

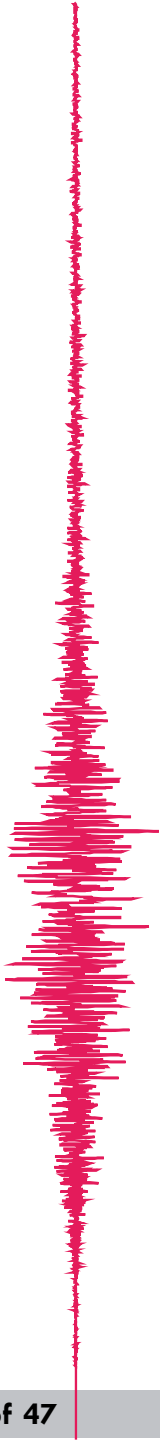


National Earthquake Monitoring and Research Center
Department of Mines and Geology

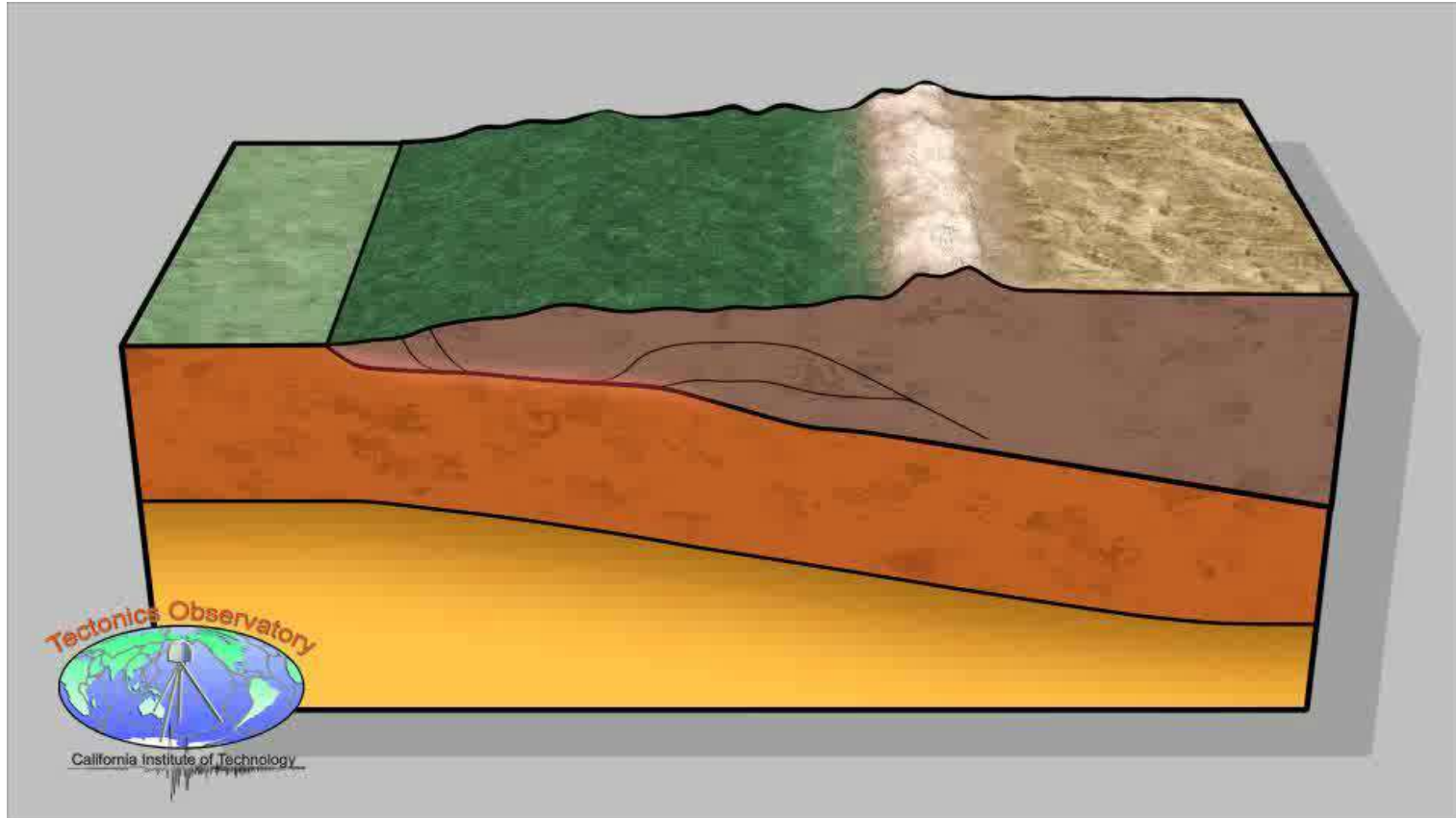


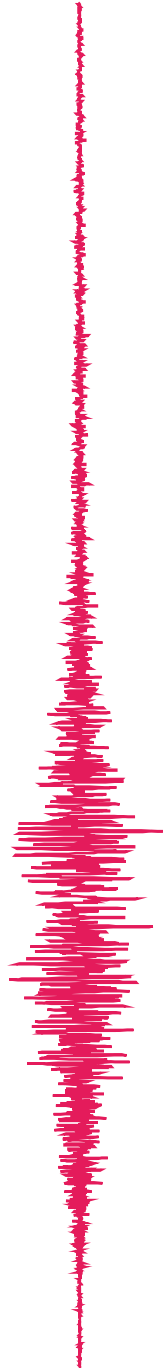
Seismicity and Seismotectonic related to Jajarkot Earthquake 2023

Dr. Lok Bijaya Adhikari
NEMRC/DMG

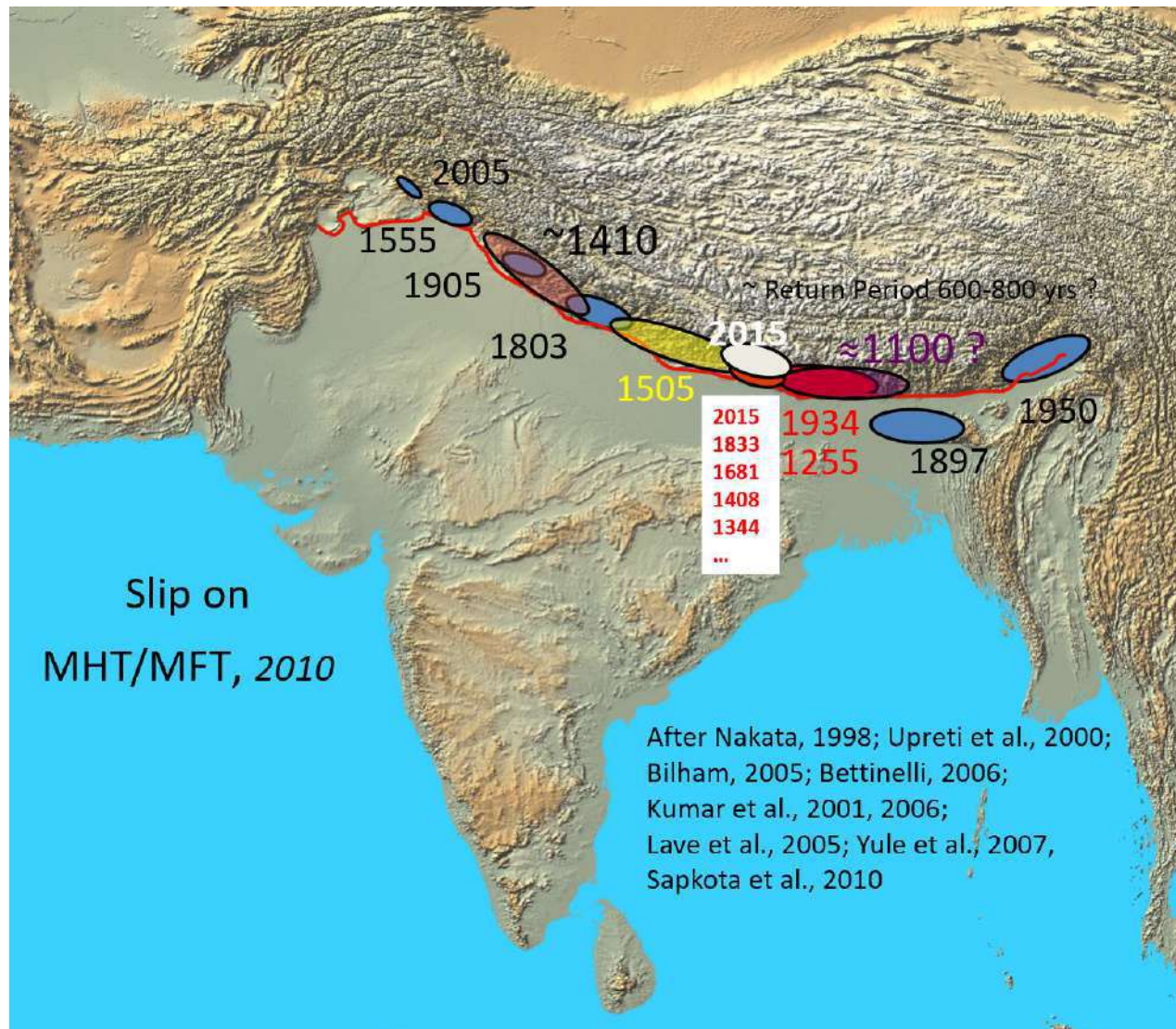


Why earthquakes in Nepal?

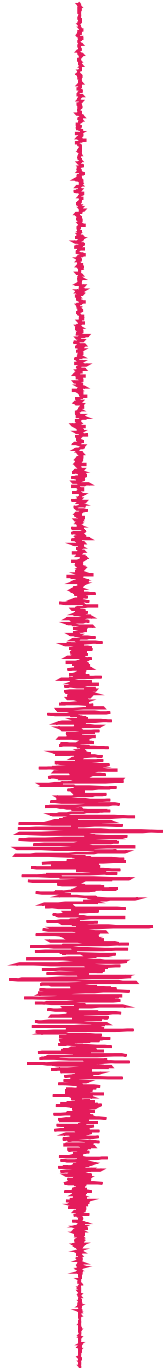
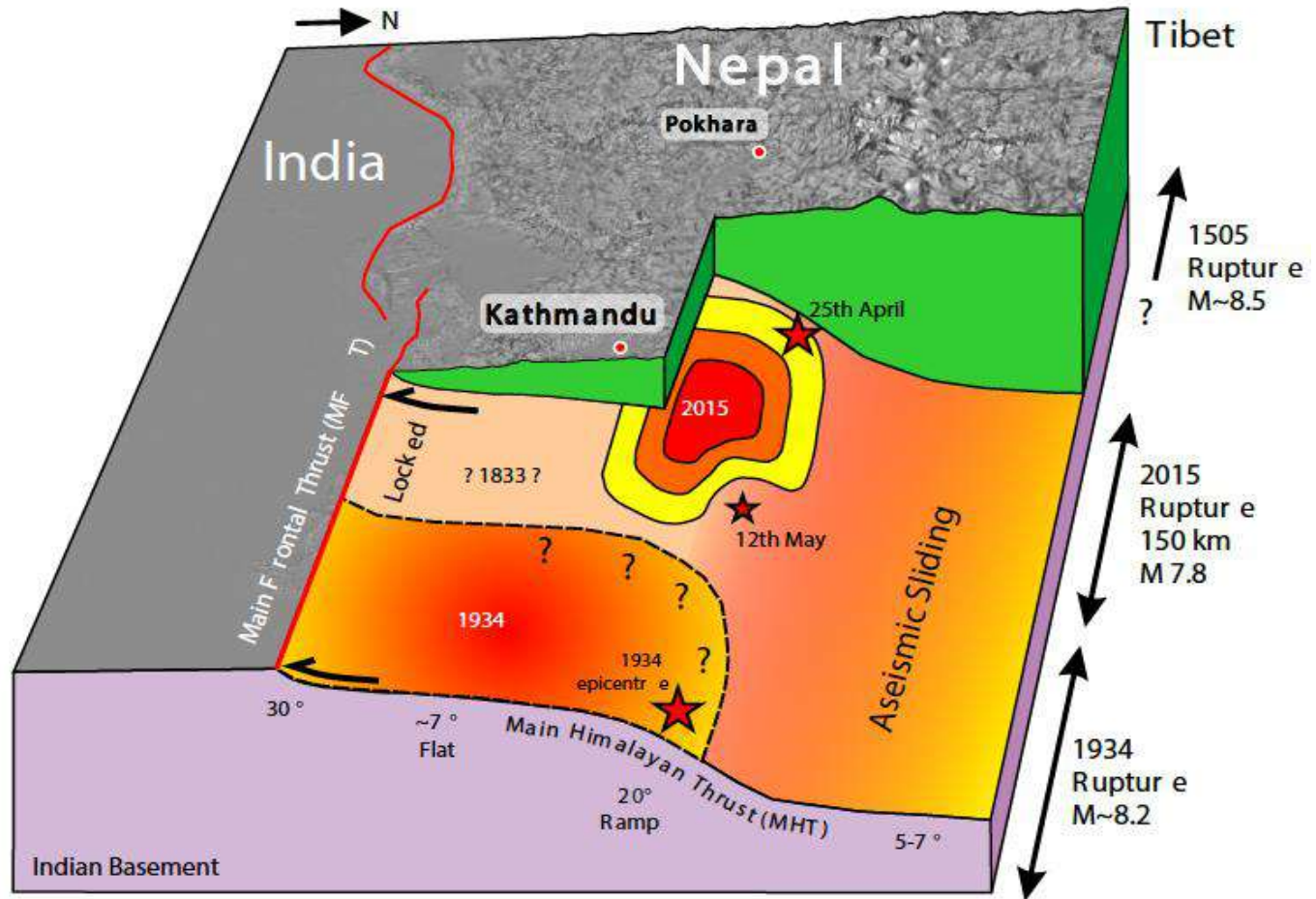


