabilities of remote sensing to contribute to the task of area-wide information extraction and spatial analysis of the derived data sets in a geo-information-system (GIS).

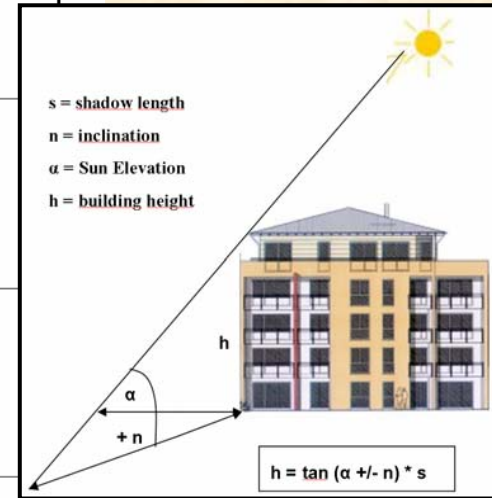
High resolution satellite imagery has the strength to give a spatial overview and to differentiate between urban locations based on several indicators.

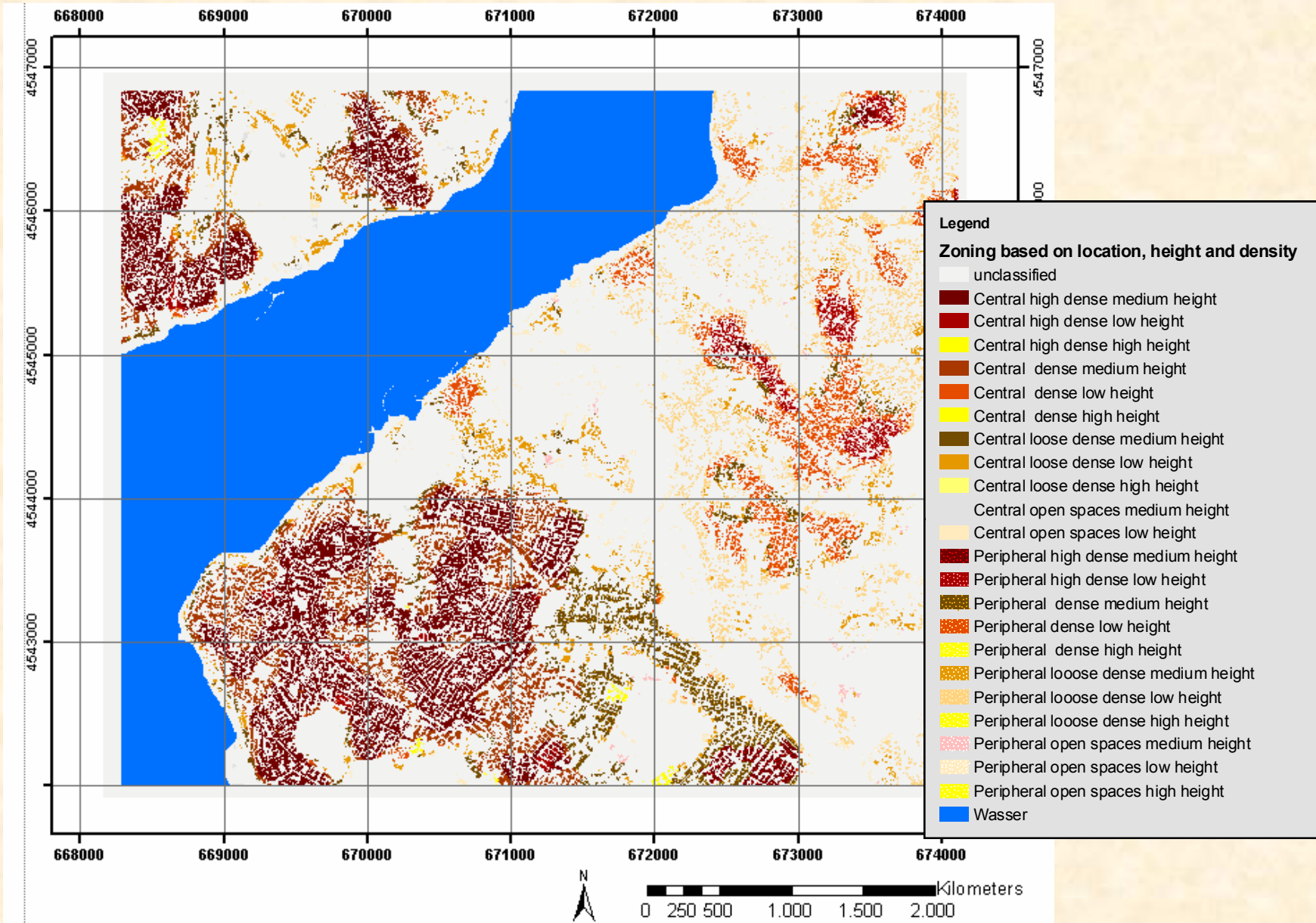




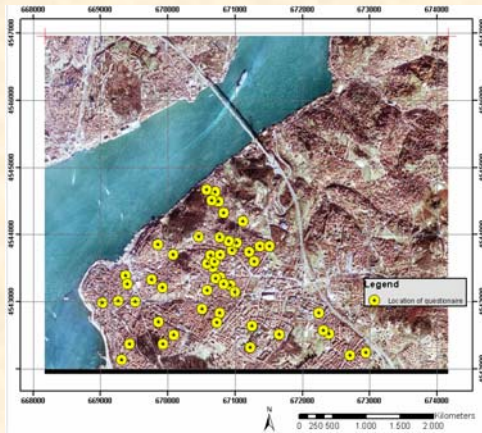


Building height

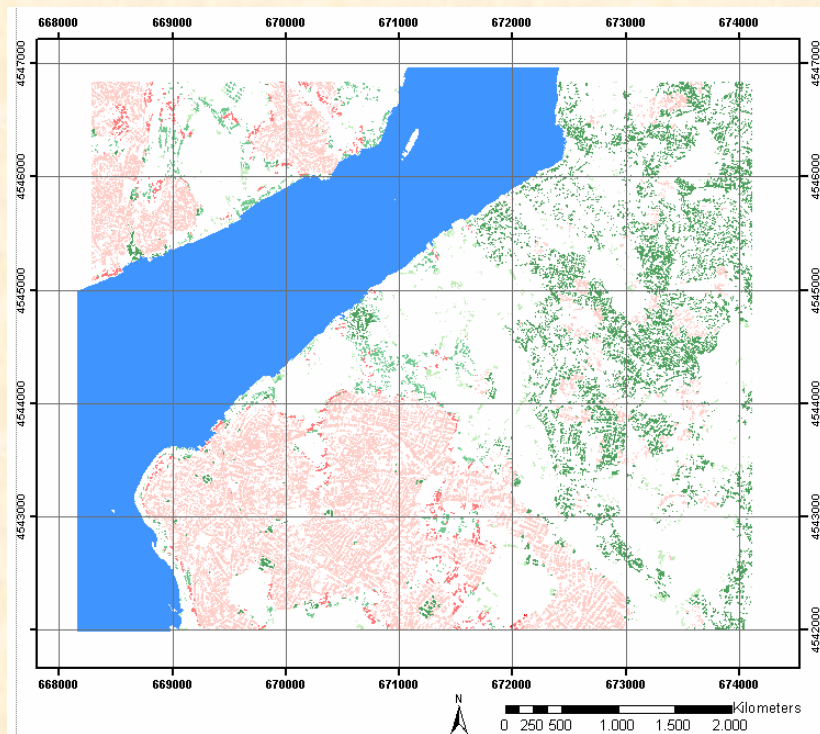
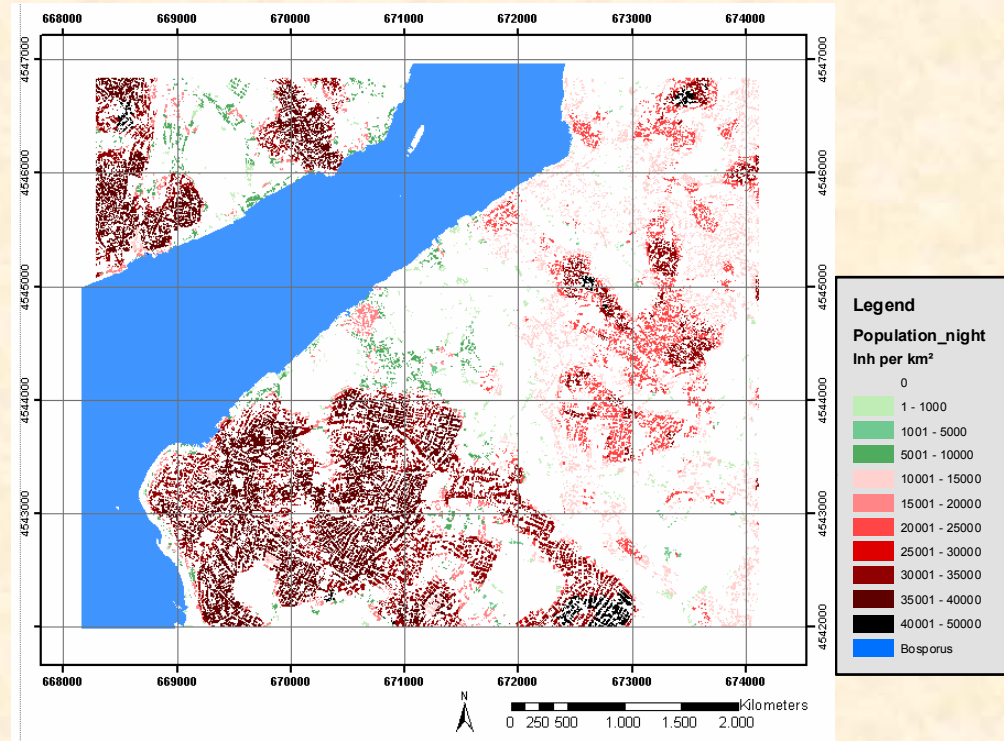




