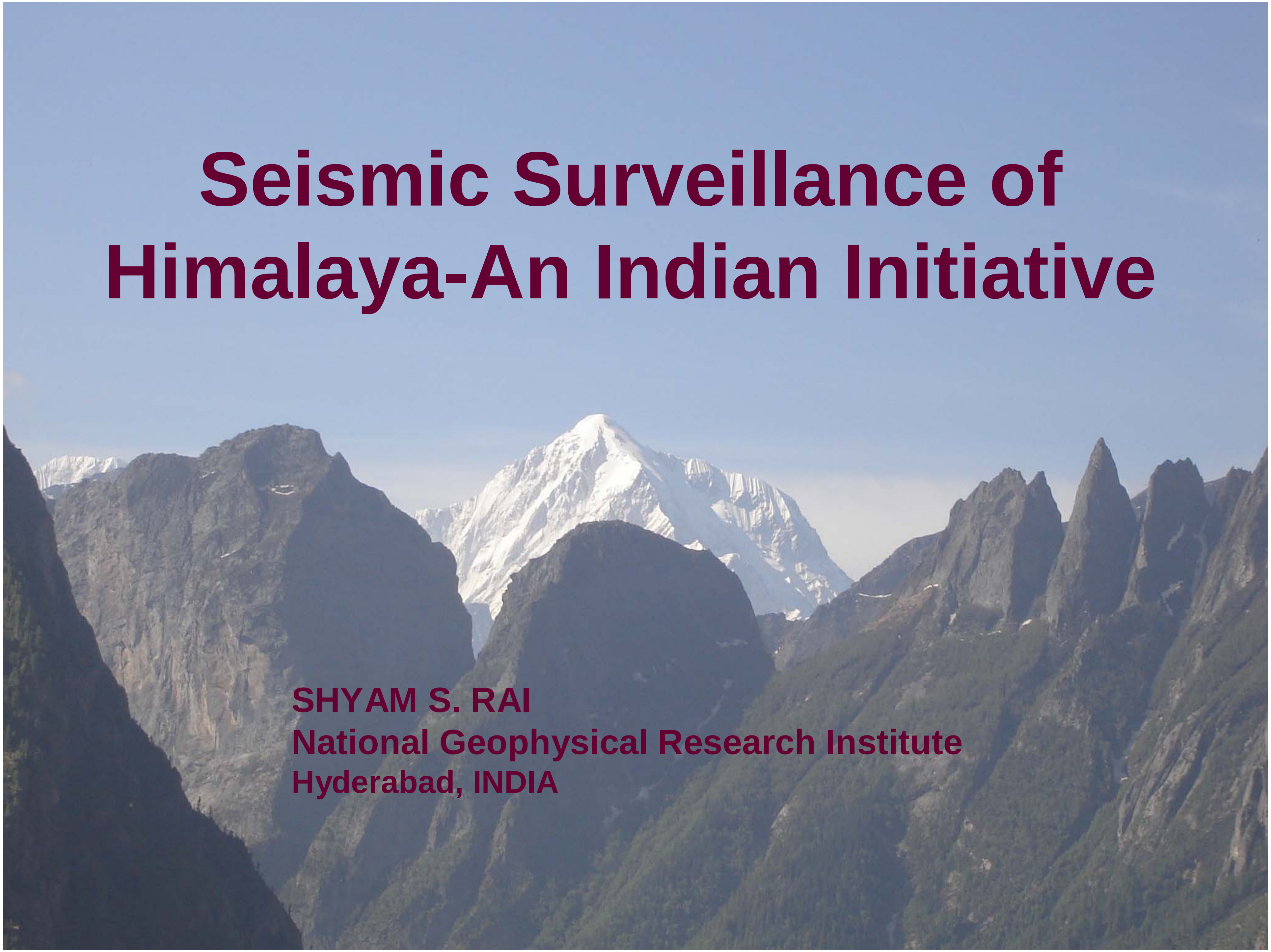

# Seismic Surveillance of Himalaya-An Indian Initiative

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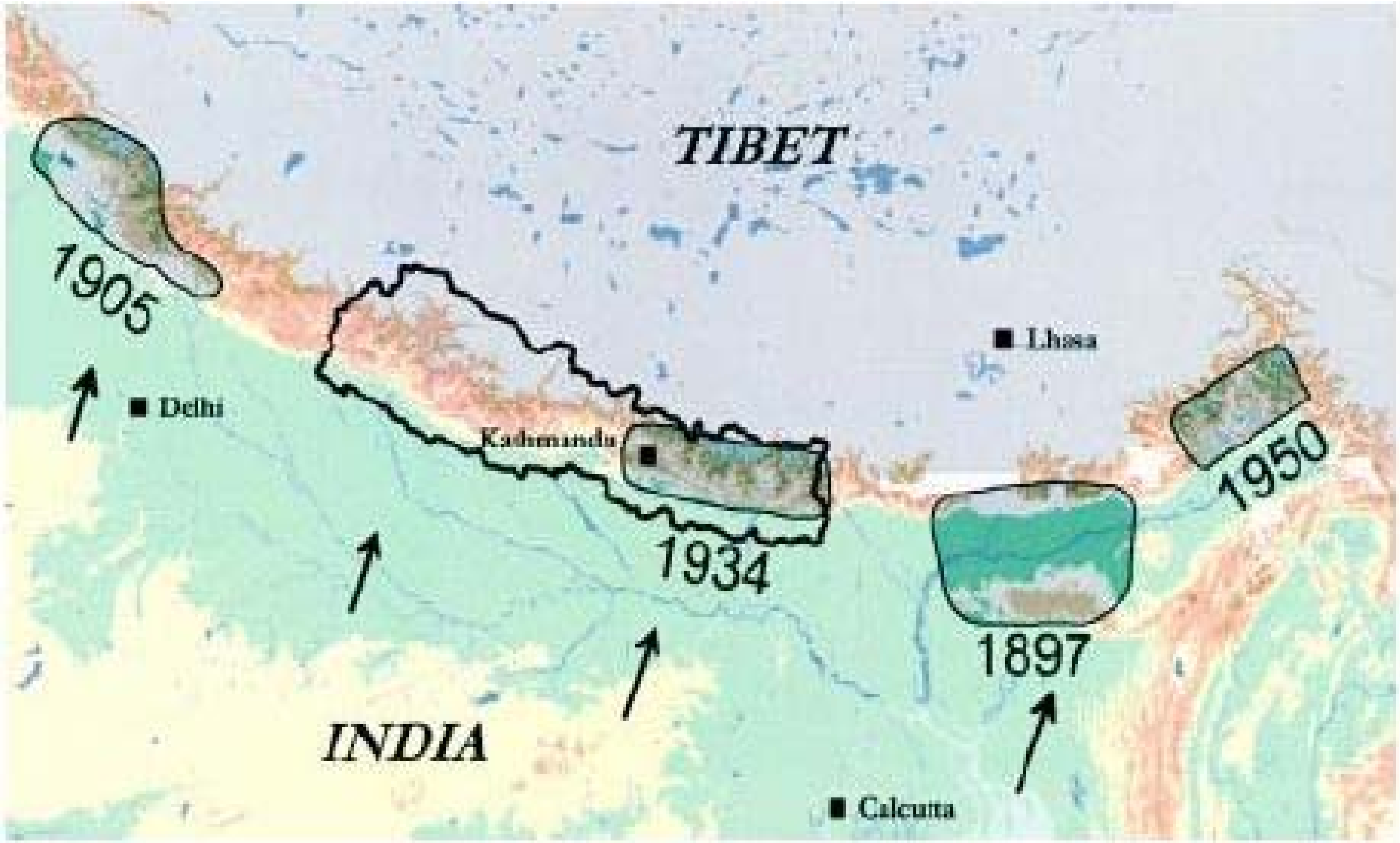
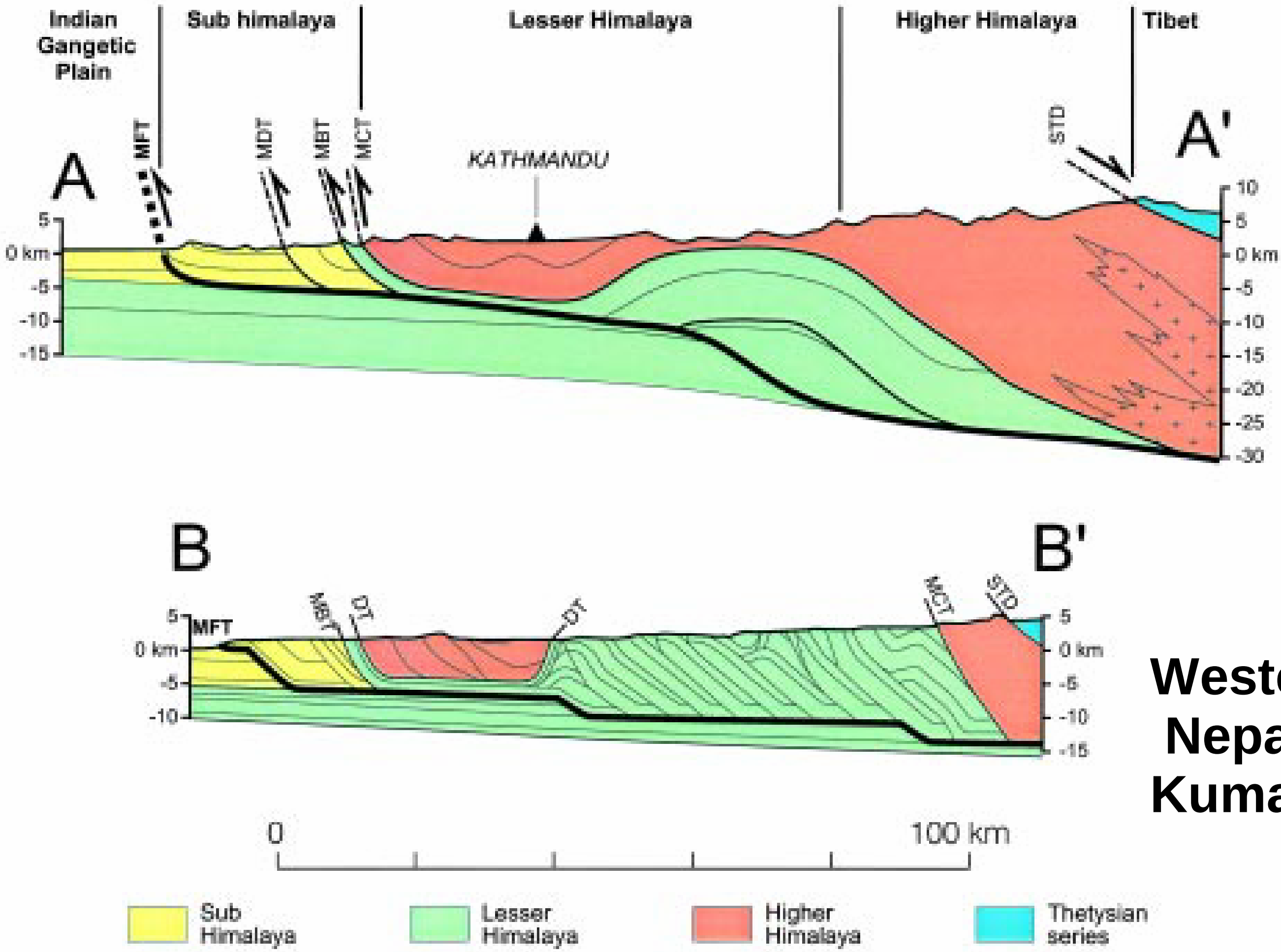
**National Geophysical Research Institute**
**Hyderabad, INDIA**

