

Microtremor measurement-based prediction of ground shaking in Kathmandu Valley of Nepal

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The Tenth International Symposium on Mitigation of Geo-disasters in Asia, MGDA, 2012.10.3-9, Japan

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Presentation Content

- ❖ Background information (Nepal and Kathmandu Valley)
- ❖ Microtremor Survey
- ❖ Analysis and Results
- ❖ Predominant period distribution map
- ❖ Double predominant period
- ❖ Concluding Remarks

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Why Earthquakes in the Nepal?

Figures 19.24 The collision of India and Asia about 45 million years ago produced the regional Himalayas.

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Active Thrust Faults

MCT: main central thrust
MBT: main boundary thrust
HFT: Himalayan frontal thrust

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Nepal: Geology and Geomorphology

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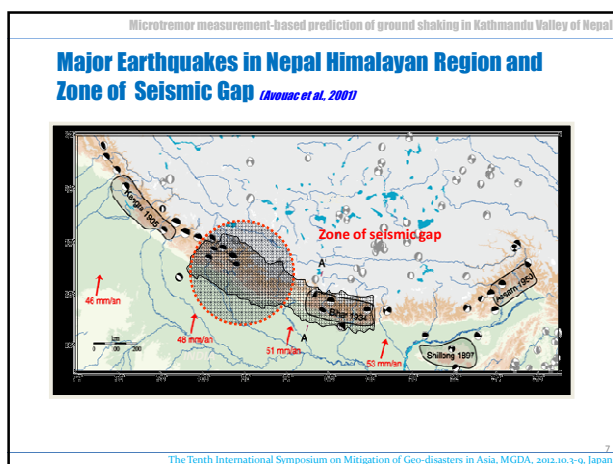
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Earthquakes in Nepal and its Periphery

DMG, Nepal, DASE, France (1979-1999)

Legend:
• 2 >= M <= 3
• 3 >= M <= 4
• 4 >= M <= 5
• M >= 5
Active faults:
- thrust fault
- normal fault
- right-lateral strike-slip fault

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Distribution of earthquake near Kathmandu (Source: JICA, 2002, UNDP/UNCHS 1994, Pandey, M.R. et al., 2001)

Recorded Earthquake History of Nepal

Date	Magnitude	Intensity	Latitude	Longitude	Epicenter (Km)	dist.	Assumed PGA (gal)
1255/6/7	7.7(assumed)	X	NA	NA	Near KTM	NA	NA
1408	NA	X	NA	NA	Near KTM	NA	NA
1681	7 (assumed)	IX	NA	NA	Near KTM	NA	NA
1810	NA	IX	NA	NA	Near KTM	NA	NA
1833	7		28	85	38	137	
1833/8/26	7	X	27	85	84	75	
1833/10/4	7	IX	27	85	151 (Kalaiya)	47	
1833/10/18	7	VIII	27	84	India	NA	
1866/23/05	7	X	27.7	85.3	Kathmandu	NA	
1869/7/7	7		28	85	45	121	
1934/1/15	8.4	IX-X	27.55	87	177 (North of Chainpur)	188	
1936/5/27	7	NA	28.50	83.5	199	38	
1954/9/4	6.5	NA	28.30	83.8	163	34	
1988/8/20	6.5		26.75	86.62	167 (Udayapur)	36	

Note: NA here represents data not available

When ??

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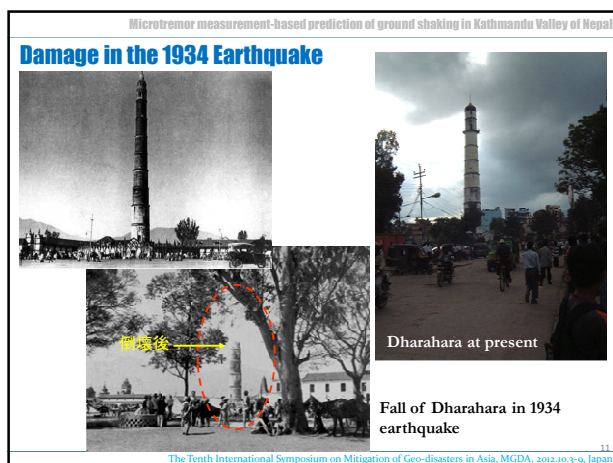