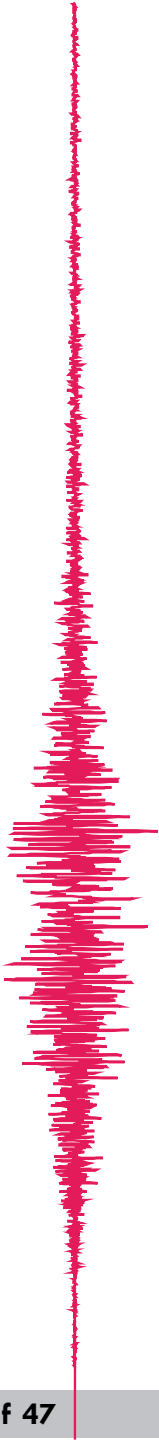


Past Earthquakes

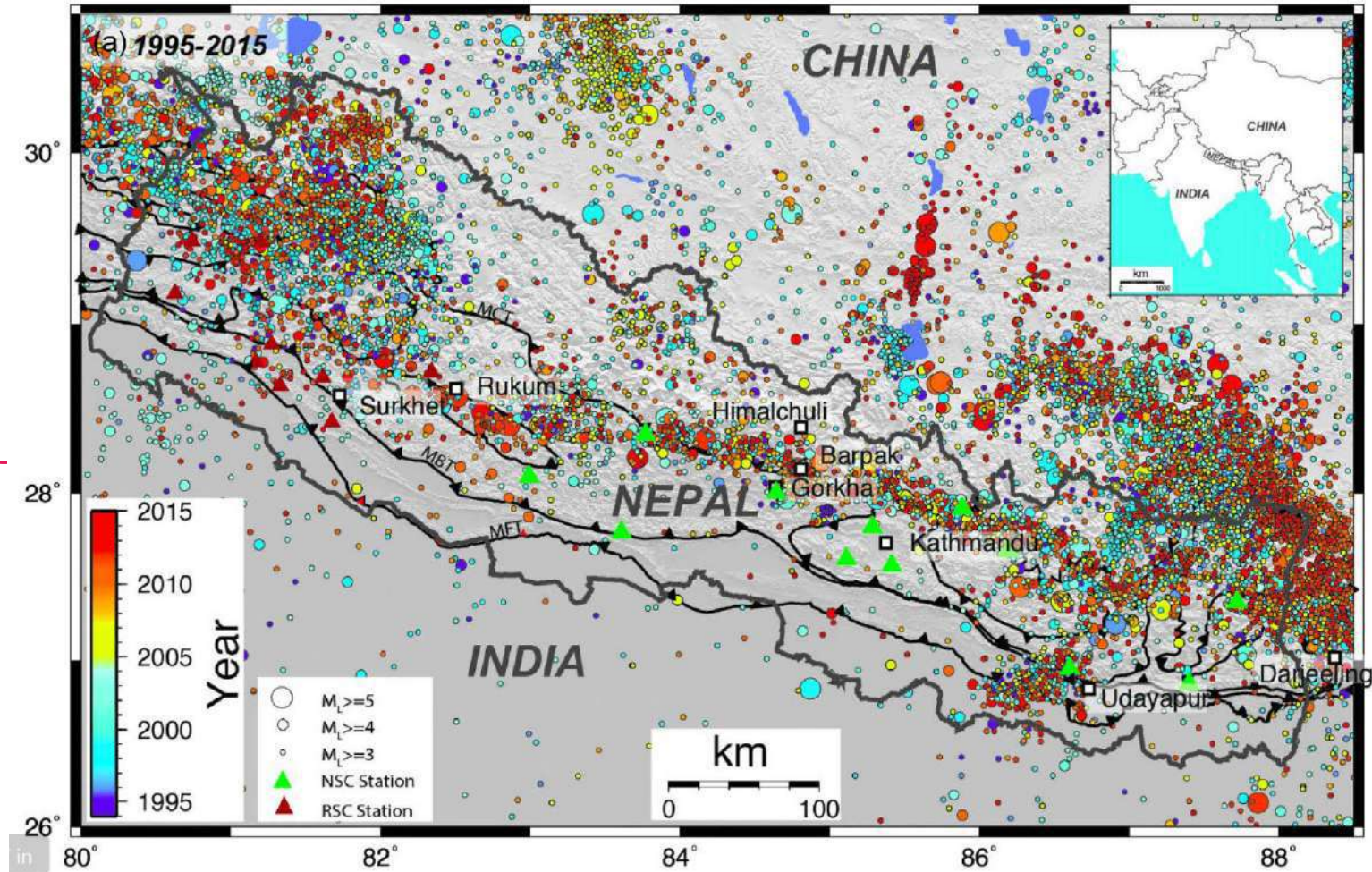


Recent Earthquake Ruptures and Seismic Gap

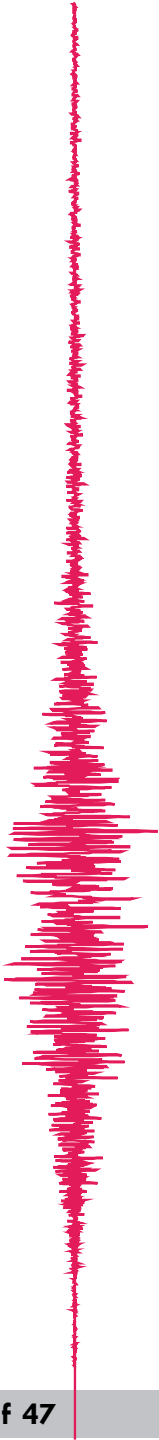




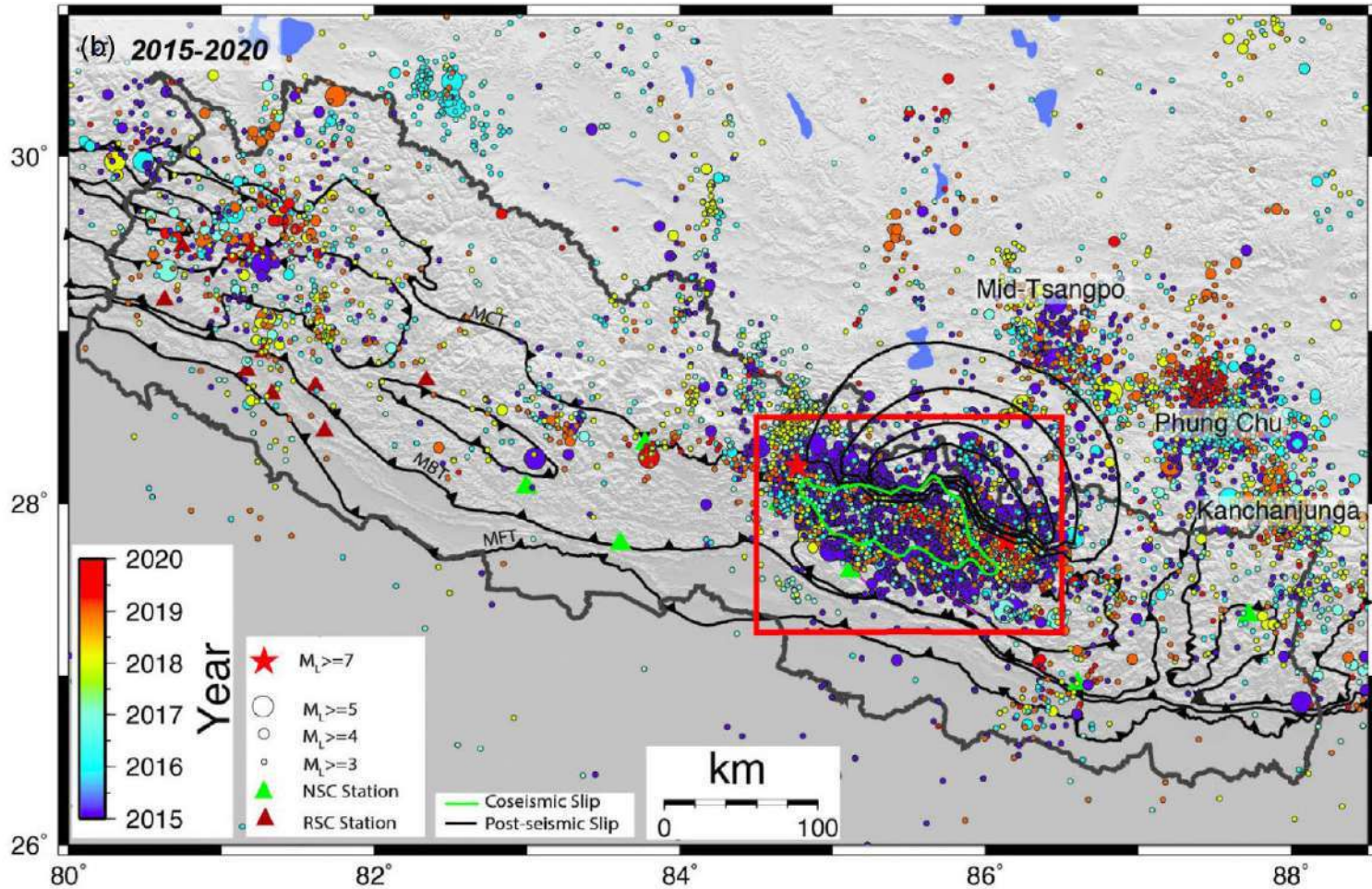
Interseismic Seismicity



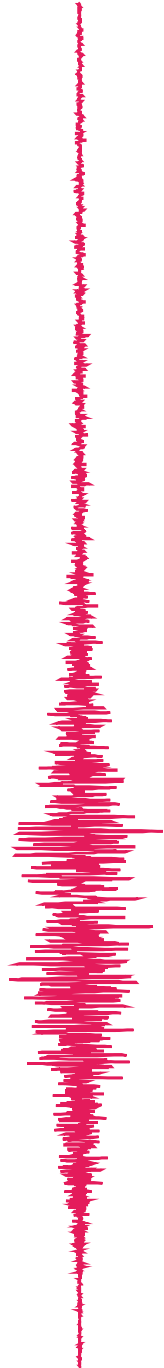
Adhikari et. al. 2023



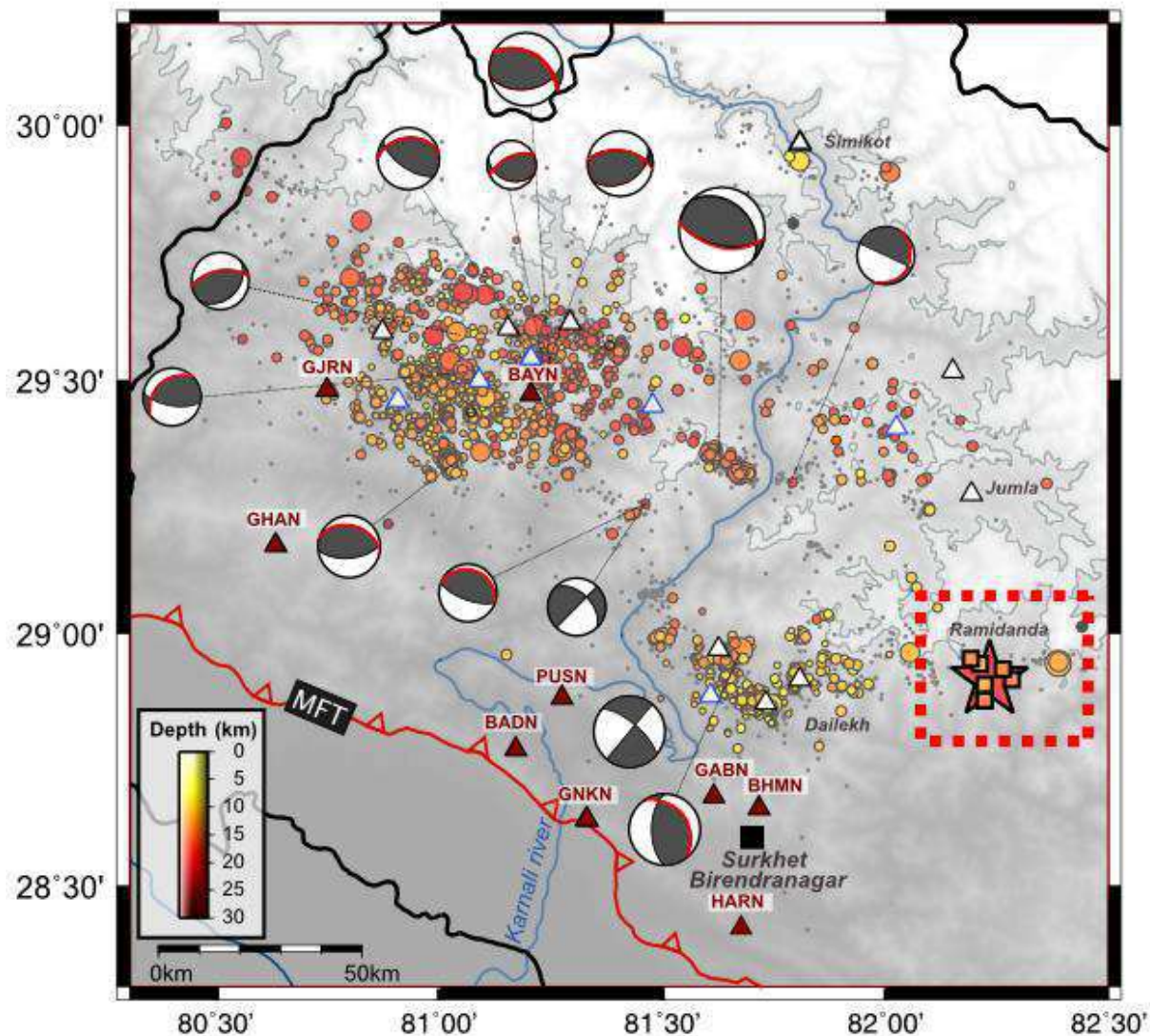
Seismicity after Gorkha Earthquake 2015

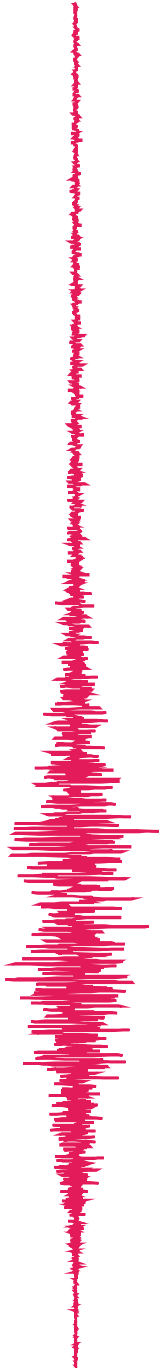


Adhikari et. al. 2023



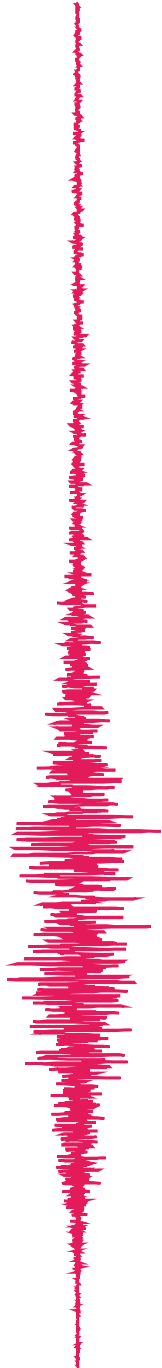
Seismotectonics





Event

- Origin time: 2023/11/03 23:47
वि.सं. २०८० कार्तिक १७ गते राति ११:४७
- Local Magnitude: 6.4
- Moment Magnitude: 5.7
- Focal depth: 12 km
- Epicenter: Ramidanda, Jajarkot District