# The Great Himalayan Earthquakes



# Geological Sections




Eastern Nepal

Western Nepal & Kumaon

Fig. 5. (a) Geological section across the central Himalaya of Nepal (AA' in Fig. 4). Modified from Brunel (1986). (b) Geological section across the Himalaya of Far-Western Nepal (BB' in Fig. 4) after DeCelles et al. (1998).

# Nepal Seismic Network

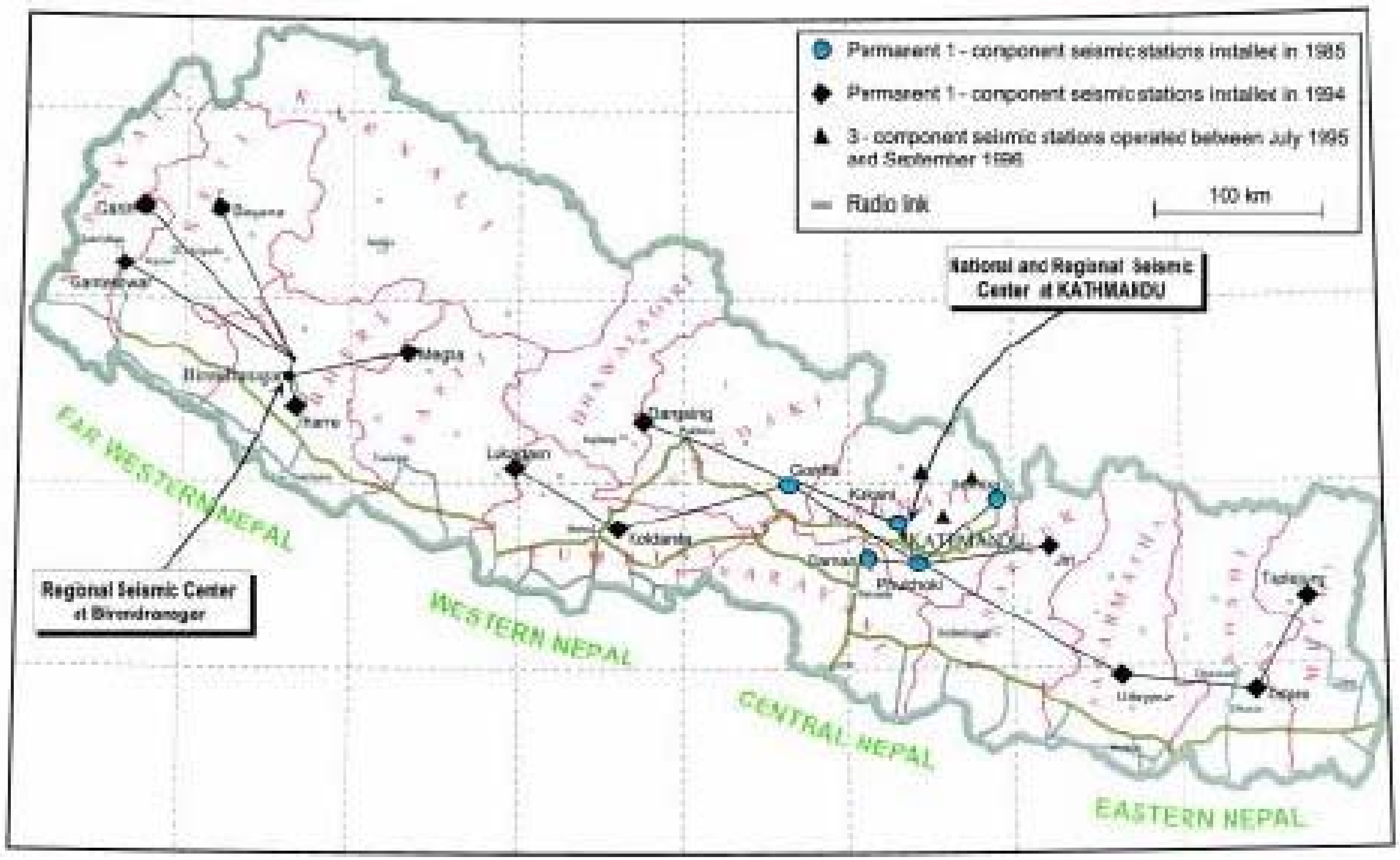



Fig. 2. Location of the short period telemetered stations of the National Seismological Network of Nepal. Continuous records are telemetered to either the national seismic center in Kathmandu, or the regional seismic center in Birendranagar. The locations of the 3-component temporary seismic stations operated between July and December 1995 are also shown.

# Seismicity pattern

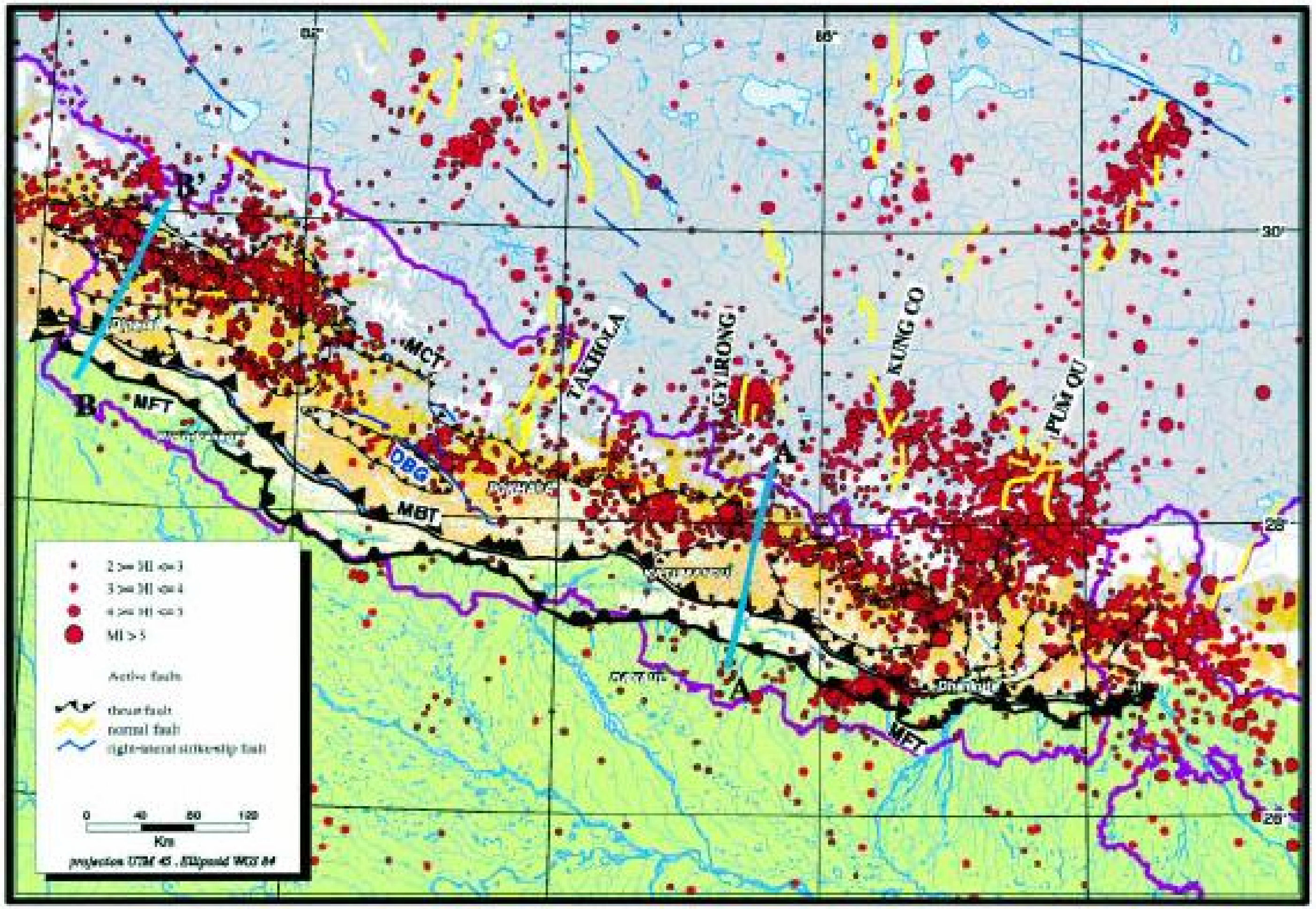



Fig. 4. Microseismicity map of Nepal monitored between May 1994 and January 1998. The blue lines AA', and BB' show locations of cross sections in Figs. 5 and 6. Active faults modified from Nakata (1989) within Nepal and from Armijo et al. (1986) for Southern Tibet. MCT and MBT from Amatya and Gnawali (1994).