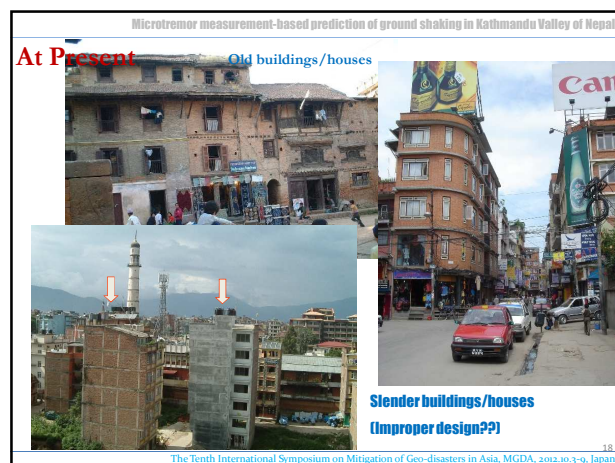
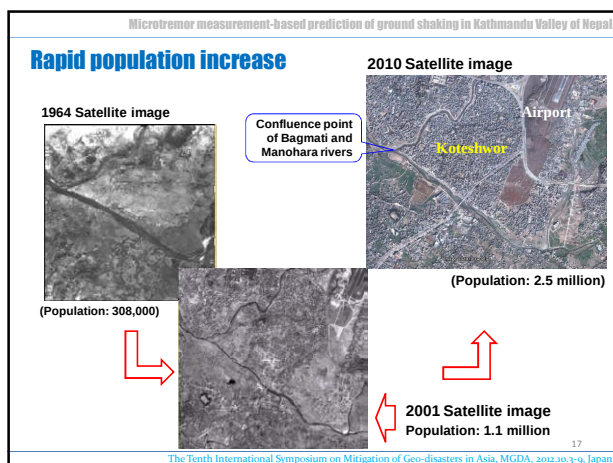
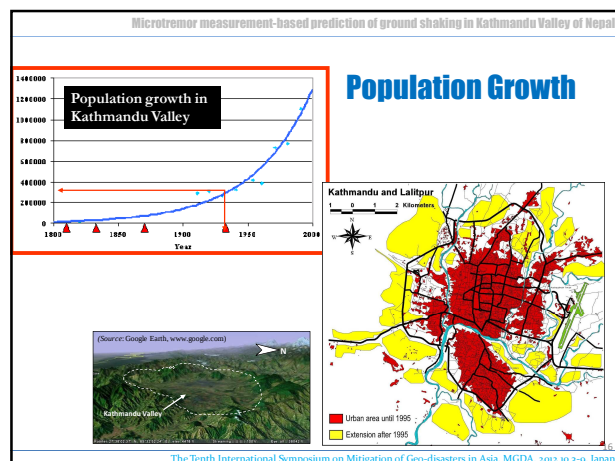
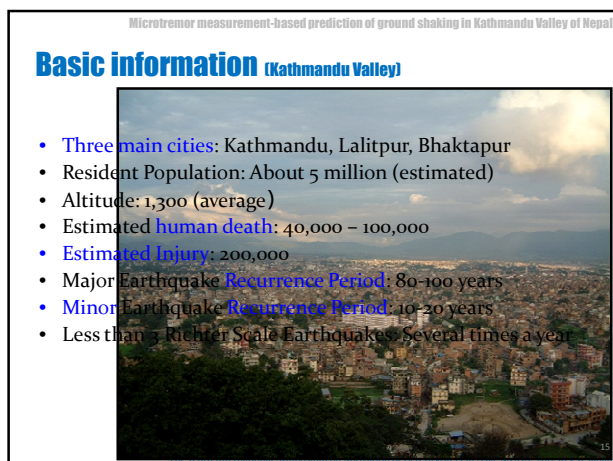
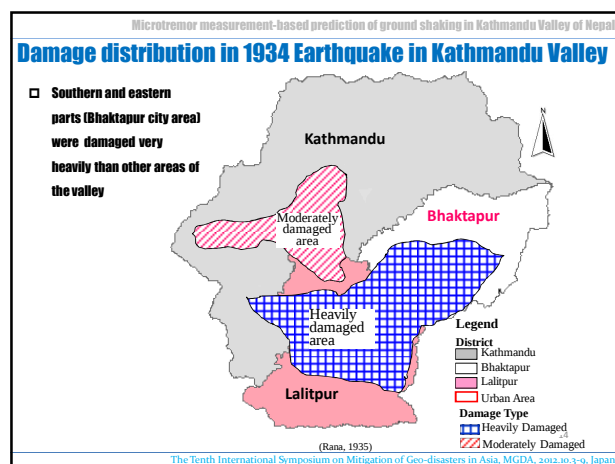
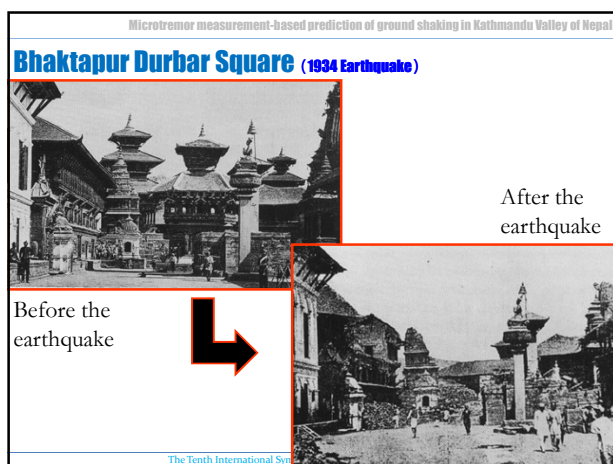
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Talking of Extremity