Damage

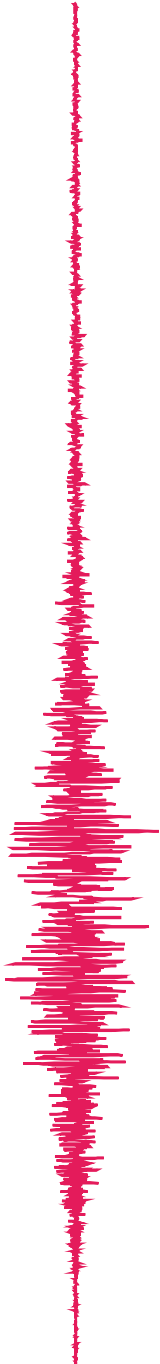
■ Casualties

- 157 killed
- 375 severely injured

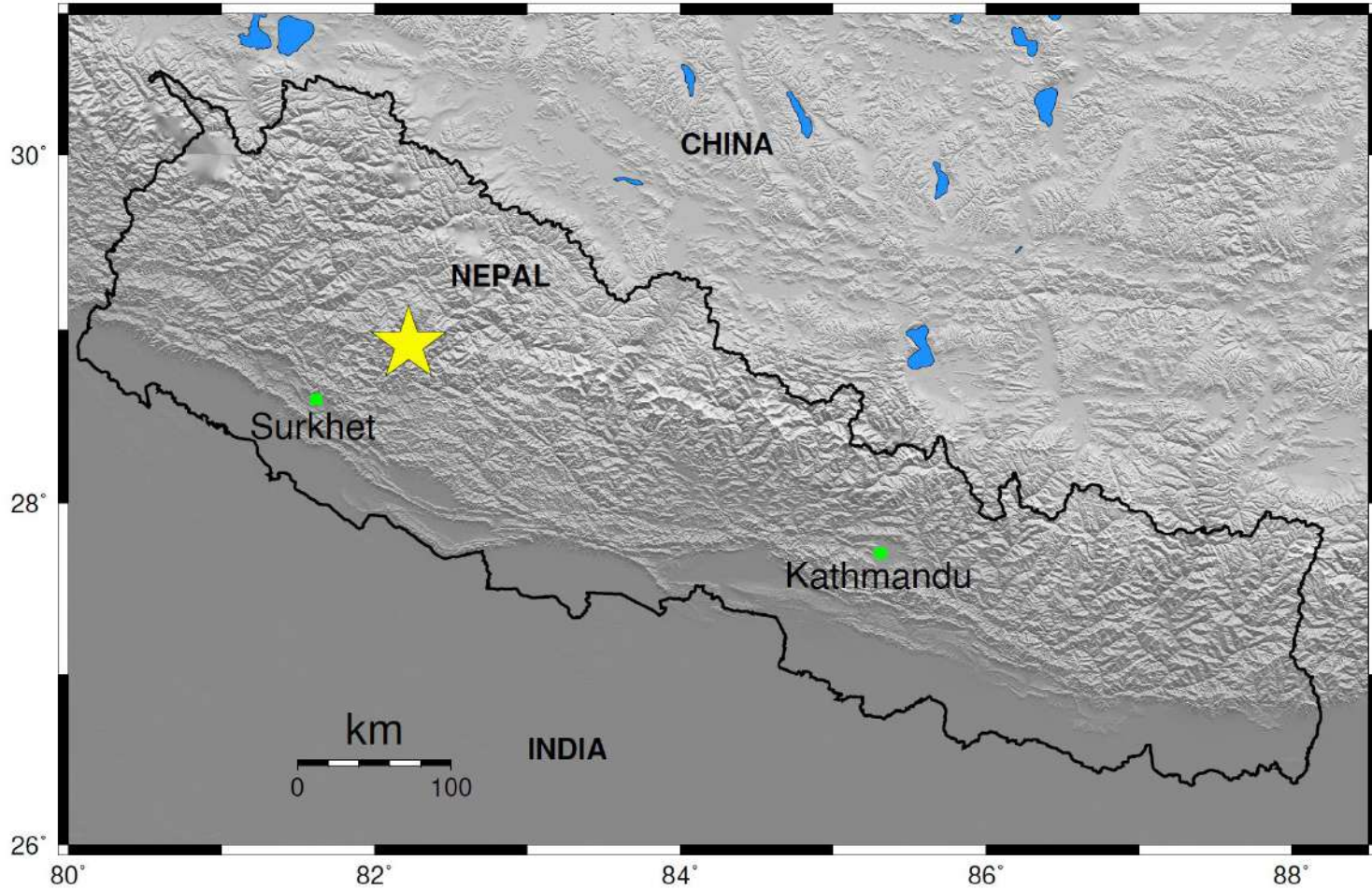
■ Houses

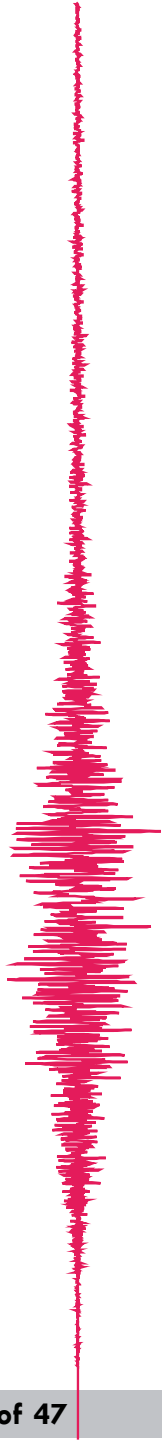
- 26,512+ fully damaged
- 39,374 partially damaged

(Jajarkot, Rukum West, Dailekh, Salyan, Surkhet, Jumla and Kalikot)

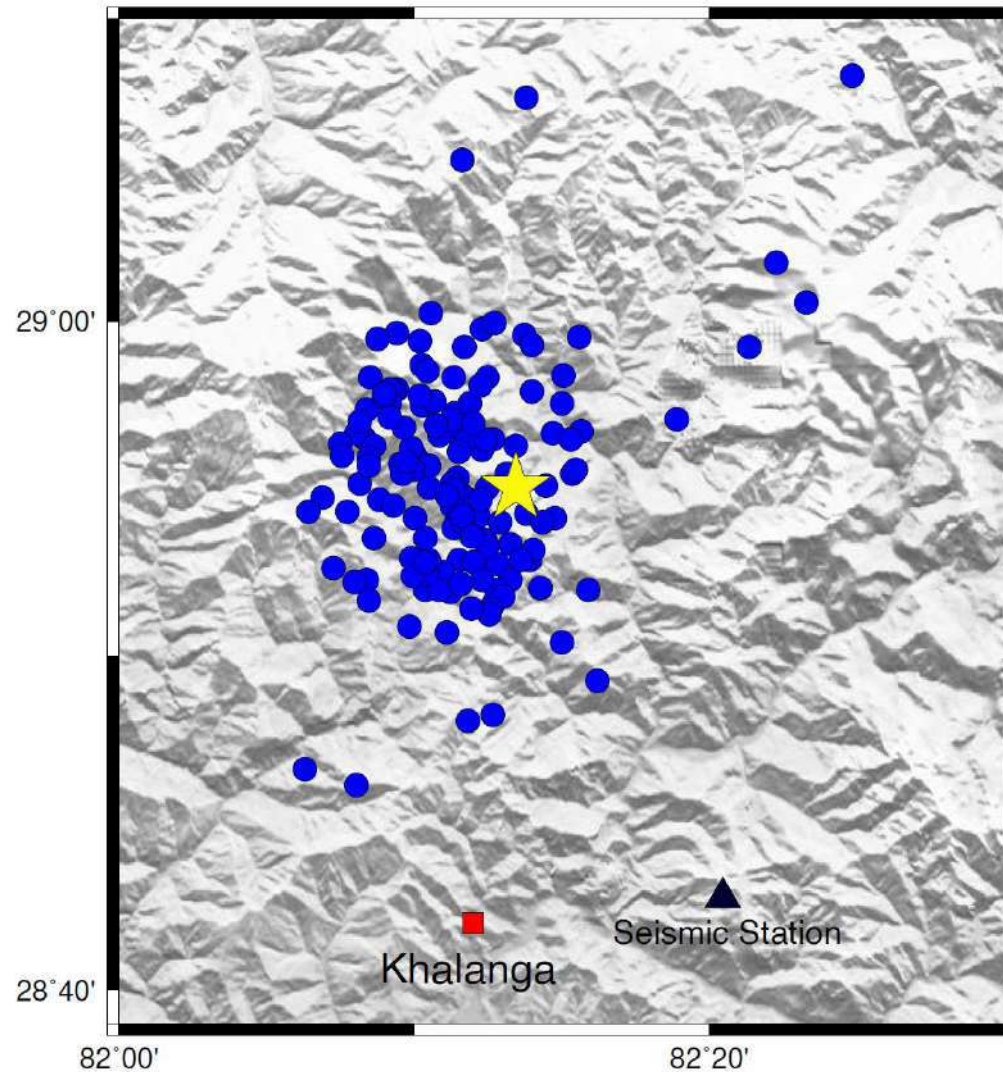


Location

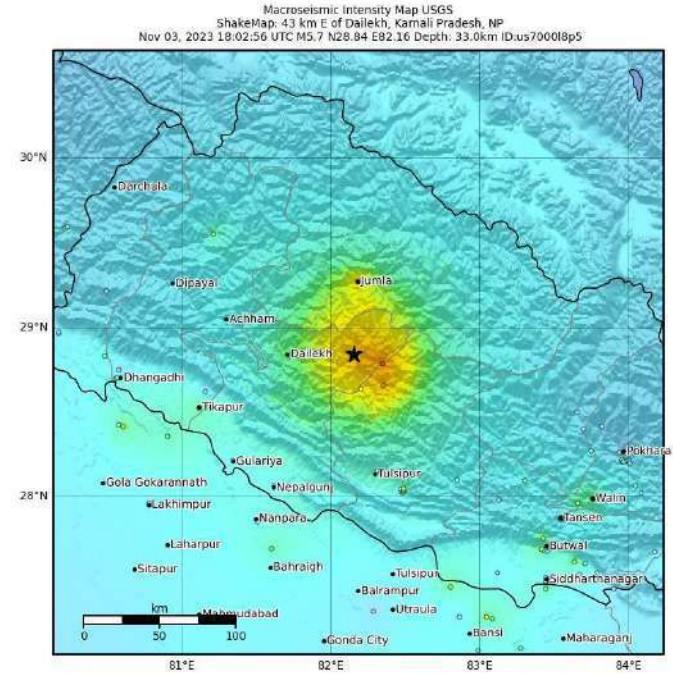
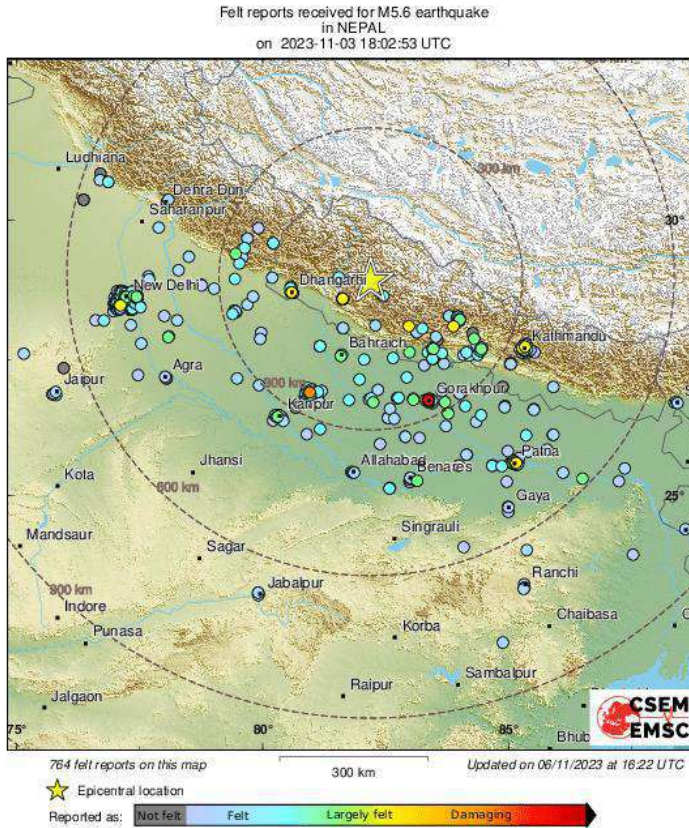
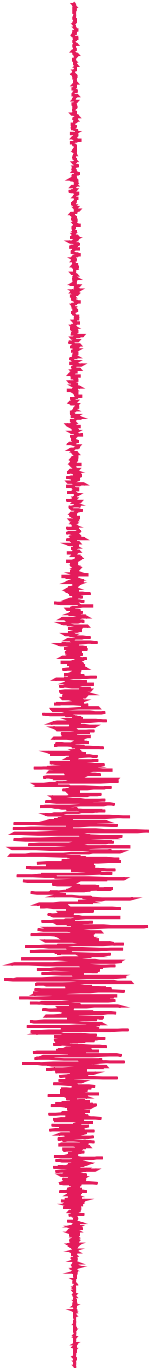




Epicenter and Aftershocks



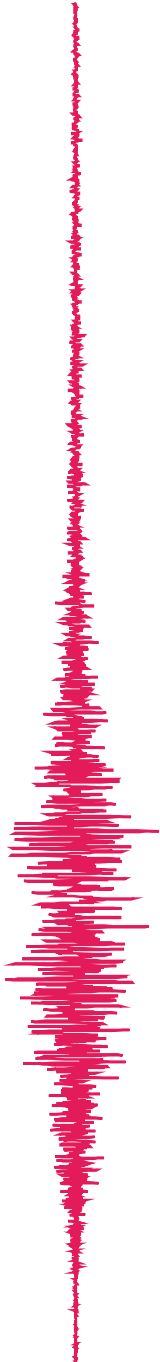
Intensity by Other Agencies



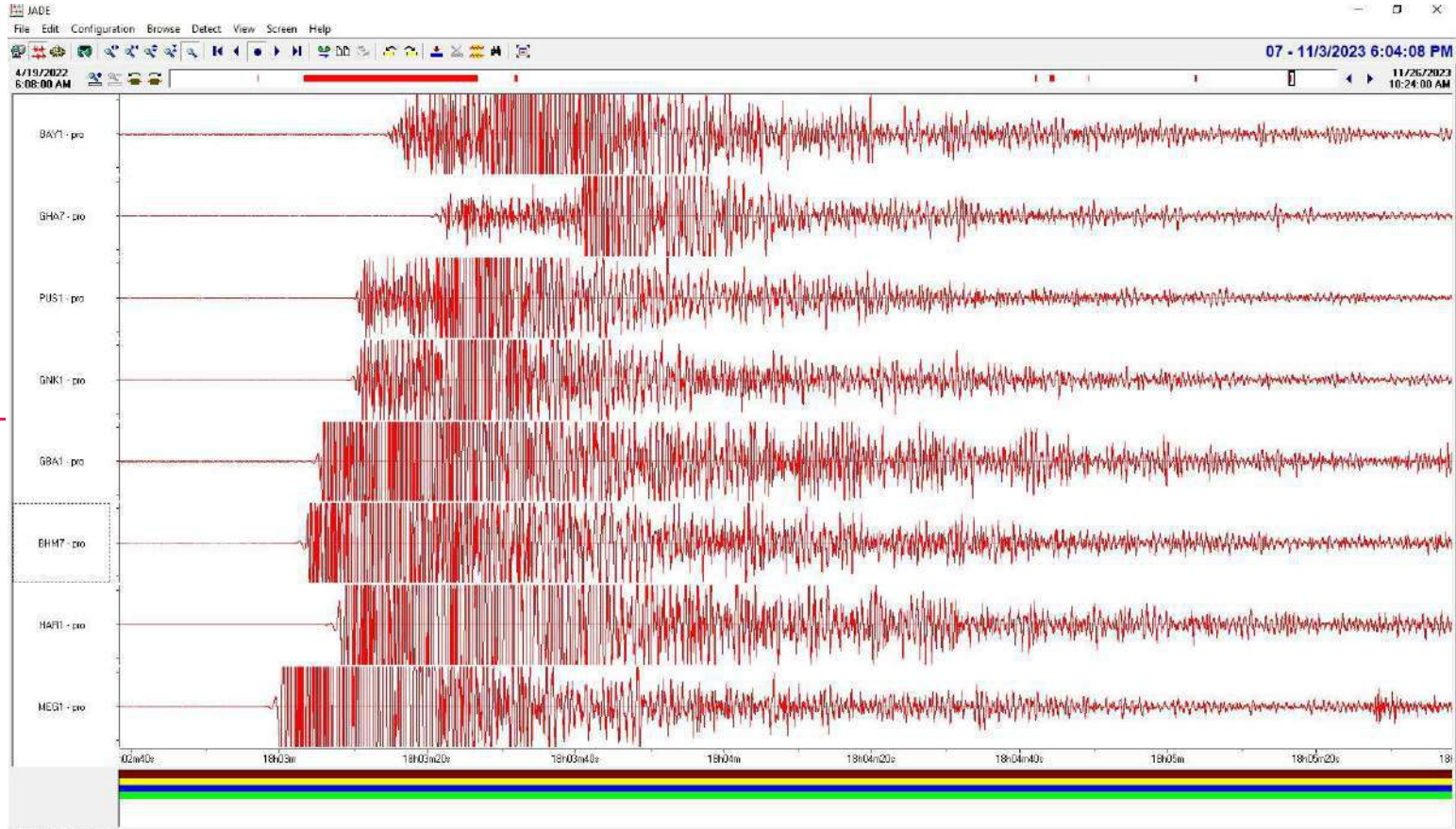
SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	None	None	None	Very light	Light	Moderate	Moderate/heavy	Heavy	Very heavy
PGA(m/s ²)	<0.0464	0.297	2.76	6.2	11.5	21.5	40.1	74.7	>139
PGV(cm/s)	<0.0215	0.135	1.41	4.65	9.64	20	41.4	85.8	>178
INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X