# Density Distribution of Epicenters

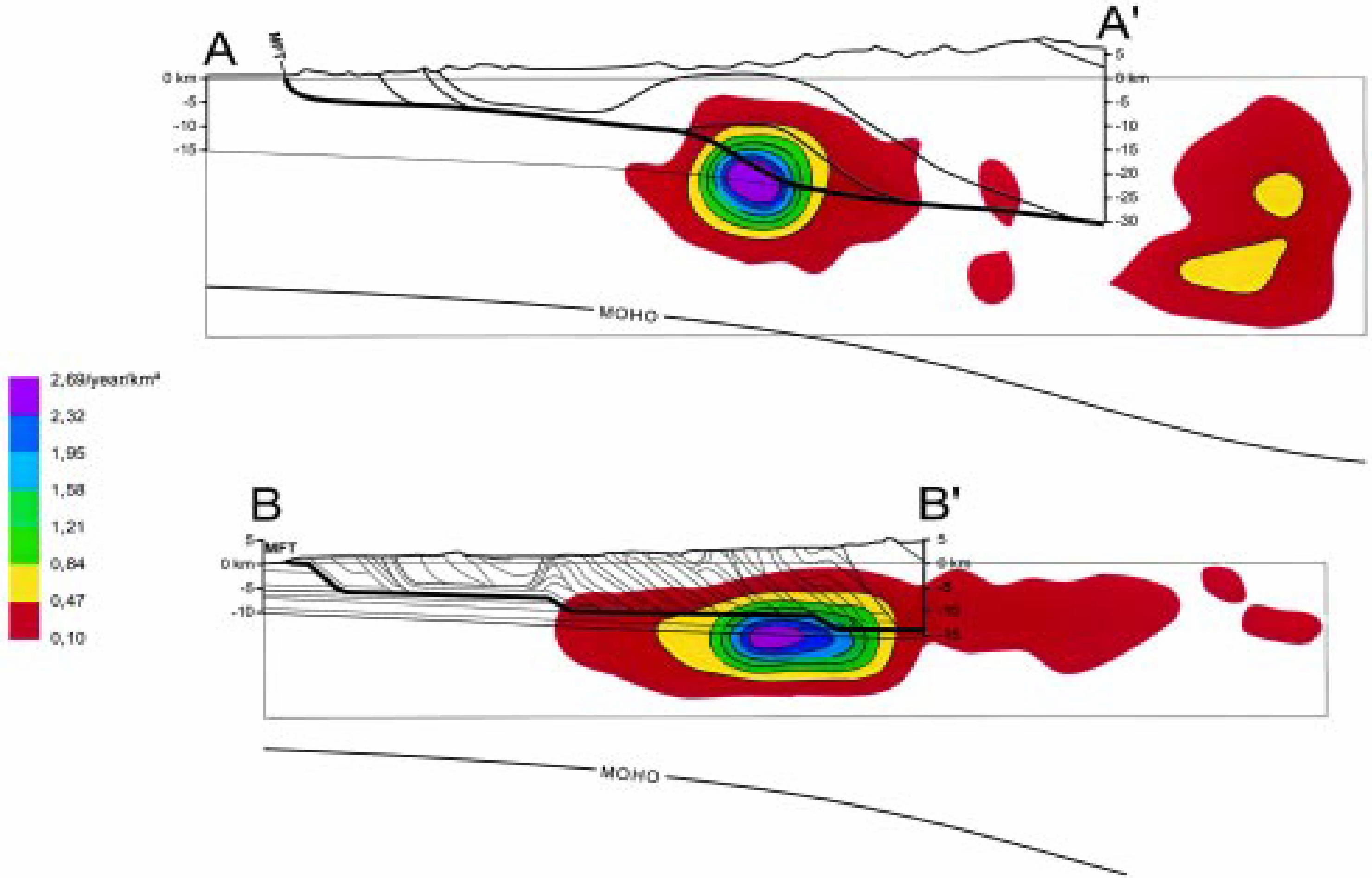
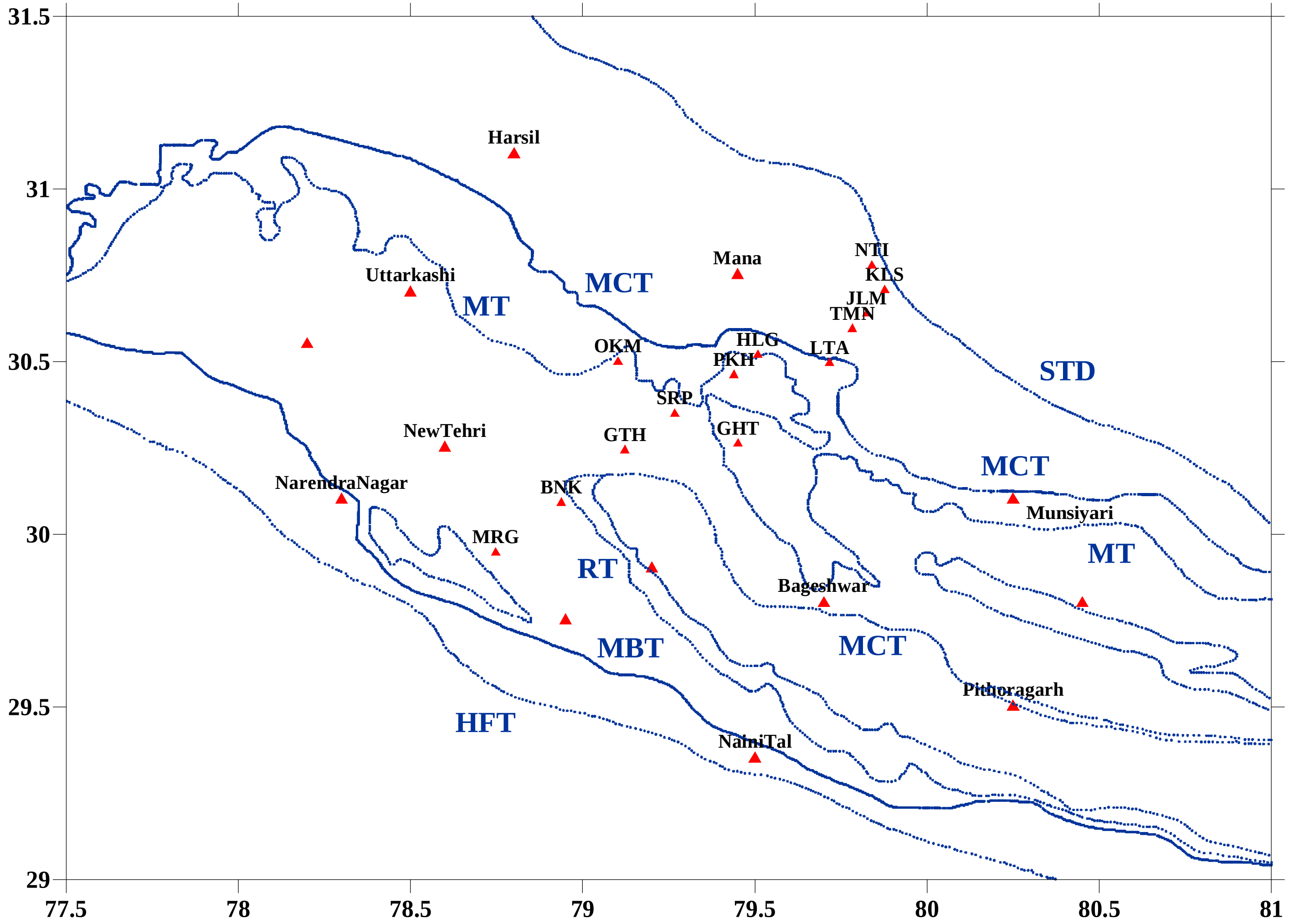