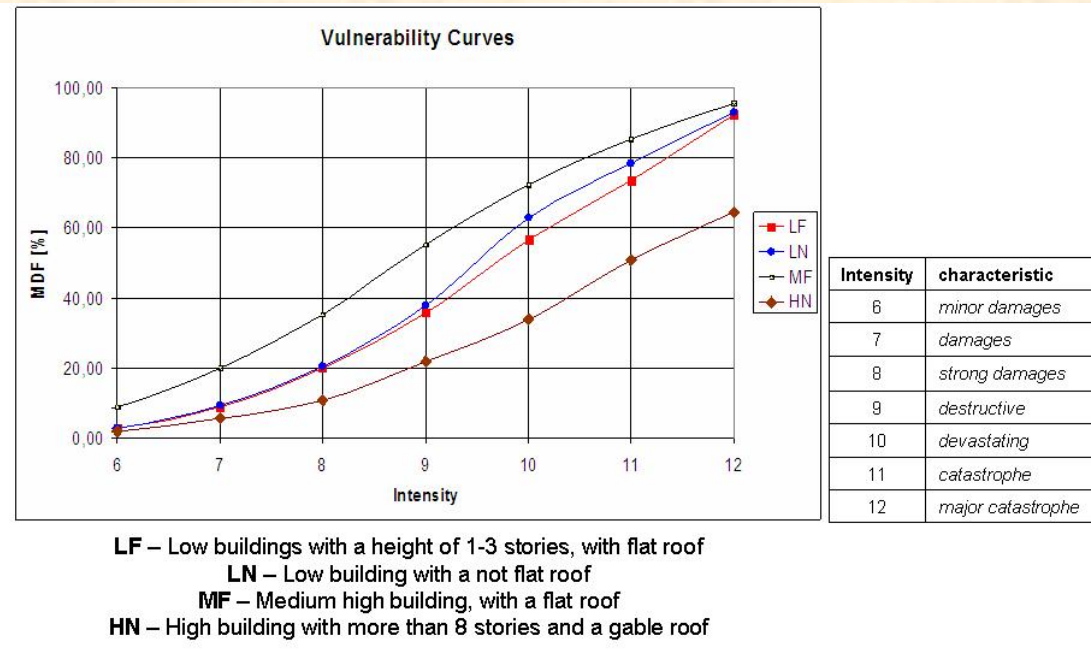
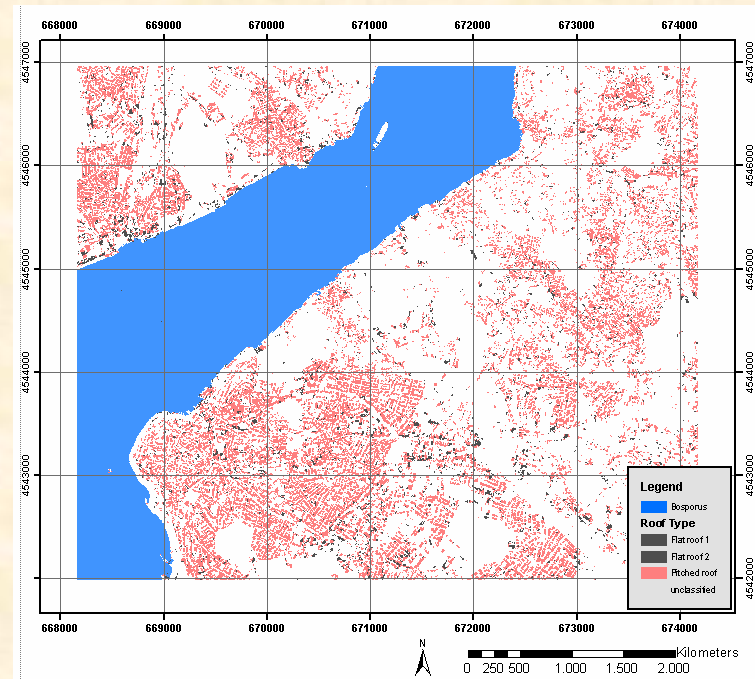
A population density inference to estimate the number of potentially affected people