Scale based on Worden et al. (2012) Version 8: Processed 2023-11-21T15:02:03Z
 △ Seismic instrument ○ Reported Intensity ★ Epicenter



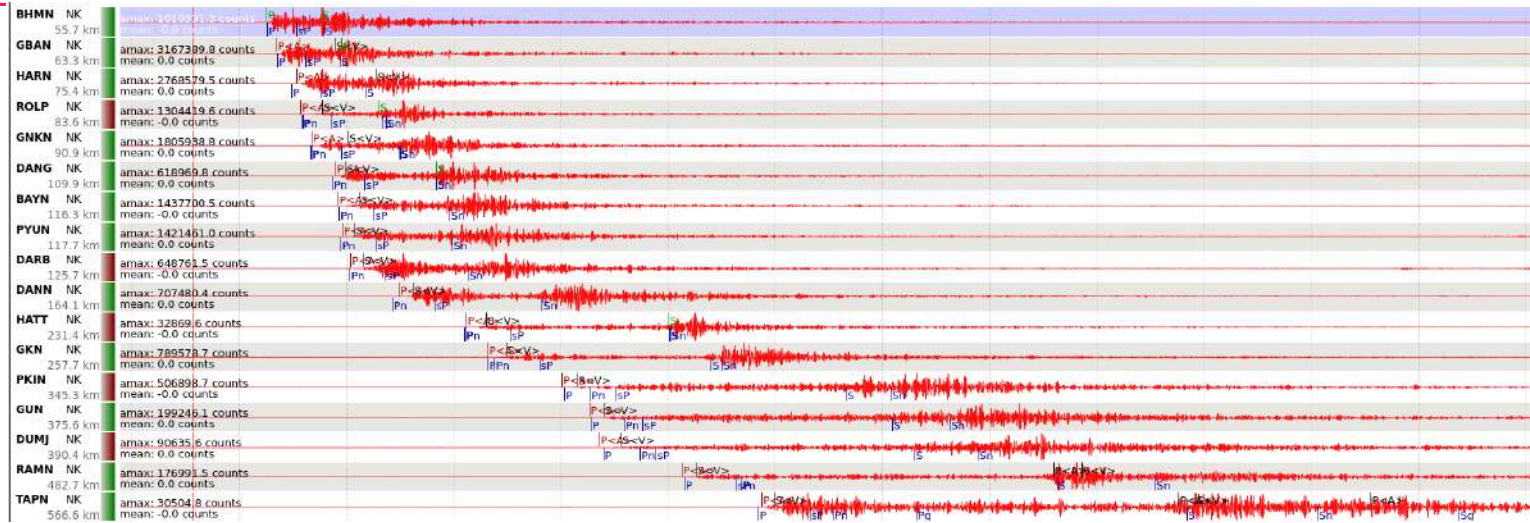
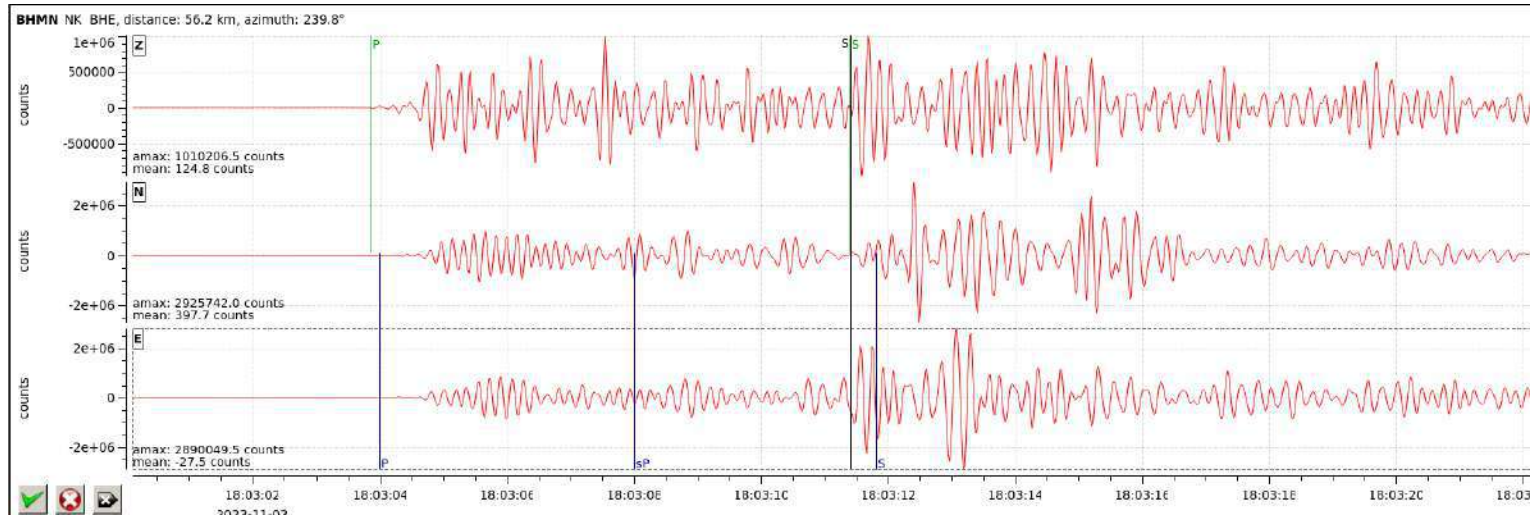
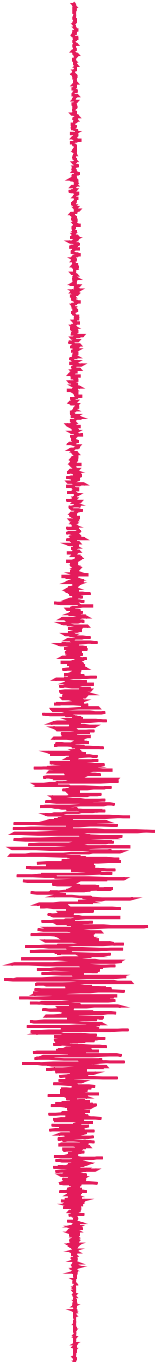


Mainshock at SC, Surkhet

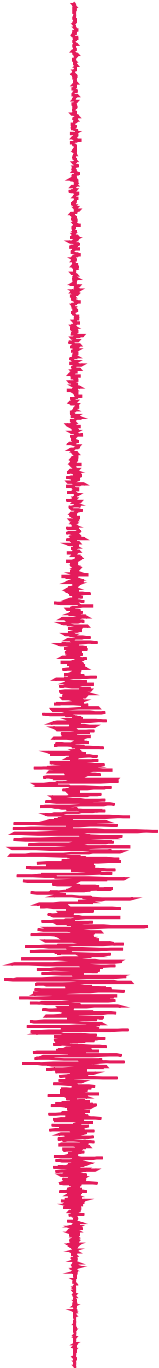
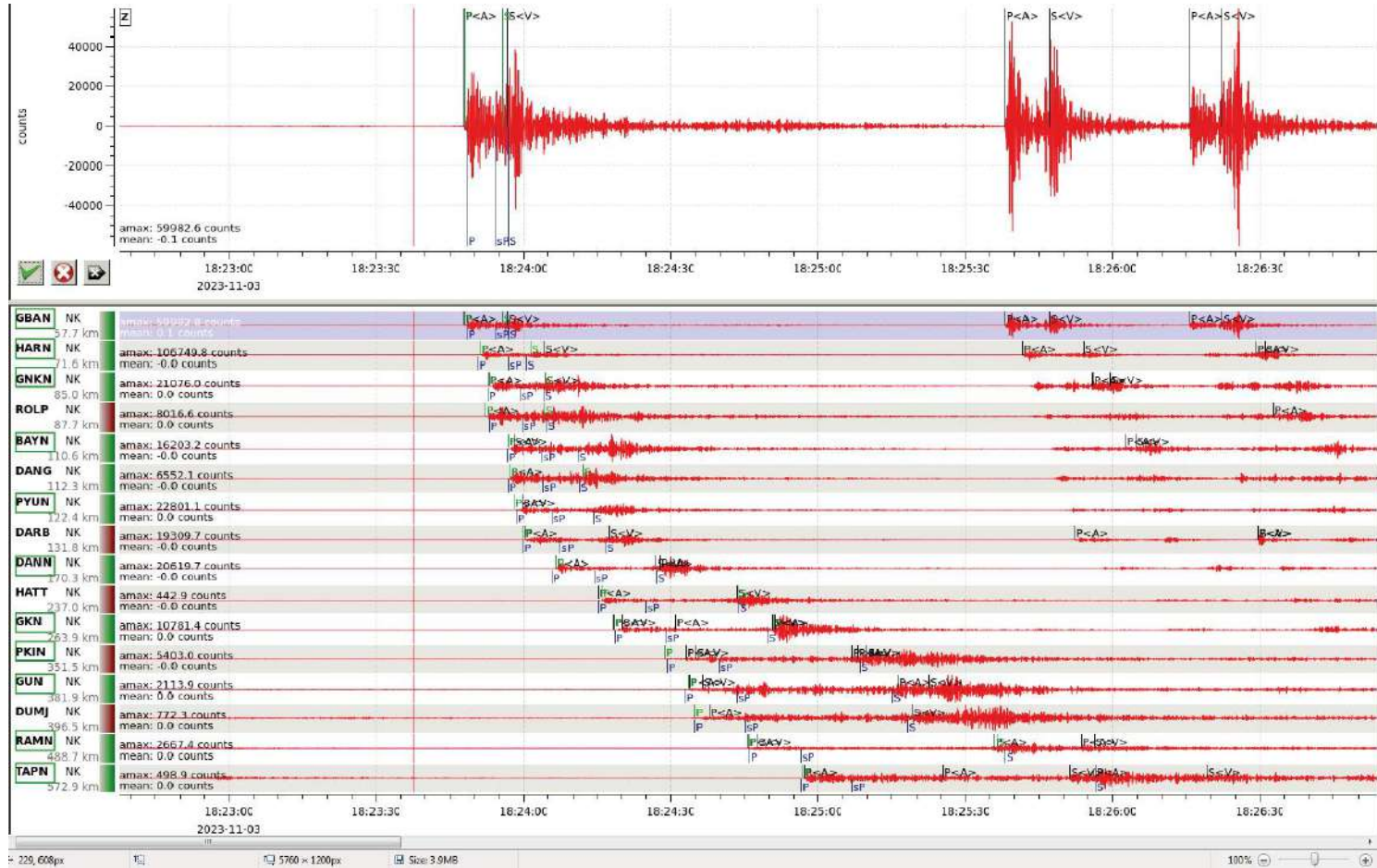