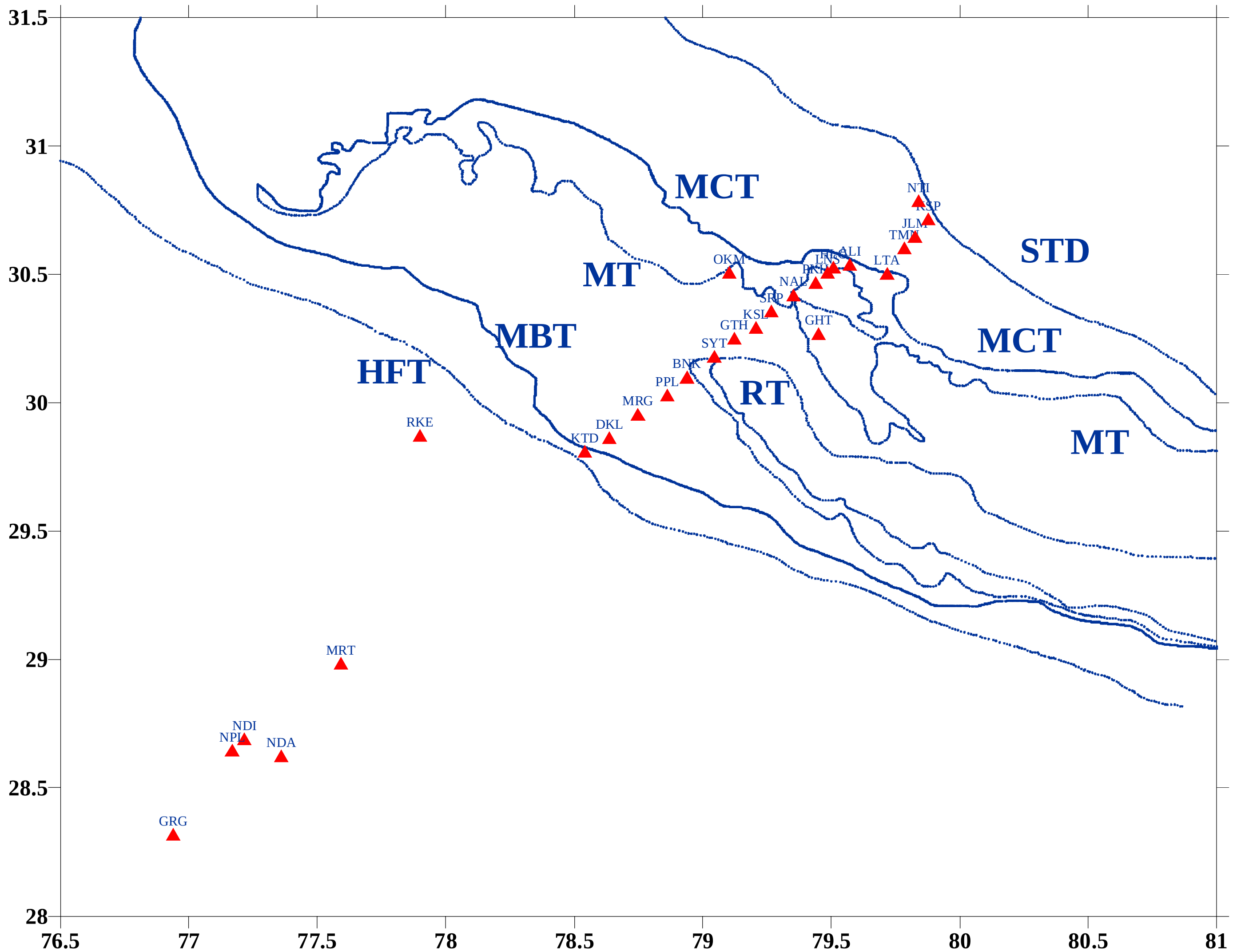

Fig. 6. Density distribution of epicenters along AA' and BB' sections. In order to take into account uncertainties in seismic locations, the distribution of epicenters was filtered using an Gaussian filter with $\sigma = 4$ km. Fault geometries reported from Fig. 5. All events within 30 km from the section are taken into account.

# Indian Seismic Network

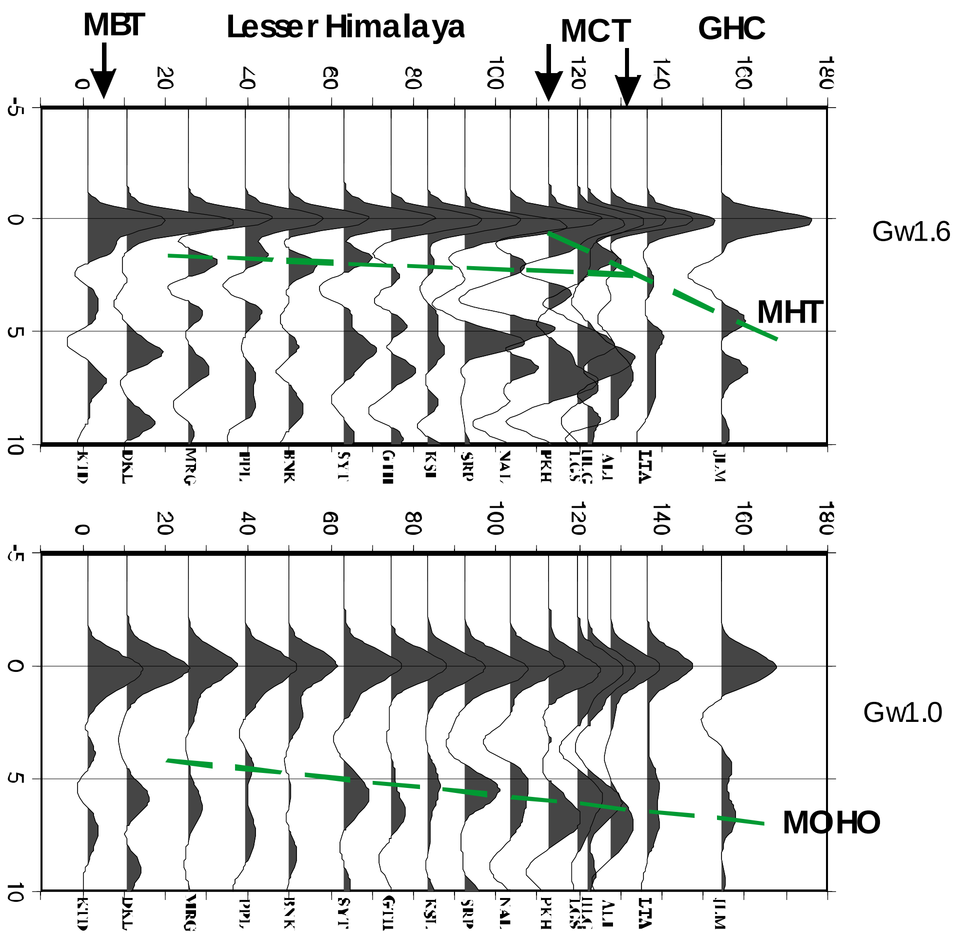


# Indian Seismic Network

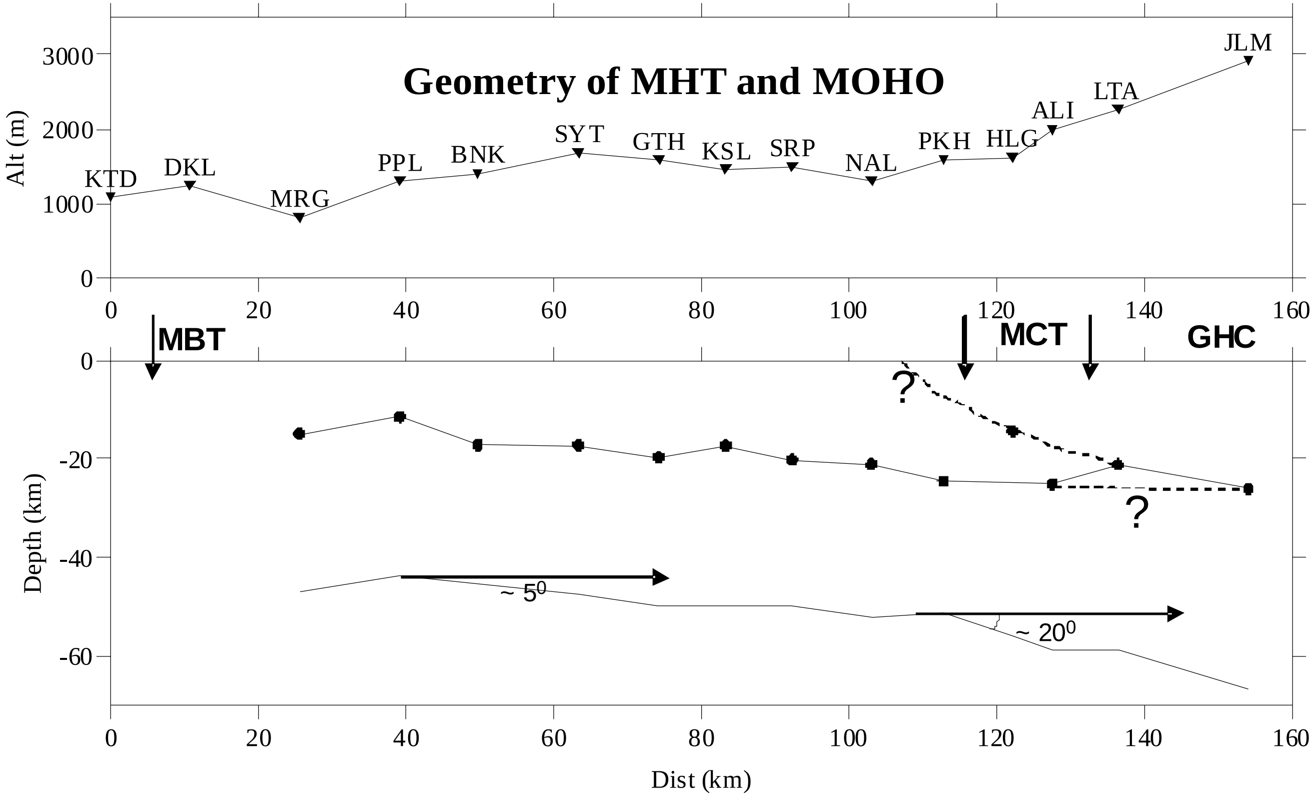
## (Apr 2005 – Dec 2006)