Field work



Quarter	Istanbul Metropolitan Municipality	Remote Sensing with zoning	Remote Sensing without zoning
Üsküdar			
Area	38,57 km ²	21,4 km ²	21,4 km ²
Population	495 118	339 204	506 040
Inhabitants/k m ²	12 837	15 851	23 647



CONCLUSION:

Results show the localisation of hazardous areas and the analysis of the spatial data sets, which can be used to plan, organize and predict counter-measures in case of a natural disaster.

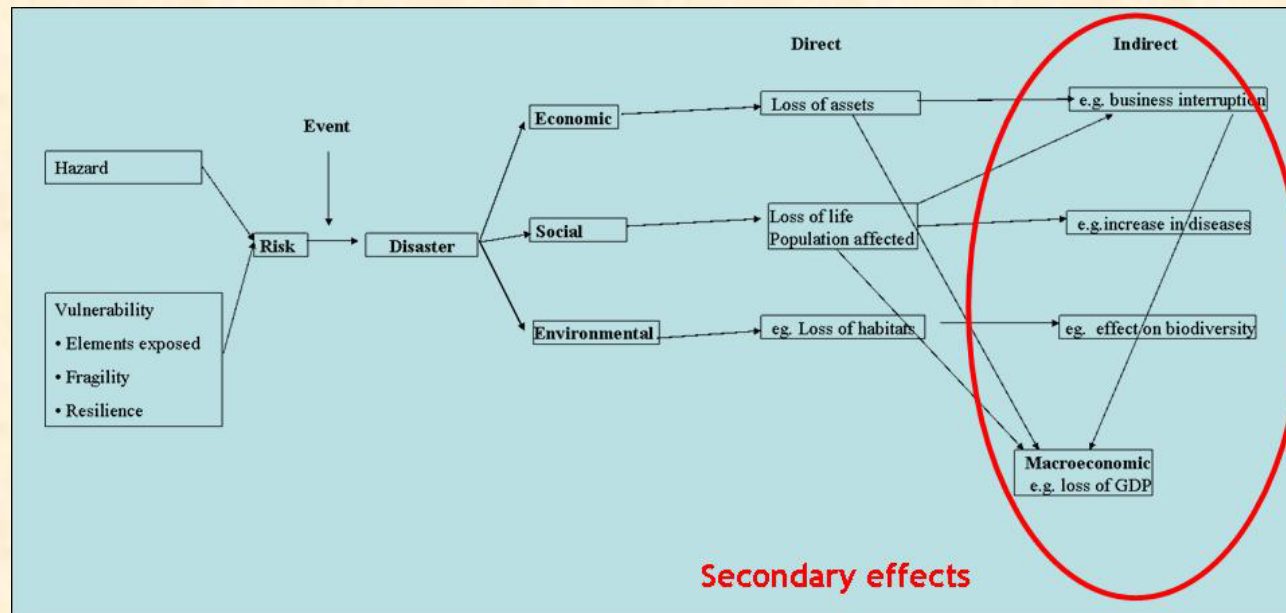
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Objective: to develop a method for assessing the totality of secondary damages due to earthquakes as a function of their timing during the next 30 years (Combination of micro- and macroeconomic approaches)