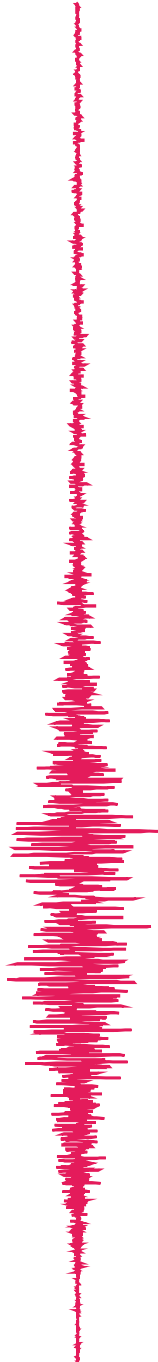


Signal of the Mainshock

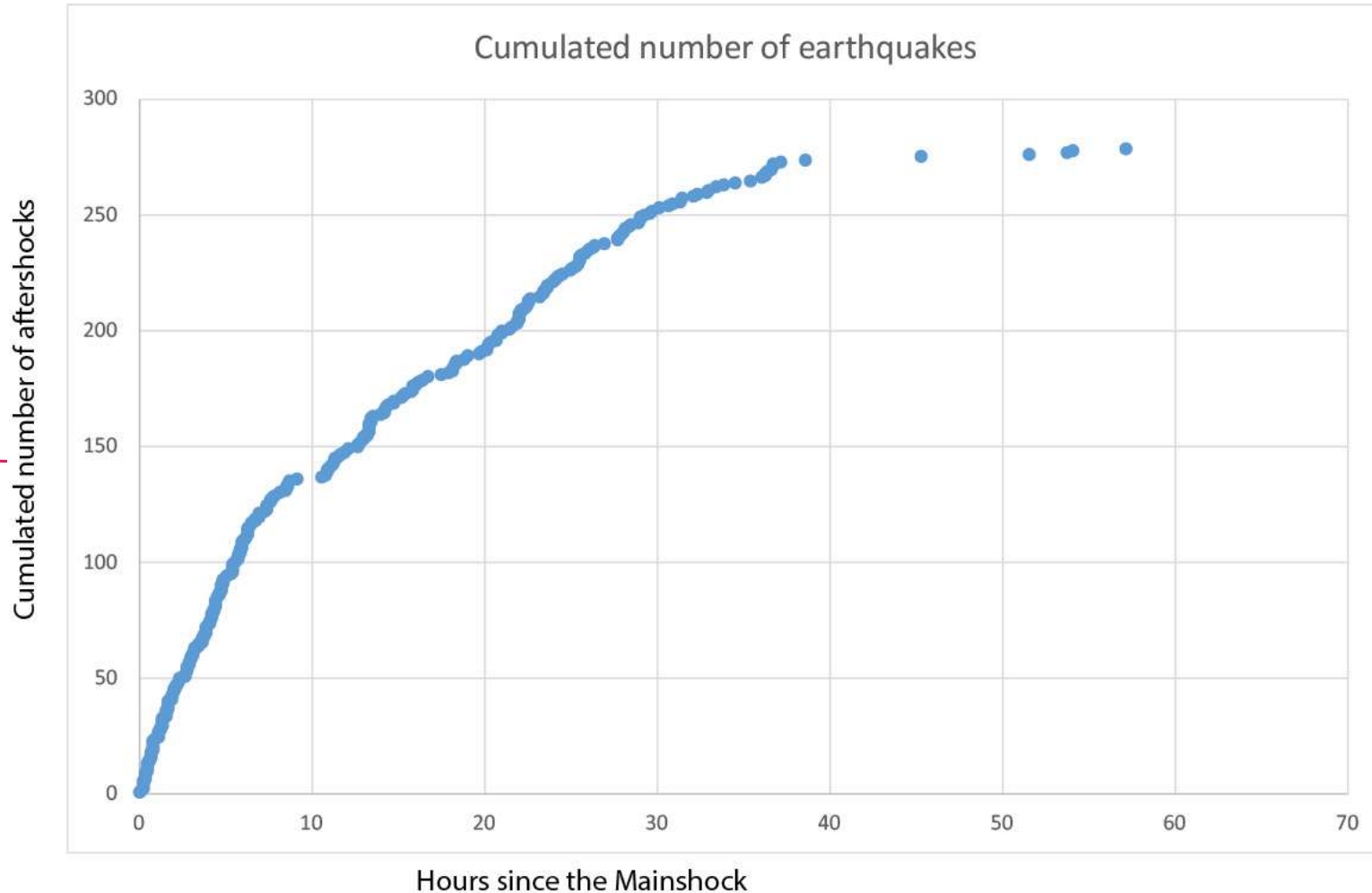


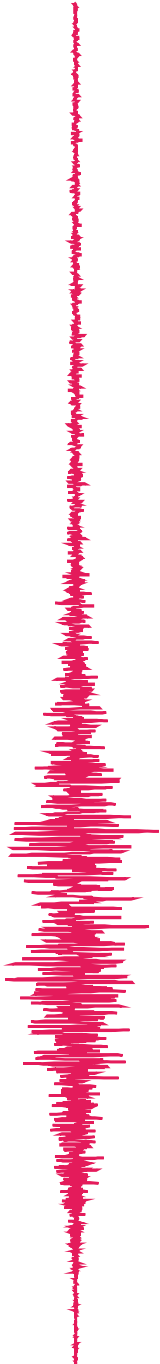
Signals of the Aftershocks



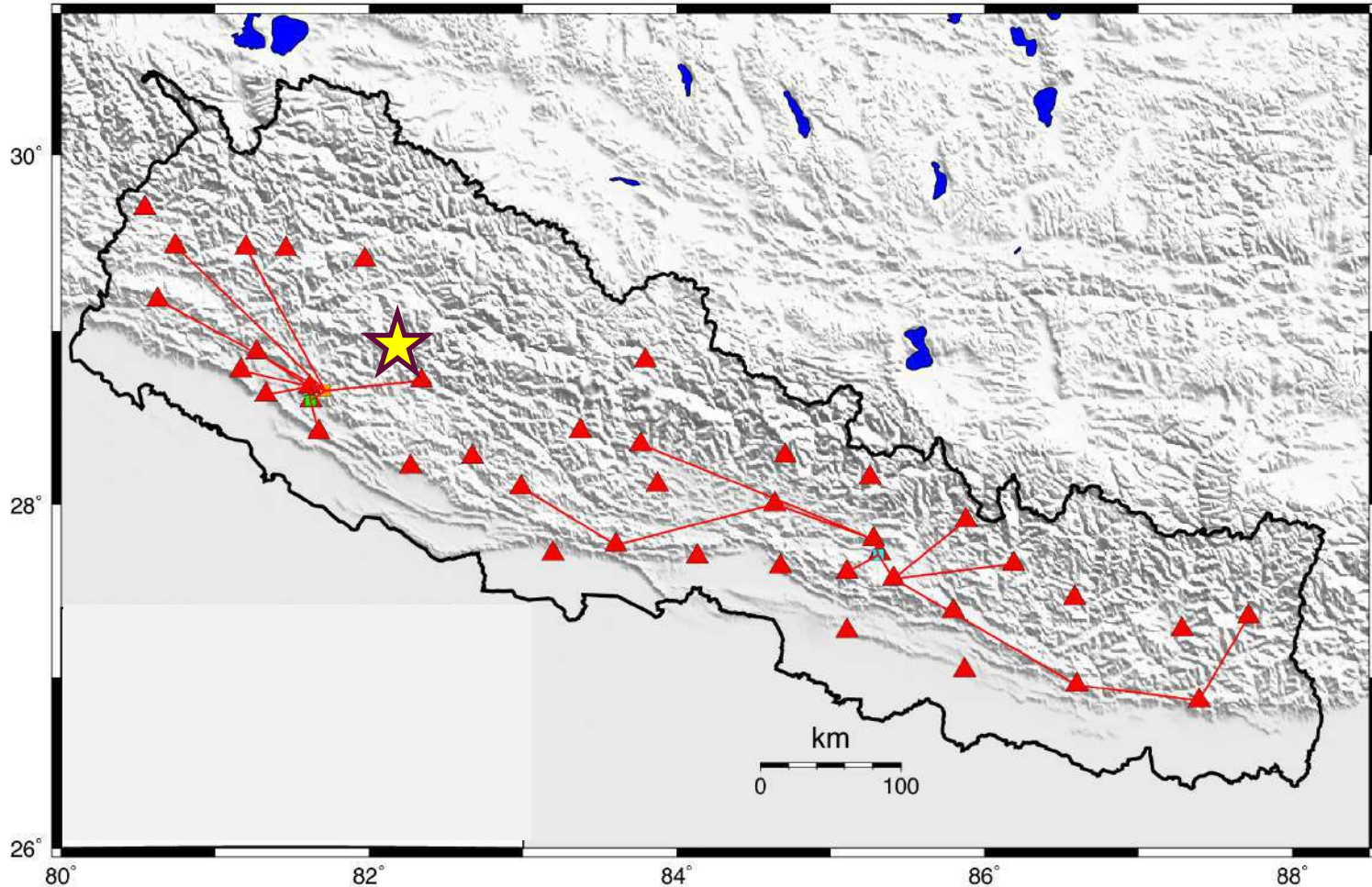


Aftershocks during the first hours



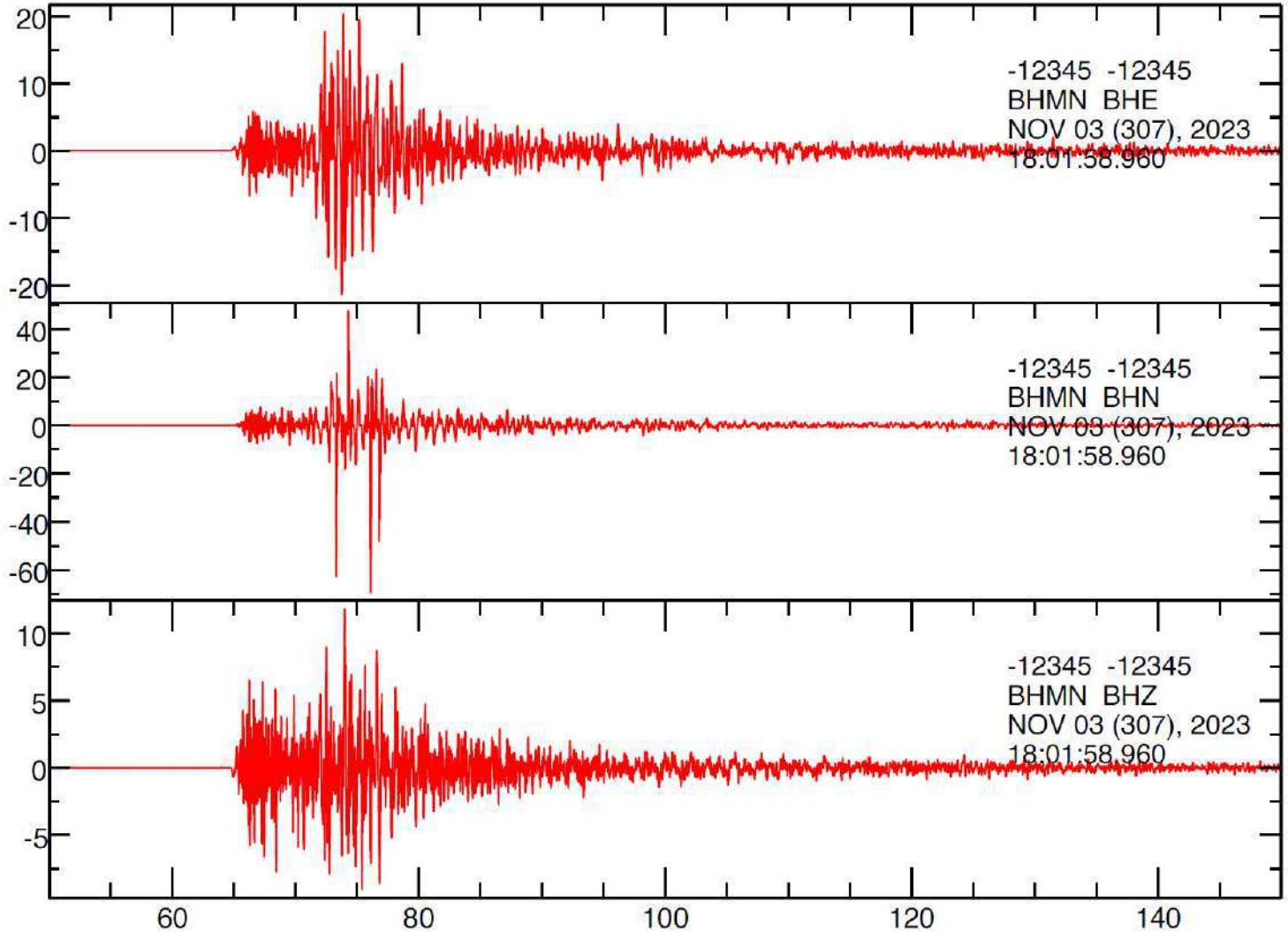
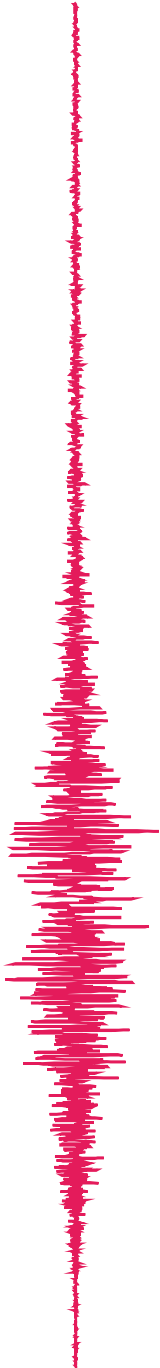


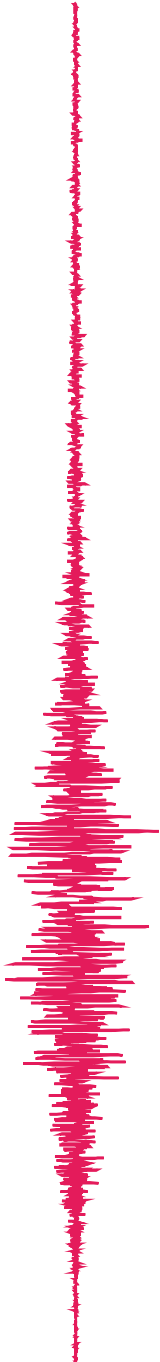
Seismic Network



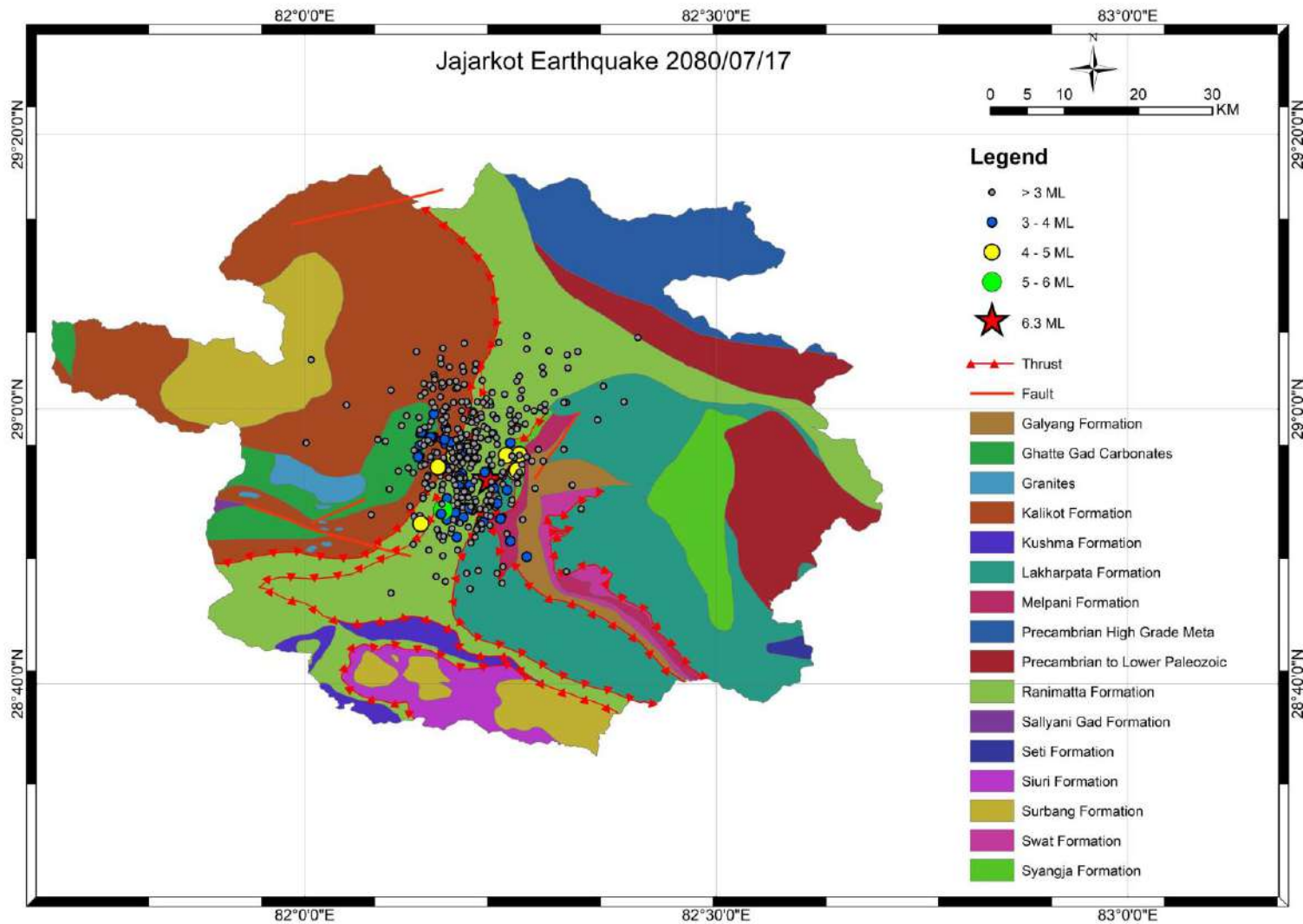


PGA



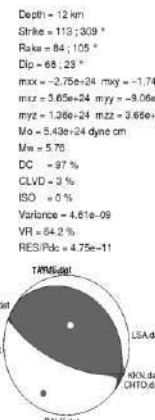
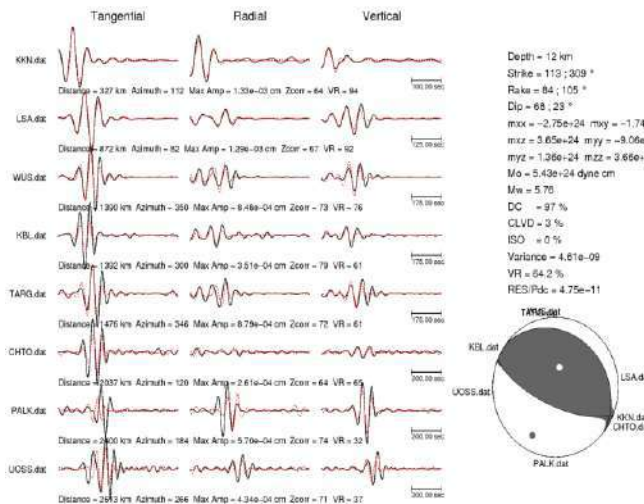
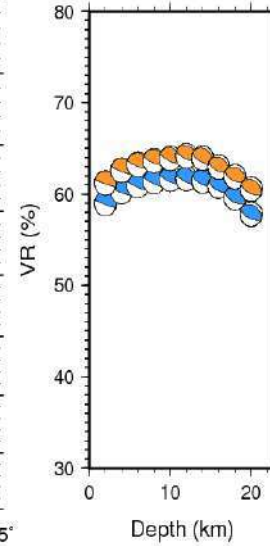
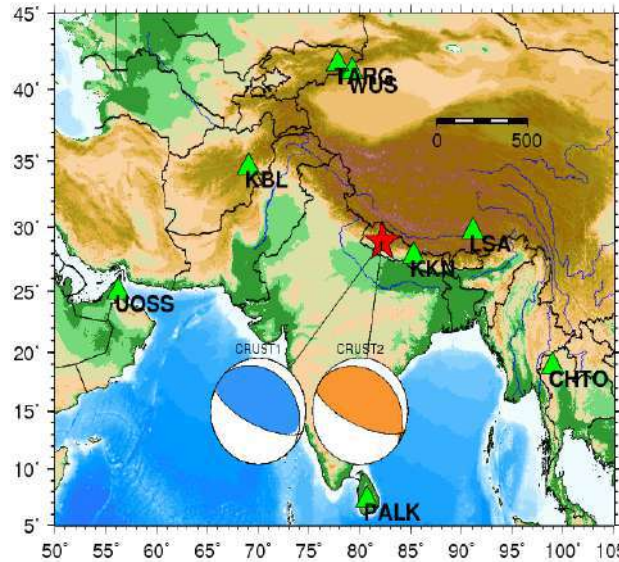
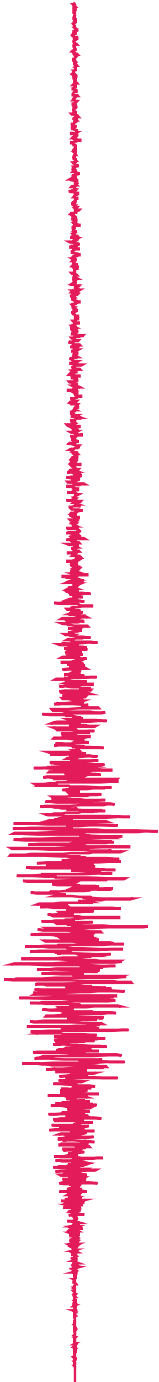