# Geometry of MHT and MOHO

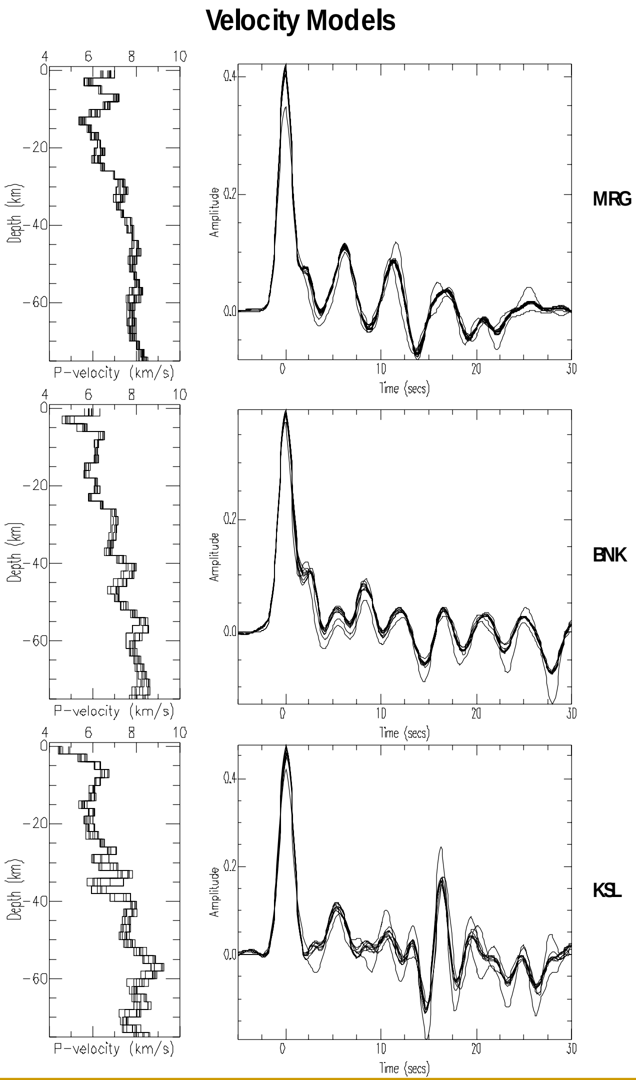


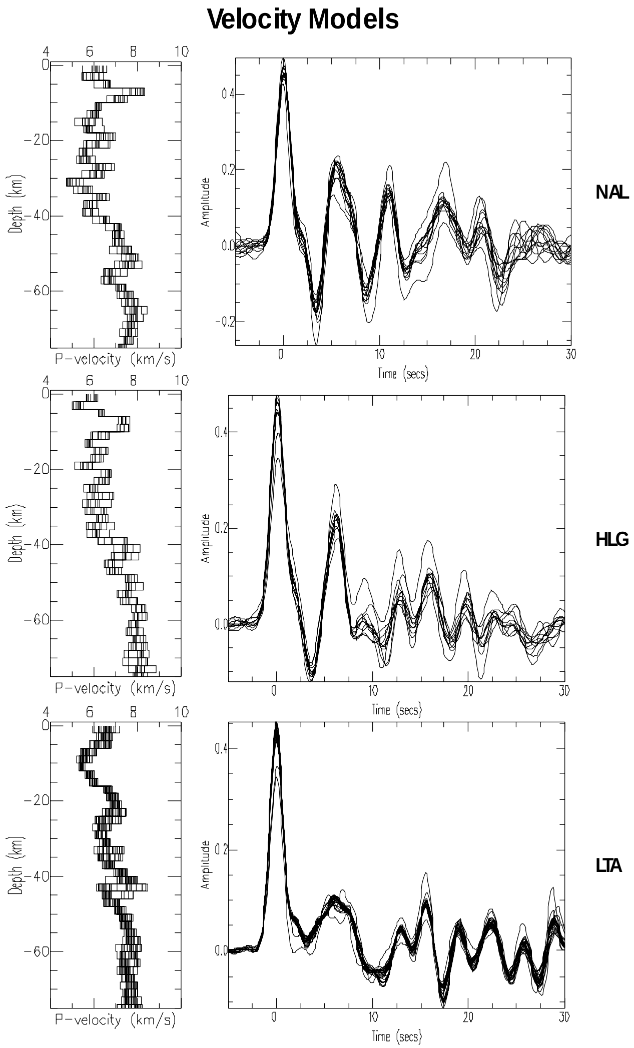

**baz 30-40, del 60-65,**

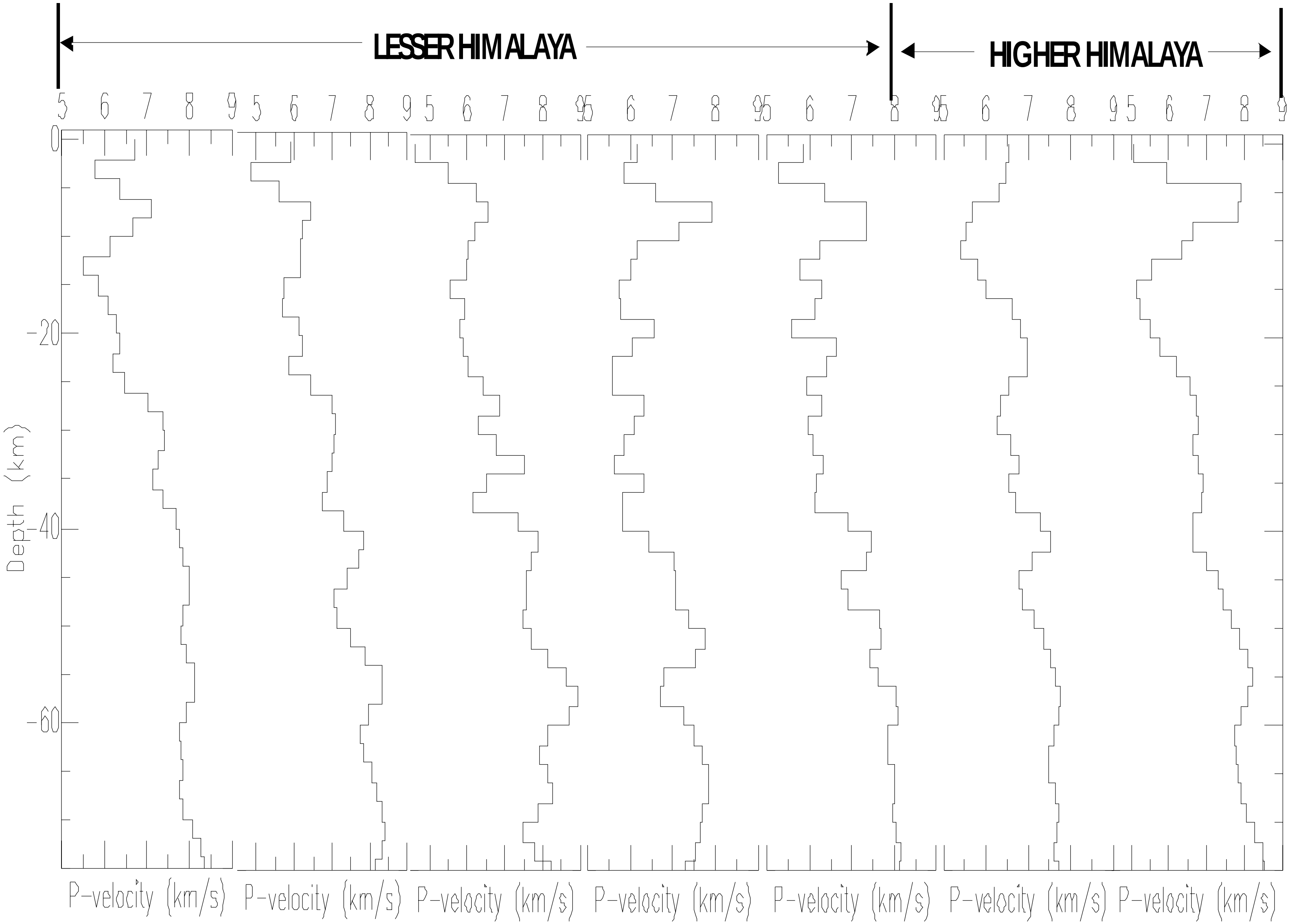



(* Distances computed with reference to Kotdwar station )