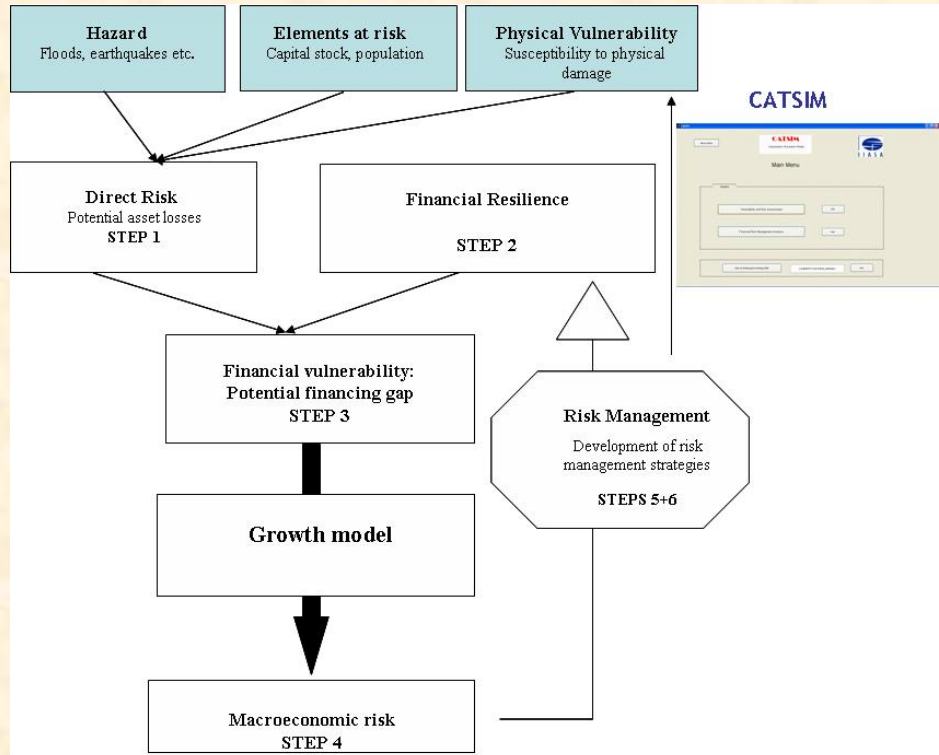


Microeconomic approach:

links up with seismological and engineering analyses of hazard, exposure and vulnerability and leads to impacts on individual units such as households and business.

Macroeconomic approach:

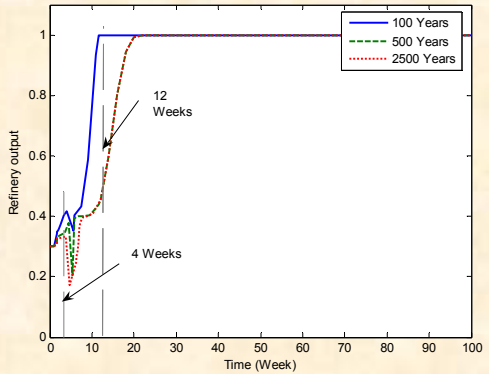
potential aggregate socioeconomic impacts to the municipality and province of Istanbul as well as the country



- ✓ Input: direct risk to capital stock
- ✓ Direct losses and financial vulnerability
- ✓ Assess macro risk: stochastic GDP impacts
- ✓ I-O model
- ✓ Timing of Effects
- ✓ Potential Results
- ✓ Next steps

I – O MODEL

Timing of Effects



Return period	Months	Direct losses	Indirect losses	indirect/direct	macroeconomic losses
Unit		\$	\$	Ratio	\$
100 years event	1	0.04	0.4	10.000	0.00
	3		0.89	22.250	25.89
	12		0.89	22.250	0.00
	36		0.89	22.250	0.00
500 years event	1	0.11	0.4	3.636	0.00
	3		1.16	10.545	40.15
	12		1.37	12.455	0.04
	36		1.37	12.455	0.00
2500 years event	1	0.3	0.4	1.333	0.00
	3		1.16	3.867	53.63
	12		1.37	4.567	0.04
	36		1.37	4.567	0.00