Geology and Aftershocks

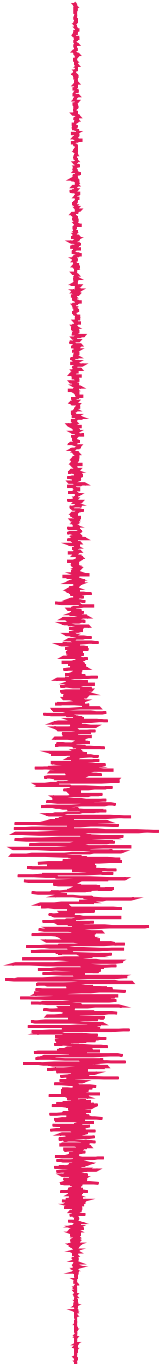




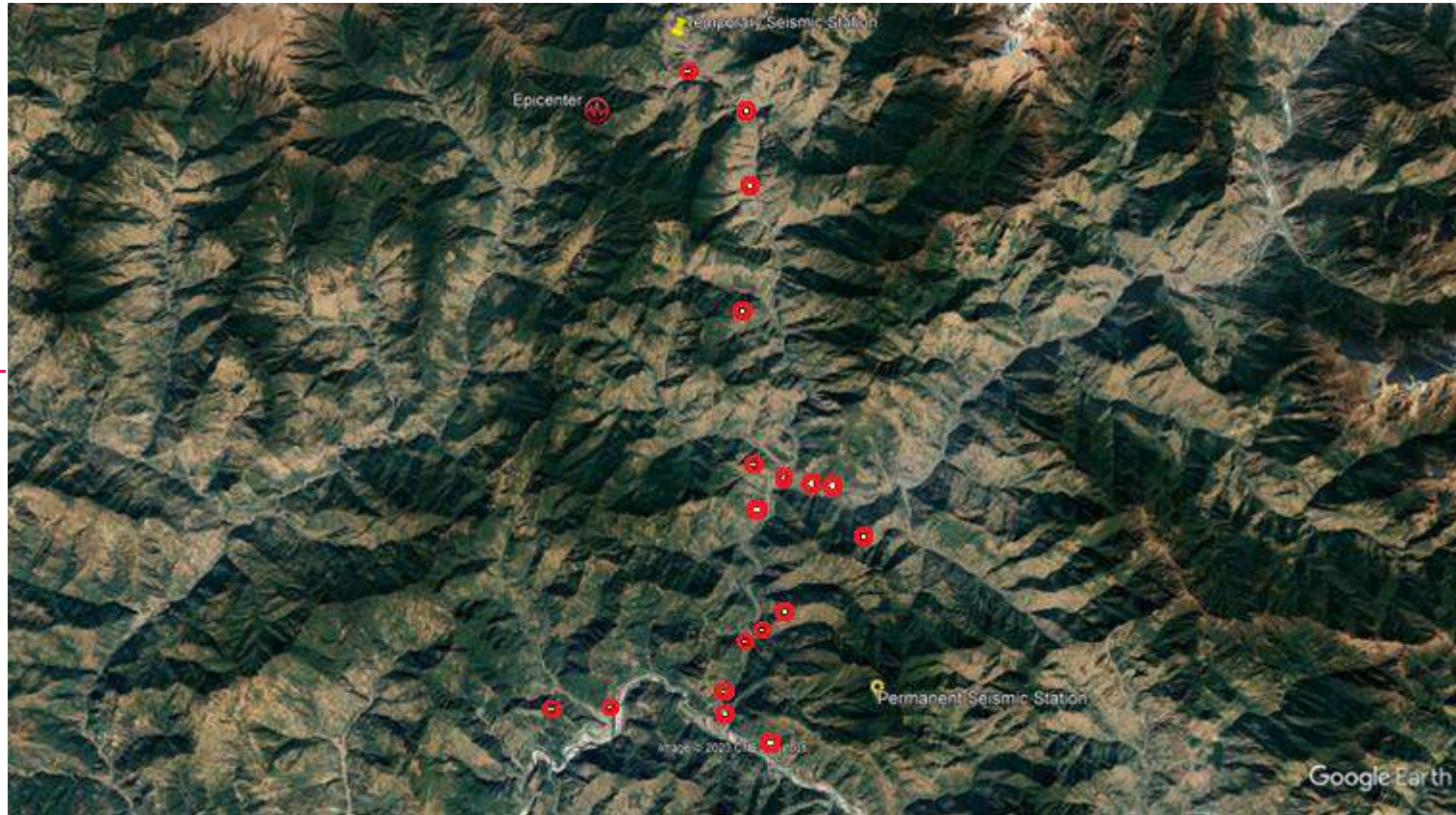
Focal Mechanism, Mw and Depth

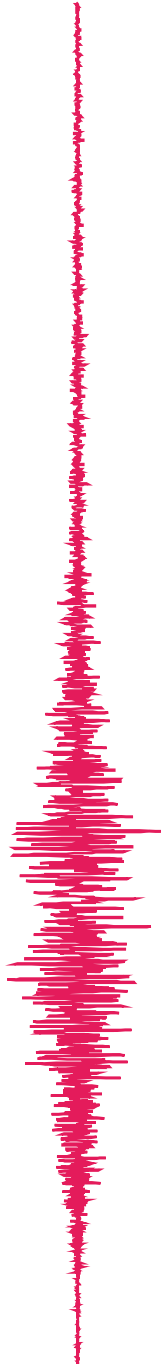


- Two models were tested, CRUST1 (blue) and CRUST2 (orange), and inverted 3-component data from 8 stations out to 2600 km (PALK and UOSS) to extend azimuthal coverage.
- Tested between depth 2 and 20 km with a 2 km step.
- Inverse mechanism similar to those published by other institutes.
- Depths are consistent, with maximum variance reduction (VR) around 12 km for both models.
- Mw magnitudes are also in agreement with IPGP and GFZ on CSEM, around 5.74-5.78 at +/-2 km from 12 km depth for both models.

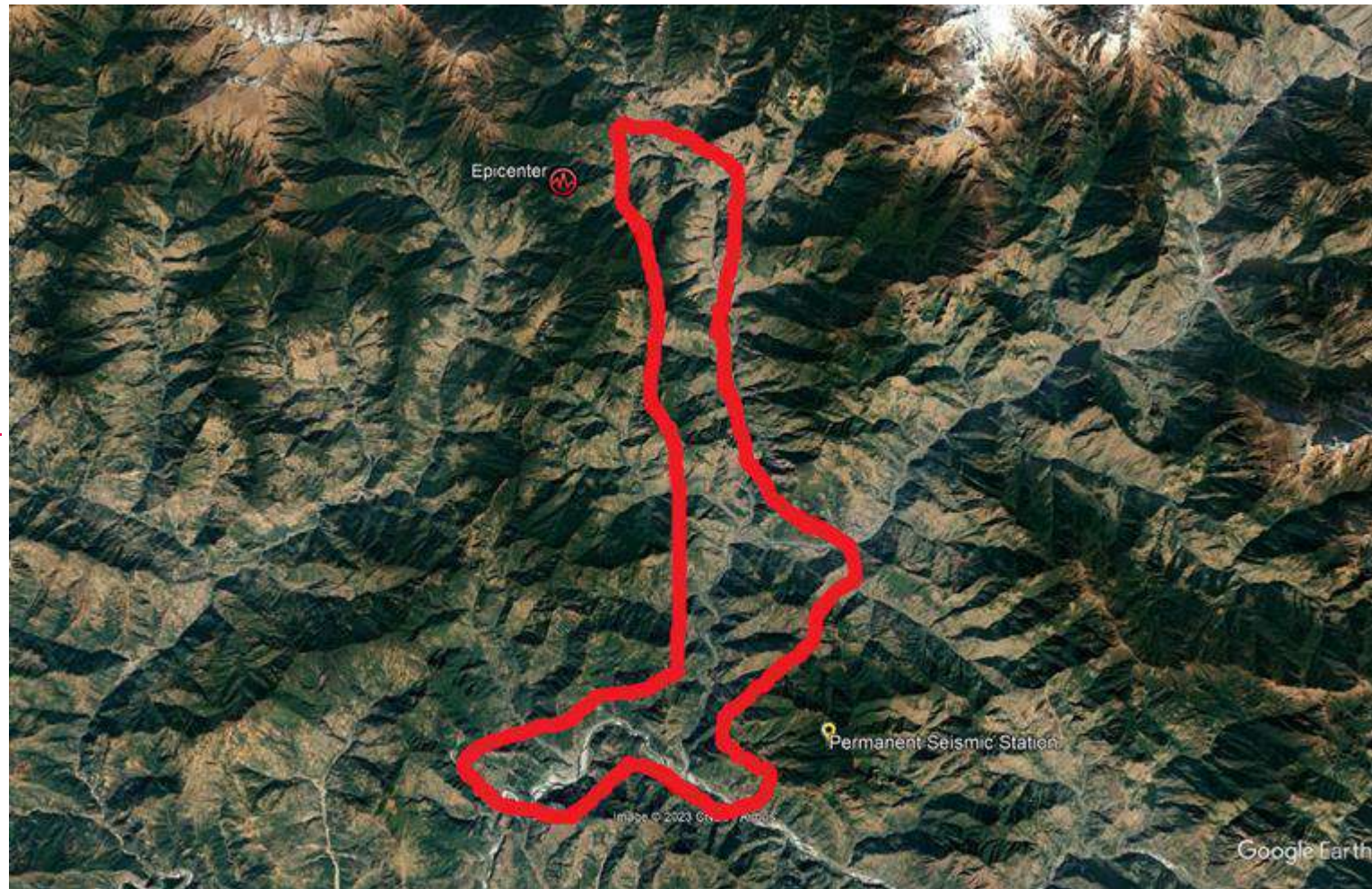


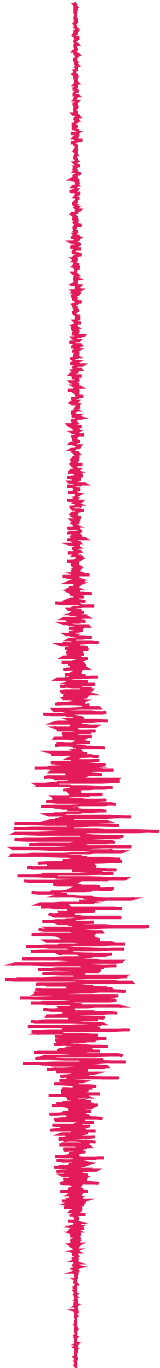
Location Maximum Casualties and Damages





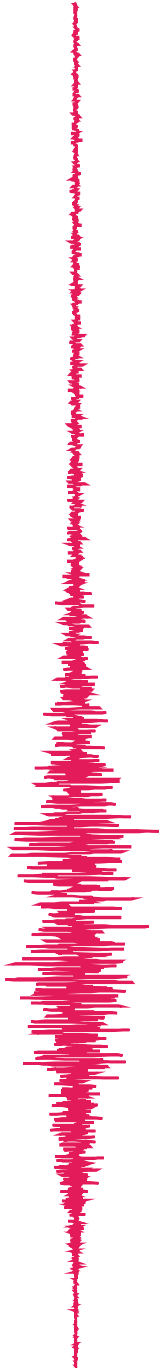
Zone of Maximum Intensity (VI)