# Velocity Models



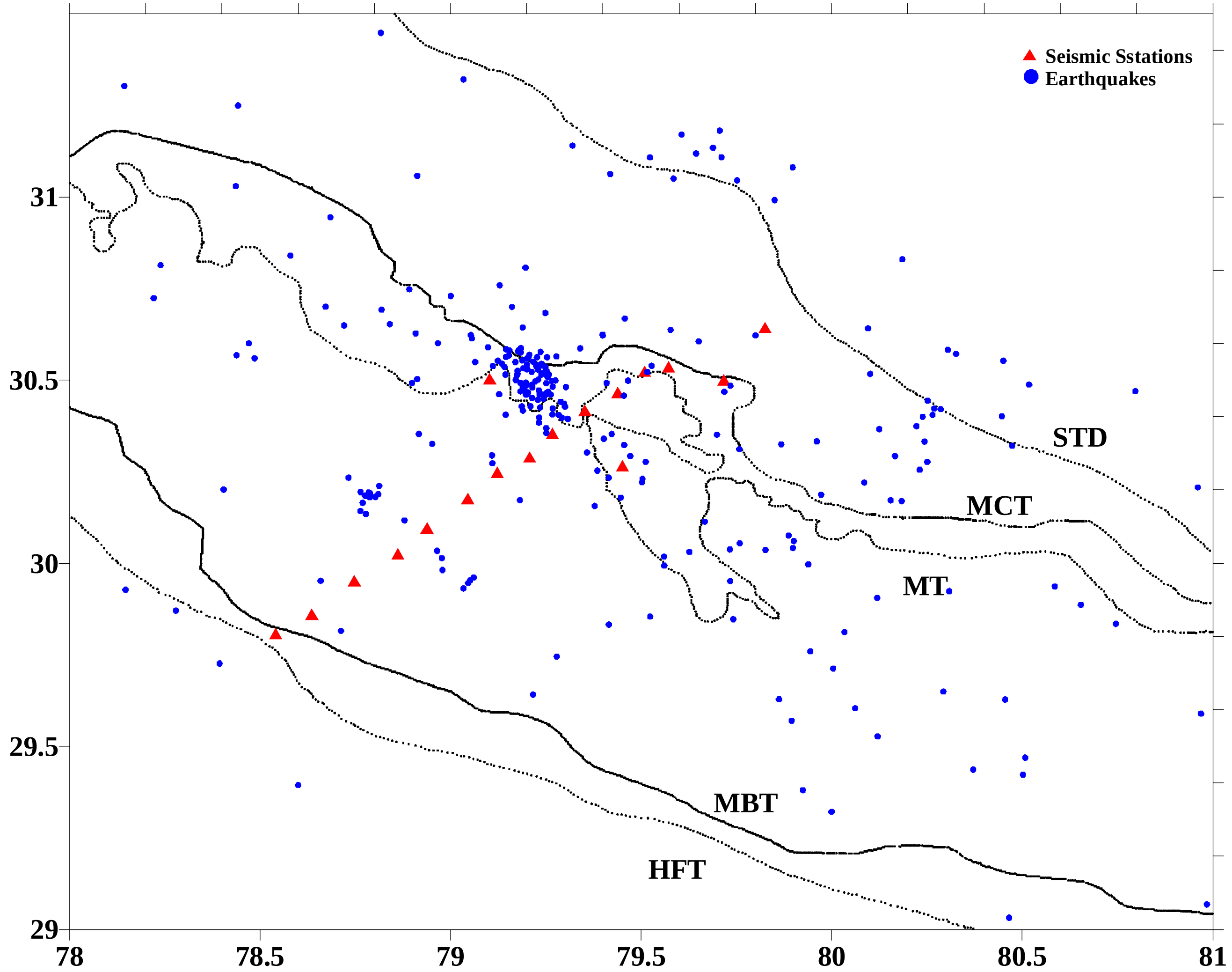



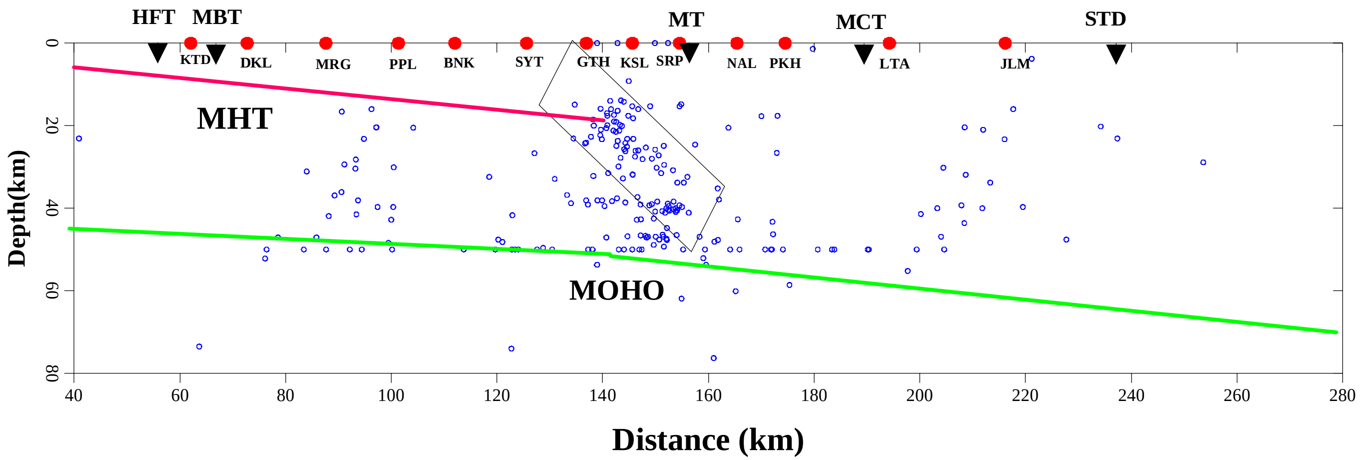


LESSER HIMALAYA
HIGHER HIMALAYA
Depth (km)
0
-20
-40
-60
5 6 7 8 9
P-velocity (km/s)

# Seismicity in Uttaranchal Himalaya

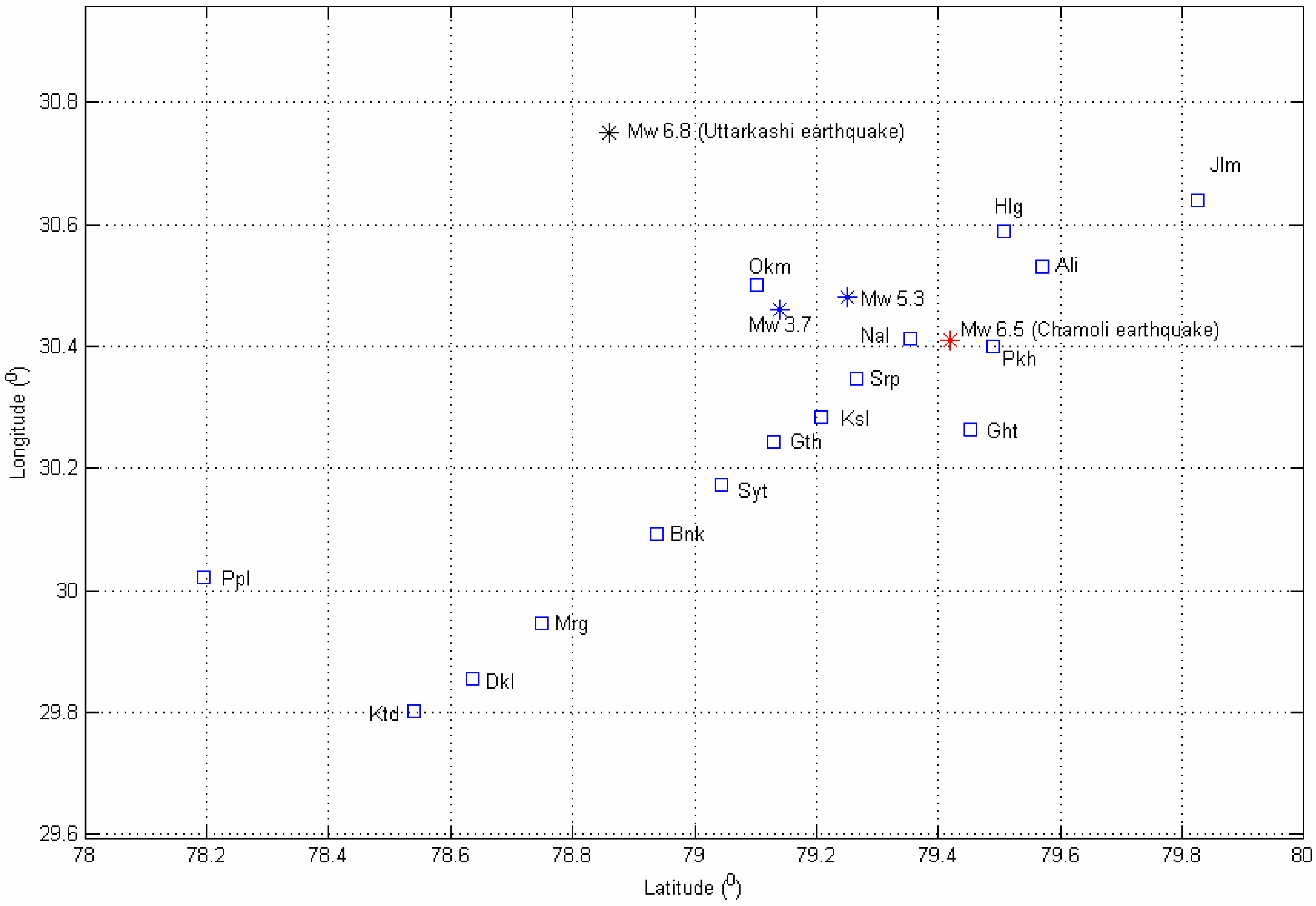
(July 2005 – Feb 2006)






# Seismic Depth Section

# Ground Acceleration Modelling



# Empirical Green's Function Approach

| Ground Acceleration | = | Earthquake source | * | Fault Property | * | Wave propagation |
|---|---|---|---|---|---|---|

$$\ddot{U}_m(t) = \sum_{i=1}^{N} C_i \left( \frac{R}{R_I} \right) \left[ S(t) * \ddot{u}(t - t_{si} - t_{ri}) \right]$$