- ❖ Transportation
 - Roads, Bridges, Airports
 - Urban roads
- ❖ Glacier Lakes
 - Morain dam failure, debris flow, flooding
- ❖ Landslides
- ❖ Communication
- ❖ Hospitals
- ❖ Schools
- ❖ Government Buildings (Presidential Palace, Singh Durbar, Ministry and Ministerial Department Buildings, etc.) and so on

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Vulnerable buildings with narrow streets



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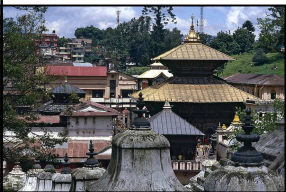
Historical Monuments (World Cultural Heritages)

- ❖ Seven World Cultural Heritage Sites in Kathmandu Valley
- ❖ Together with the environmental degradation and scenic deterioration following the urbanization, the earthquake disaster risk has increased greatly
- ❖ Disaster risk: Earthquake and Landslides

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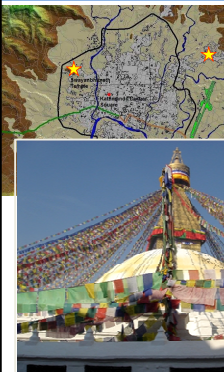
Pashupatinath Temple




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Boudhanath Stupa



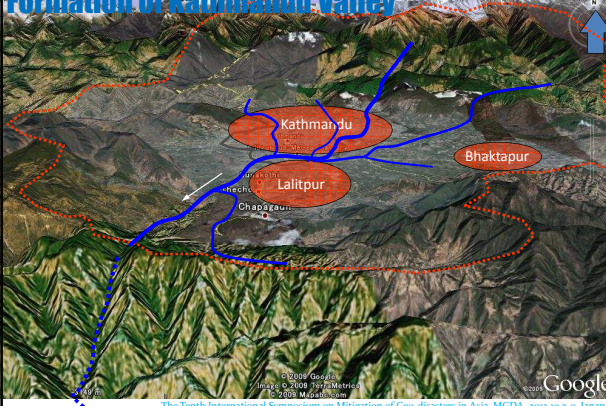
Swayambhunath Stupa



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Formation of Kathmandu Valley



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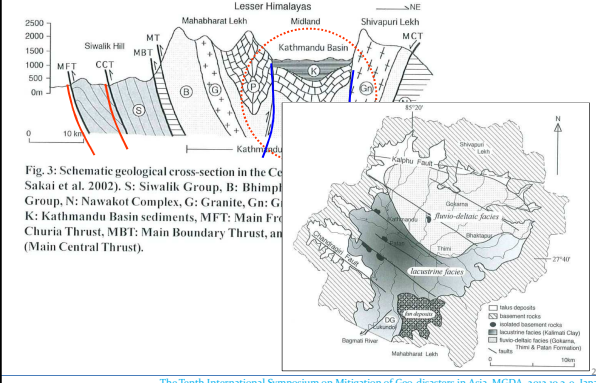


Fig. 3: Schematic geological cross-section in the Ce Sakai et al. 2002). S: Siwalik Group, B: Bhimp Group, N: Nawakot Complex, G: Granite, Gn: G K: Kathmandu Basin sediments, MFT: Main Fr Churia Thrust, MBT: Main Boundary Thrust, and (Main Central Thrust).

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