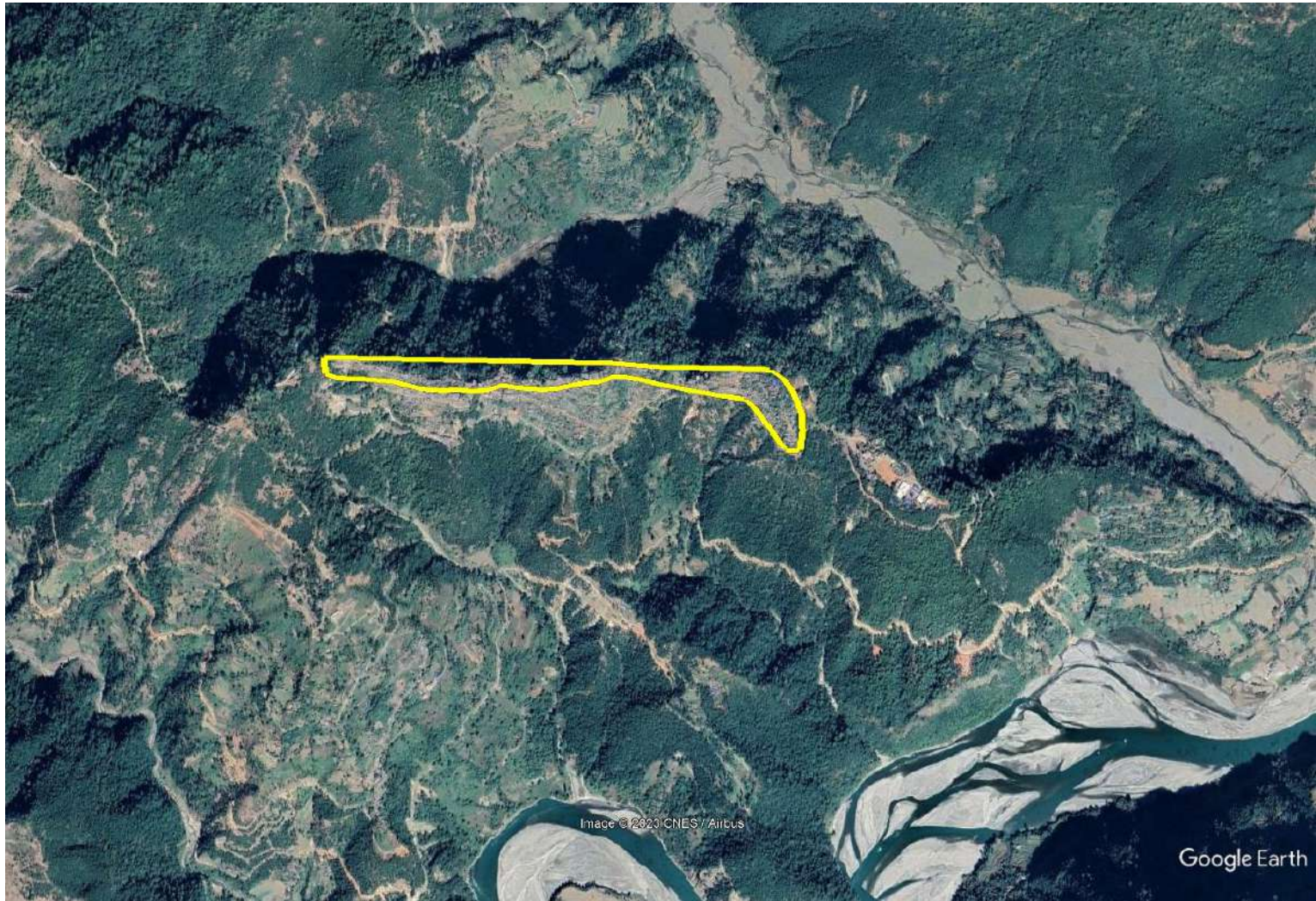
Damage

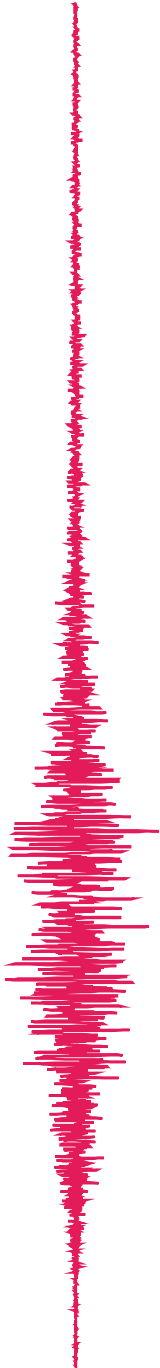
- Only mud stone masonry buildings suffered damage
- No structural damage in concrete buildings
- Maximum damages are concentrated along the river valley and ridges.
- Topographic effect and Local Site effect was noticed.