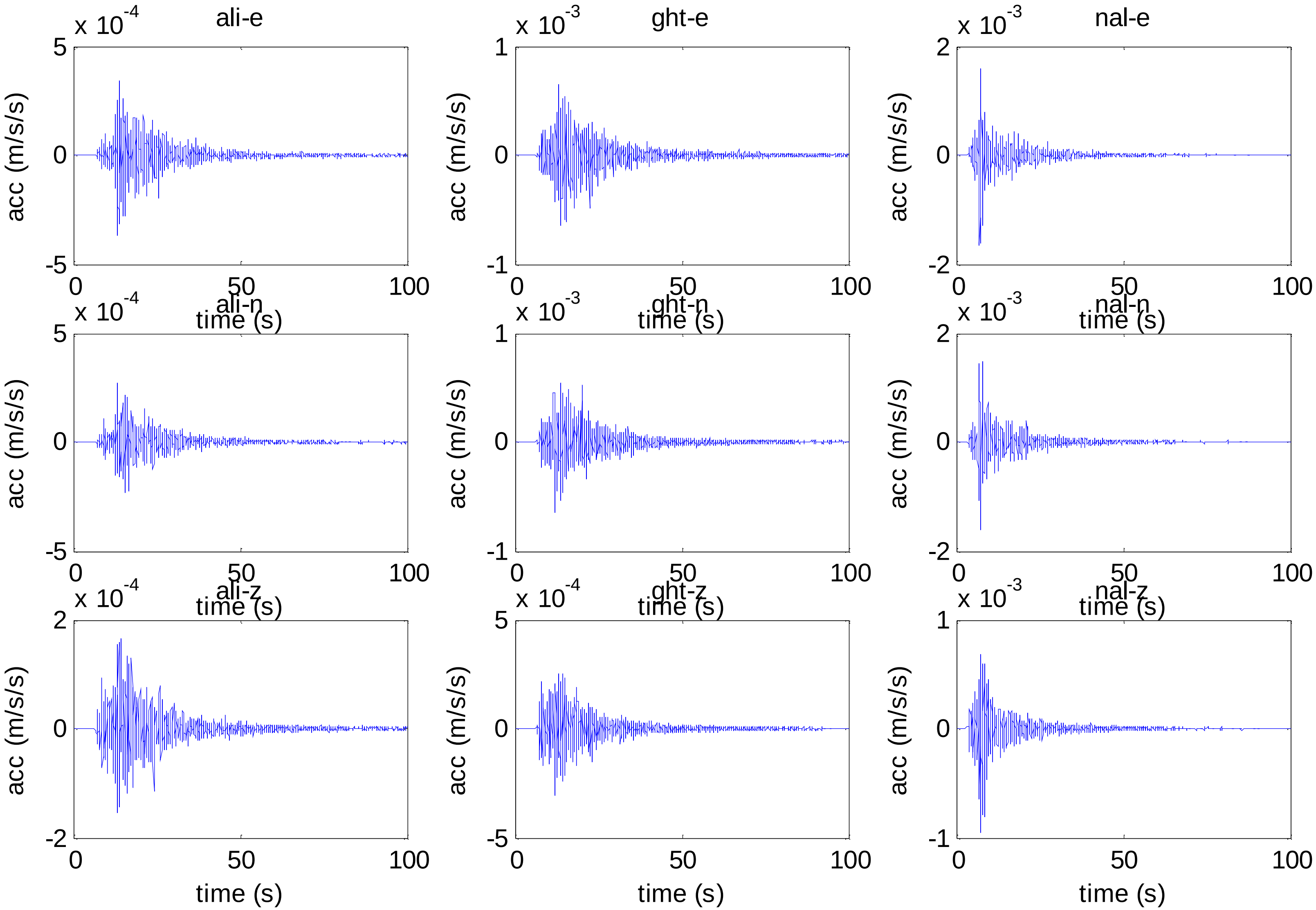
Here u¨(t) is the recorded acceleration (EGF) corresponding to subfault i.

Ci is the ratio of the stress drop in the i-th fault to that of the small aftershock event.

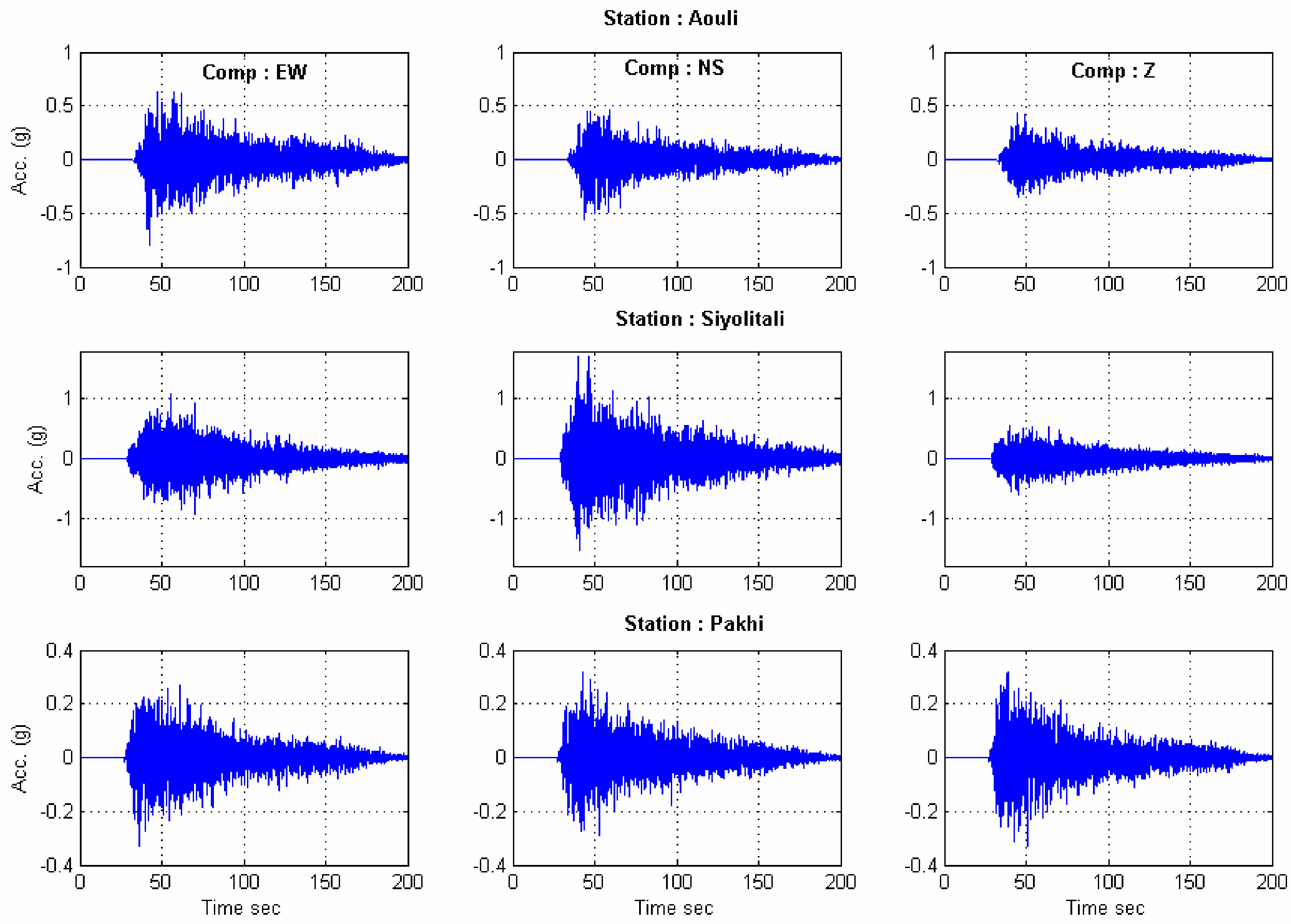
Ri is the distance of the i-th fault to the surface station and R is the hypocentral distance between the station and the source of the aftershock.

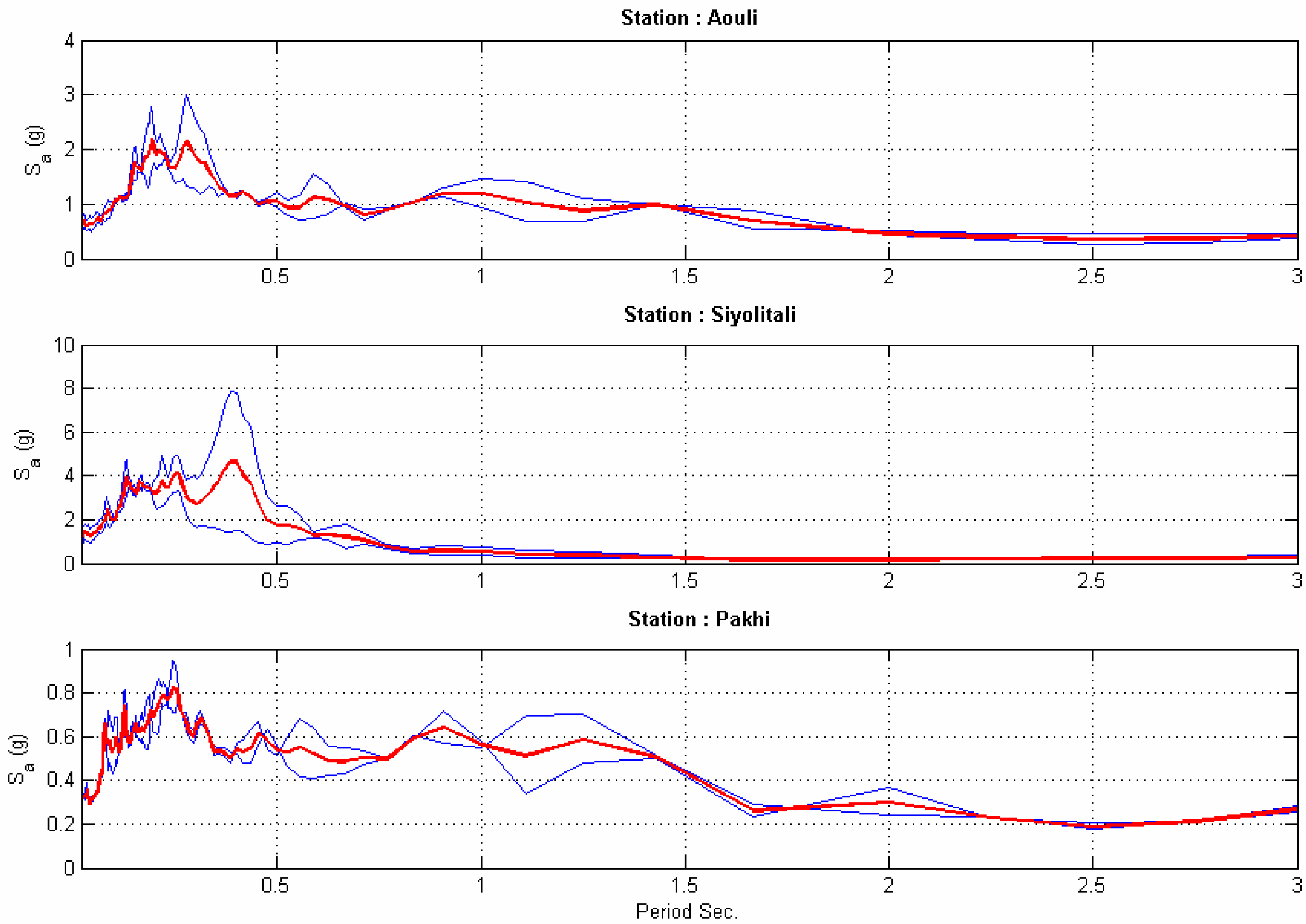
The shear-wave travel time tsi from i-th fault to the station can be computed from the velocity model