Potential Results

- Defining basic scenarios with respect to the seismic hazard and direct loss thereof
 - seismic hazard, inventory of infrastructure, direct loss: remarkable work done so far
 - seismic hazard: most probable scenario magnitude of 7.5
 - Direct (economic) loss: casualties, building damage; furthermore works on business interruptions of medium to big size industry
 - constant need for updated and more detailed data, to be received from the municipality
- Analysis of the economic structure of Istanbul (branches and underlying characteristics of industrial production within the metropolitan area) and selection of a pilot sector for investigation
- Analysis of the processes of adding value of businesses as the nodes of a network model with their according attributes
- Development and implementation of the network model for the spreading of indirect losses
- Calculation of the model and evaluation

focus: „neglected“ part of economy – sector with high percentage of small size enterprises, labour-intensive, high socio-economic vulnerability -> textile

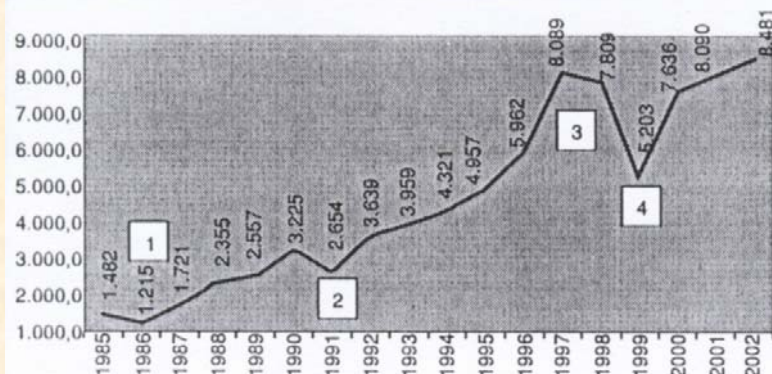
- ✓ **Analysis of processes of adding value**
- ✓ **The development of a model of interlinked micro-economic units is the core of this research project**
- ✓ **Last working package: calculation of the model and evaluation**
- ✓ **Excursion: Why microfinance for relief? Insights in the project of C. Menny**

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Tourism Revenues of Turkey

The yearly increasing trend of tourism income provided to the Turkish economy is, however, shadowed by a few downturns in the years that are marked by wars, nuclear accidents in the region, and earthquakes or terrorism threats in the country.

OBJECTIVE: to illustrate small hotels' risk management capabilities to face a disaster in Istanbul that could have a serious impact on their business continuity

Providing an understanding of small hotel owner/managers'

- *awareness of hazards,*
 - *perceptions about potential impacts and*
 - *recovery from rapid onset events,*
- risk perceptions, risk transfer, and choices concerning disaster preparedness and mitigation are the main points of investigation.

- ✓ **Sampling**
- ✓ **Organizational Demographics**
- ✓ **Hotels' Geographic Distribution**
- ✓ **Respondents**

- **Business worse case scenario**
- **Risk Information**
- **Other Hotels' Damage Risk**
- **Own Hotel's Damage Risk**
- **Preparedness Measures Taken**
- **Fire Safety**
- **Look on Disasters**

CONCLUSIONS

- Most small hotel managers have awareness and takes some DMP measures for a potential disaster
- 'optimistic bias' is prevalent, i.e. often make unrealistically positive appraisals of their own risks and prospects relative to other persons
- With a critical look, more than half of the surveyed small hotels may not measure up to the satisfactory level of preparedness (similar findings e.g. Drabek, 1994; Webb et al. 2001)
- Institutional measures and strict governmental control has larger influence than self-initiative for risk management → expecting leadership from governments
- 'Hotel insurance package' purchased widely, but only 1/3 has 'business interruption insurance', - lack of information → window of opportunity
- extensive information concerning alternative ways of risk reduction and prevention, through credible sources
 - other businessmen
 - insurance companies
 - local governments
 - sector NGOs

Expected average loss per day (in YTL)	Frequency	Percent
1-2500	6	12.8
2500-5000	14	35.9
5000-7500	4	10.3
7500-10000	3	7.7
10000+	3	7.7
Do Not Know	9	23.1