Topographic Effect

Khalanga

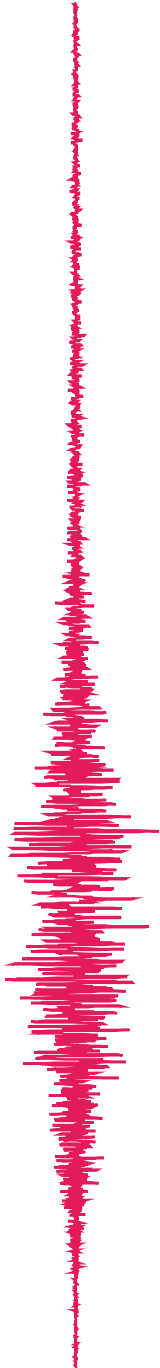




Topographic Effect

Jyamire

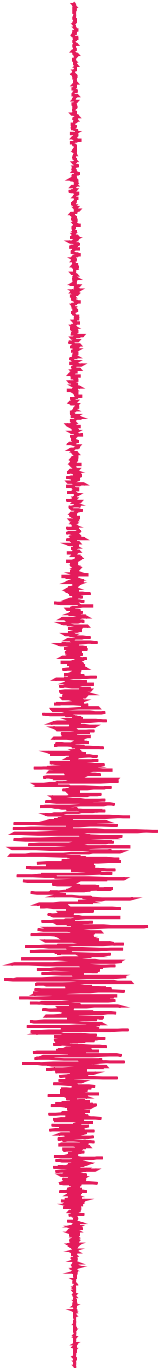




Topographic Effect

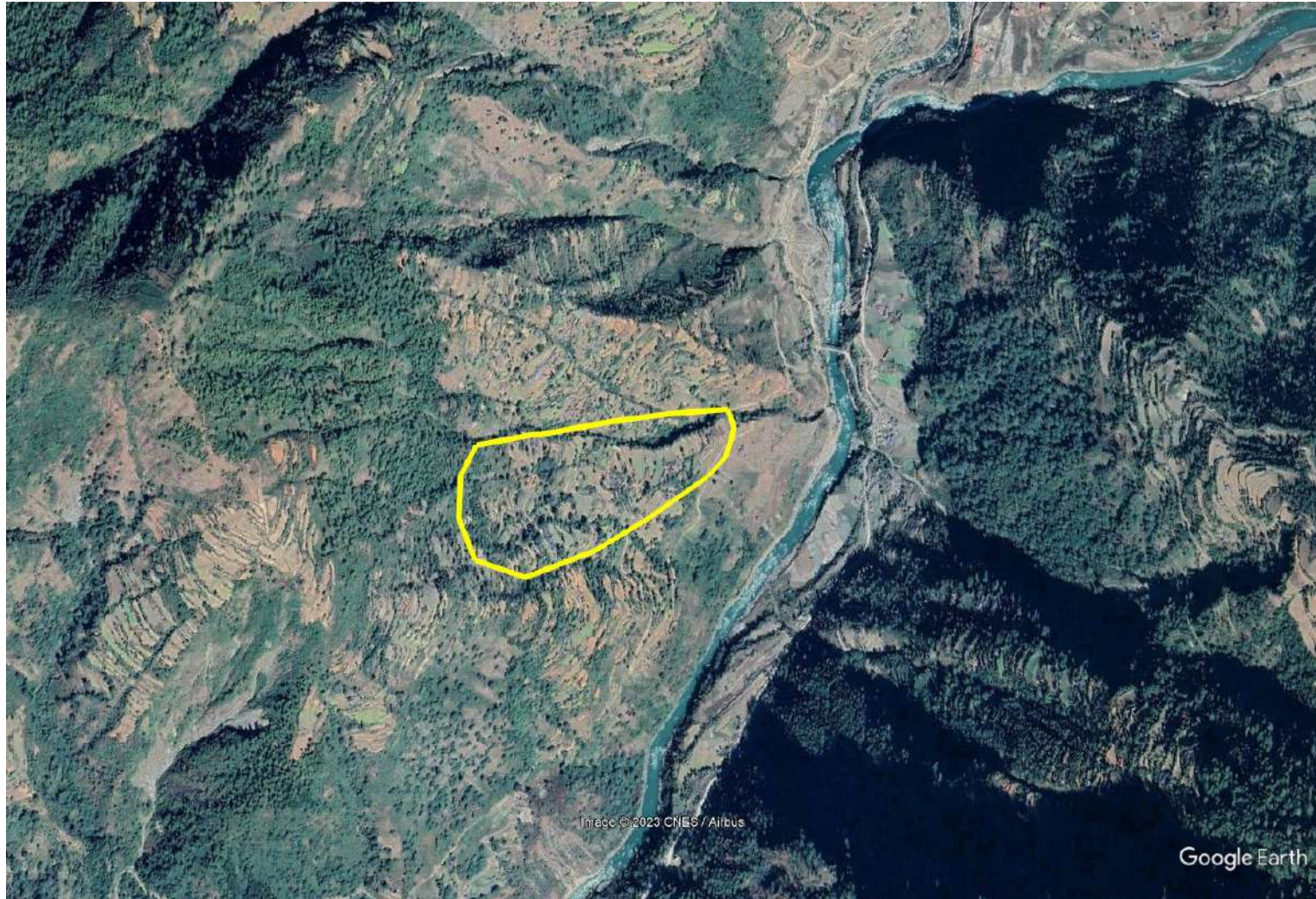
Goiri

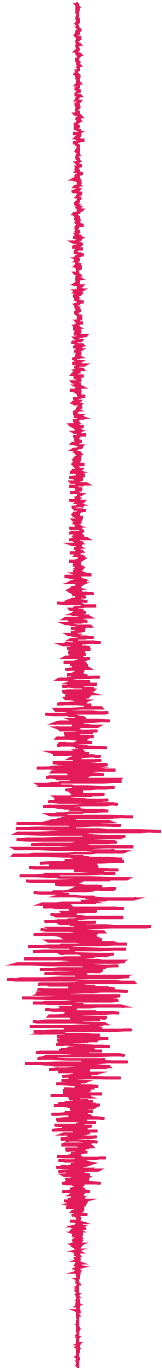




Topographic Effect

Chiuree

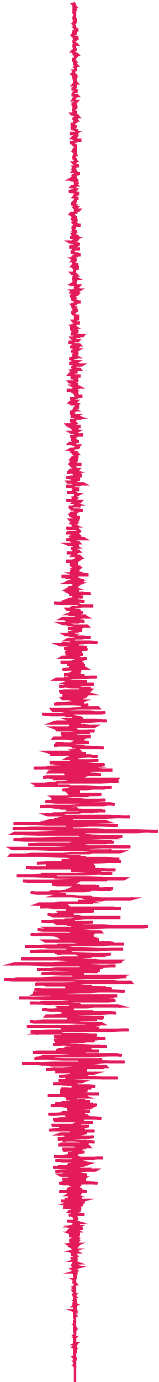




Topographic Effect

Barekot, Limsa

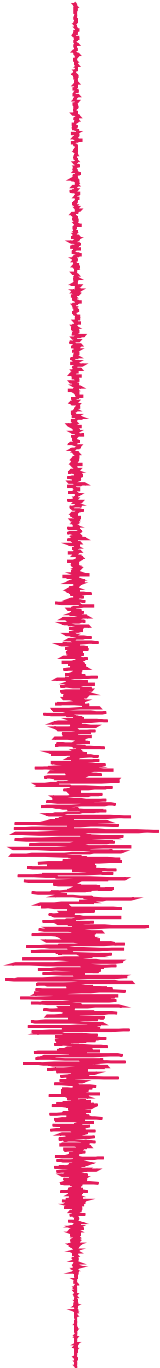




Damage

Chiuree





Damage

Jyamire





Damage

Khalanga



Damage

Khalanga

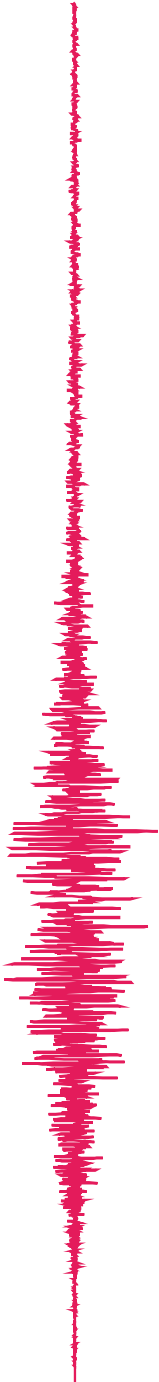




Damage

Chhepare

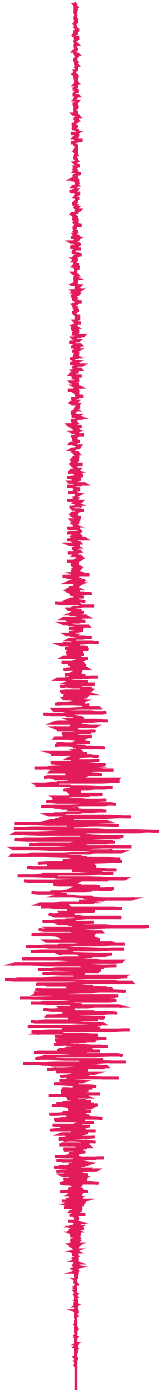




Damage

Chiuree

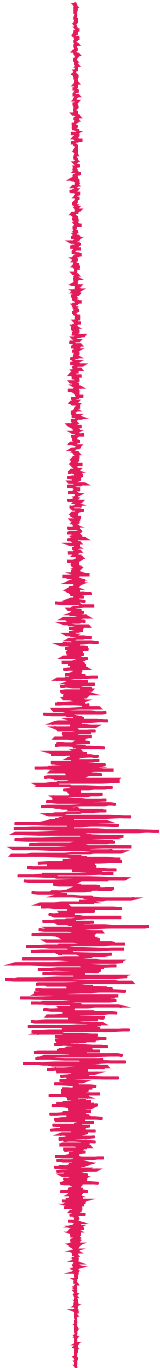




Damage

Chiuree

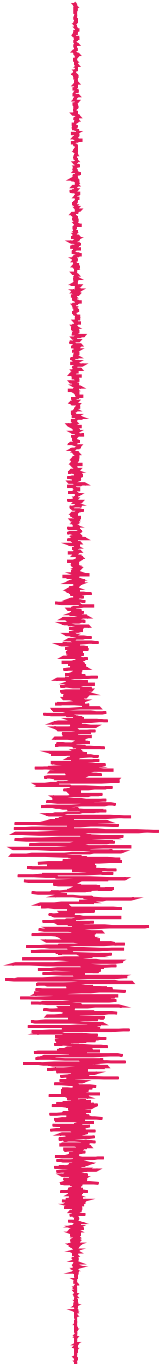




Damage

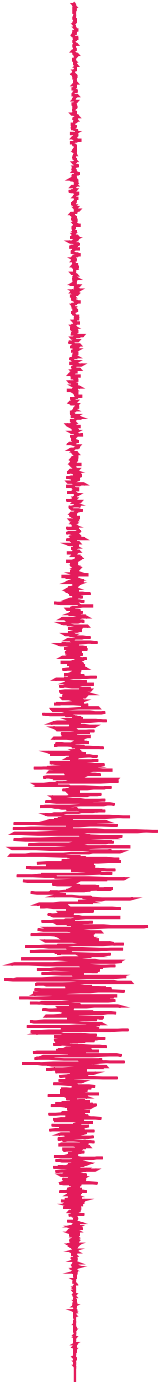
Limsa





Local Site Effect

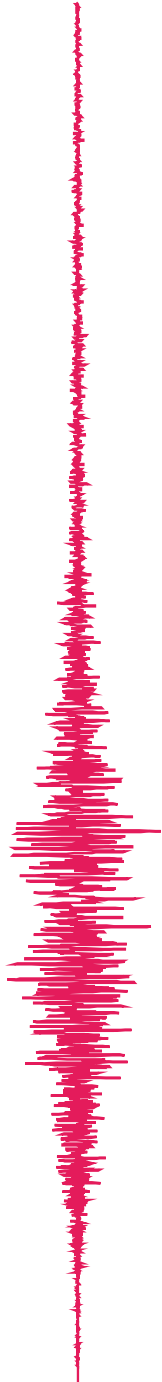




Local Site Effect

Rimna

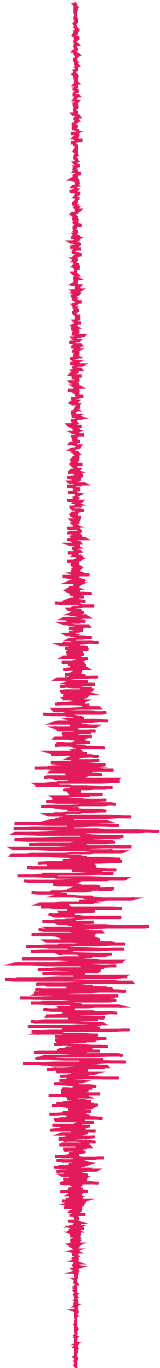




Damage

Rimna





Damage

Chhepare



Damage

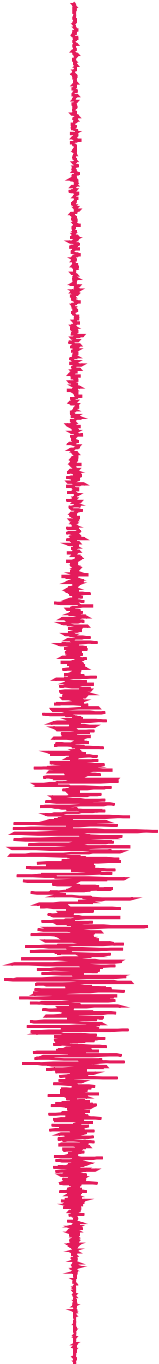
Chhepare



Damage

Syanivery



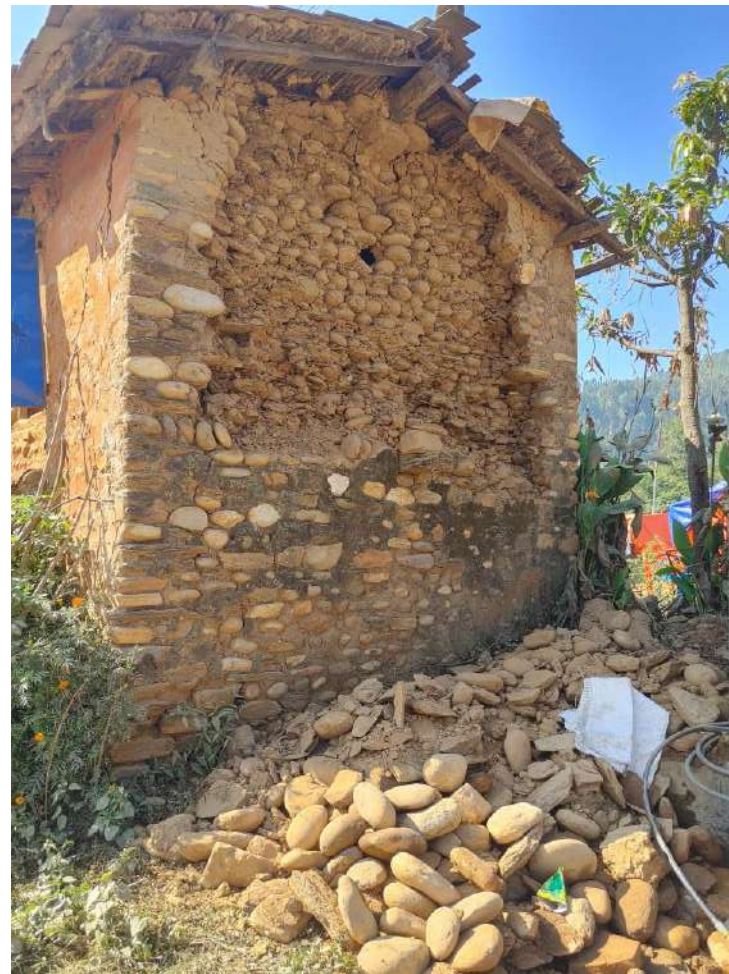


Damage

Kotadanda

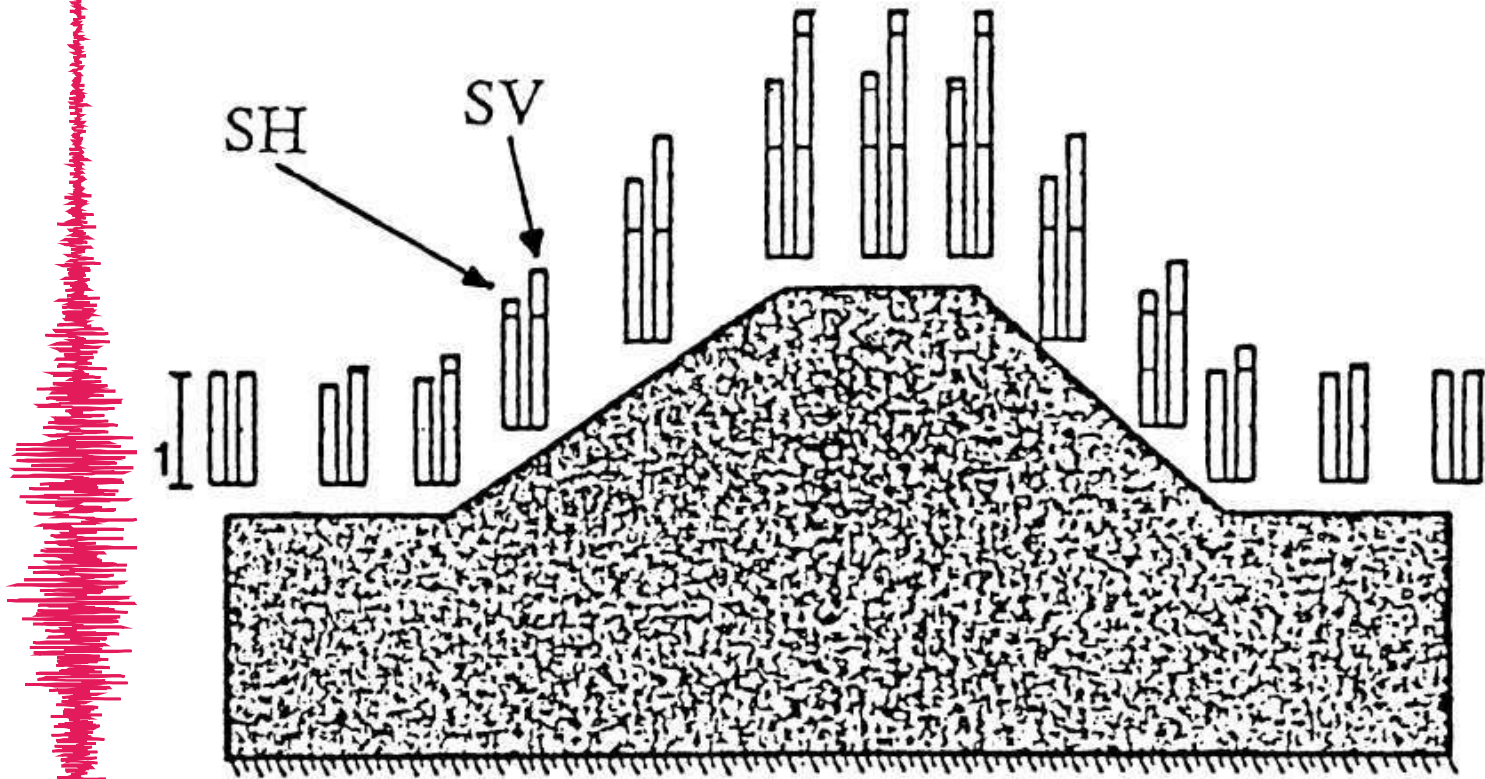


Rautgaun

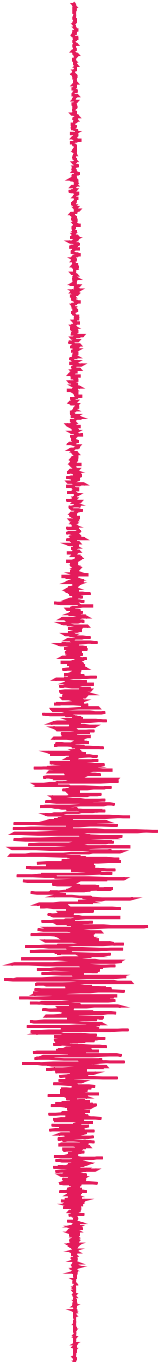




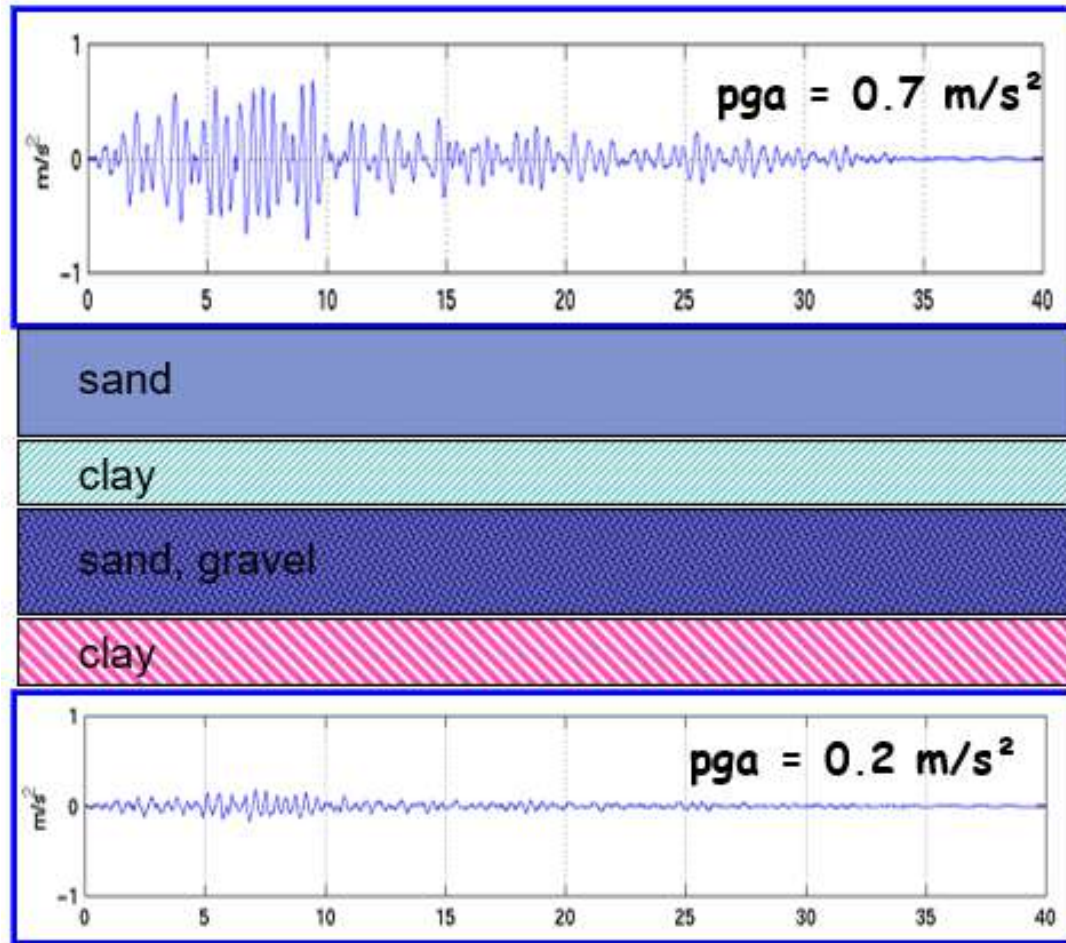
Surface Amplification



Castellani et al., 1982)

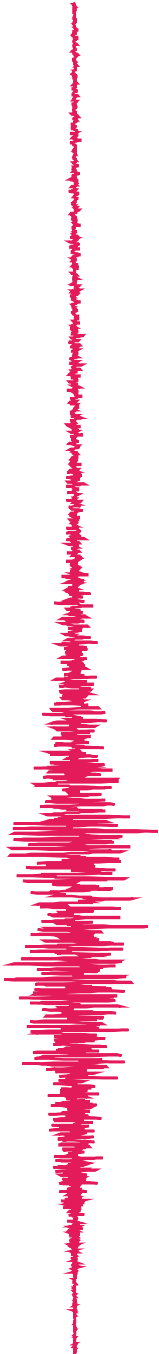
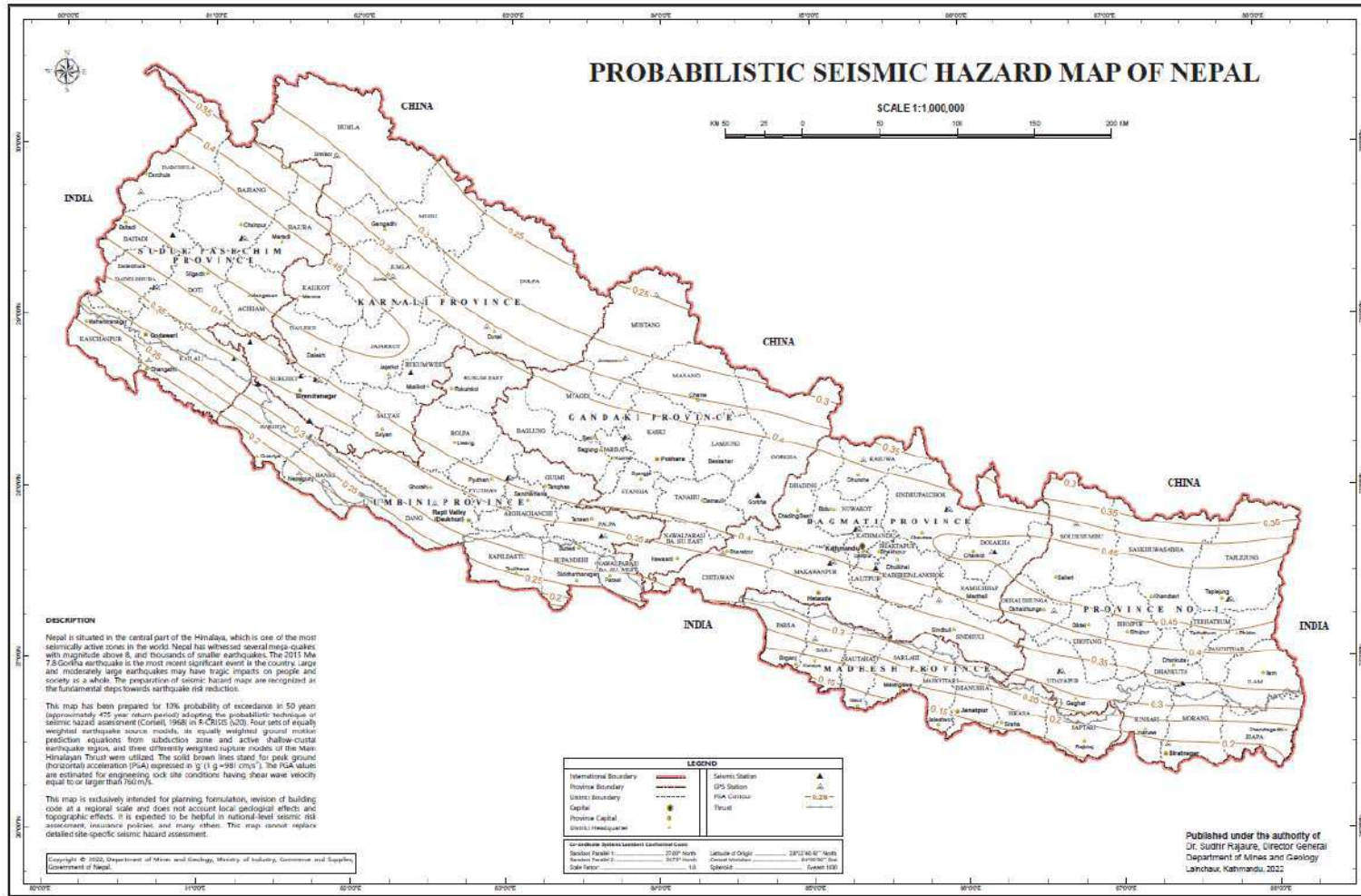


Site Effect



(Modified after Cotton, 2001)

Seismic Hazard Map of Nepal



Thank you