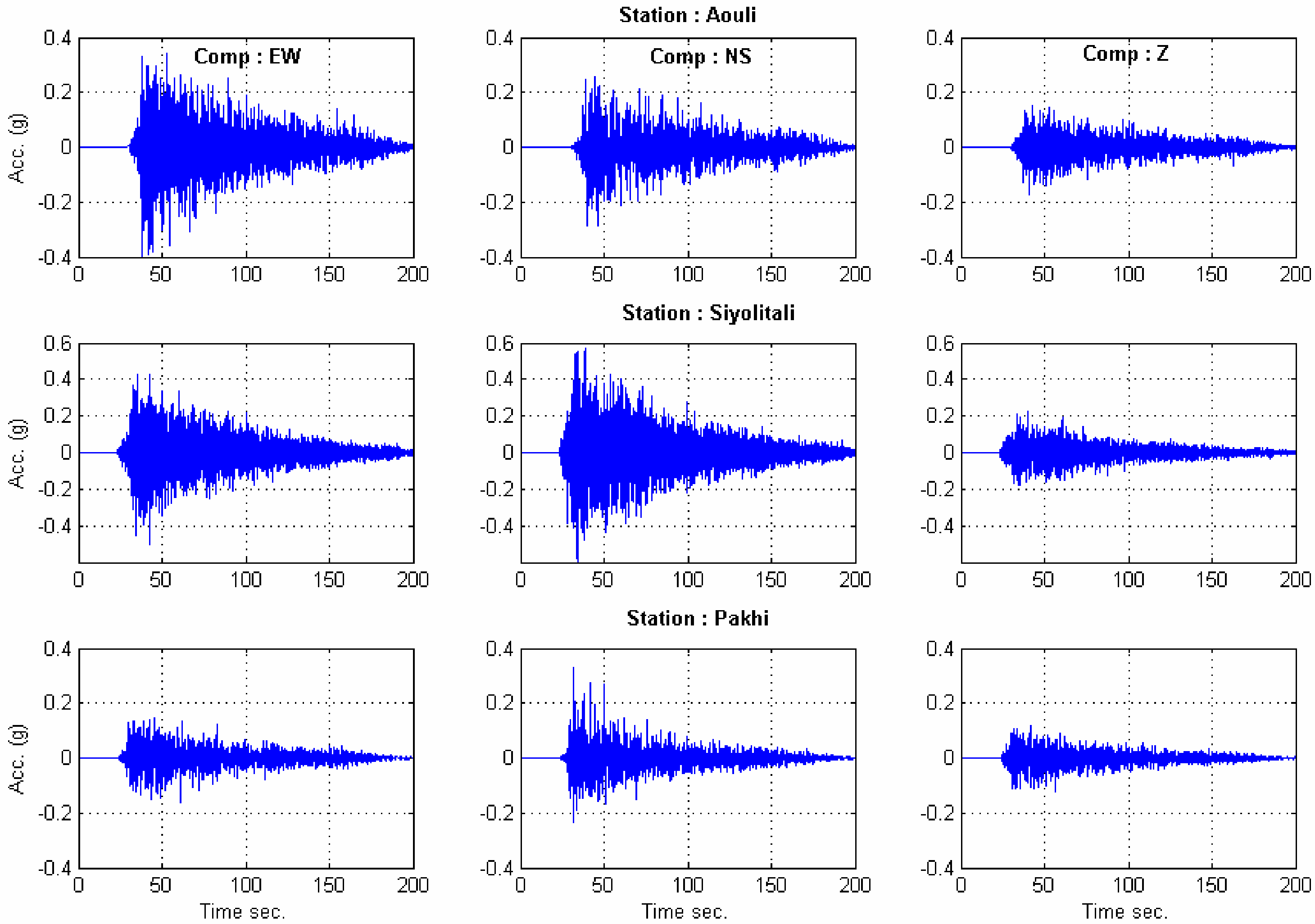
# Recorded Ground Acceleration

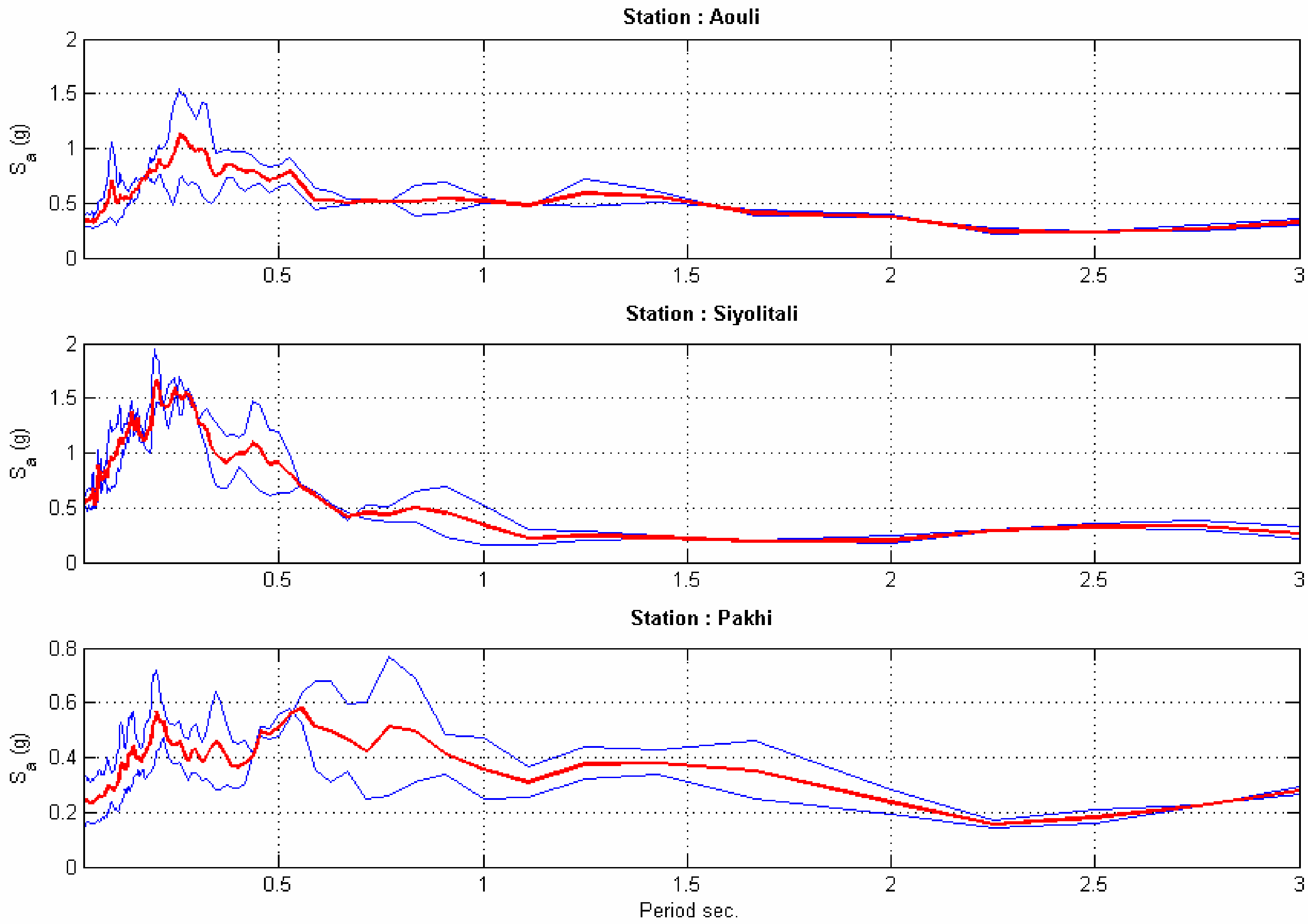


# Modelled Ground Acceleration *(for M=8)*




Station : Aouli
Sa (g)
Station : Siyolitali
Sa (g)
Station : Pakhi
Sa (g)
Period Sec.


Station : Aouli
Comp : EW
Comp : NS
Comp : Z
Acc. (g)
Station : Siyolitali
Acc. (g)
Station : Pakhi
Acc. (g)
Time sec.
Time sec.
Time sec.


Station : Aouli
Station : Siyolitali
Station : Pakhi
$S_a$ (g)
Period sec.
0
0.2
0.4
0.6
0.8
0.5
1
1.5
2
2.5
3


Thank You
Shyam S. Rai
raiss@rediffmail.com