

Seismotectonics of Bhutan: Evidence for segmentation of the Eastern Himalayas and link to foreland deformation – Electronic Supplement

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Table S1. Quality scheme and associated uncertainty intervals used for manual picking of P- and S-phases in this study.

Quality Class	Error (\pm sec)	Number of observations in 3-D tomographic inversion	Weight in 3-D tomographic inversion
0	0.025	764	1.000
1	0.050	548	0.500
2	0.100	394	0.250
3	0.200	93	0.125
4	0.400	10	0.0625
5	>0.400	0	0

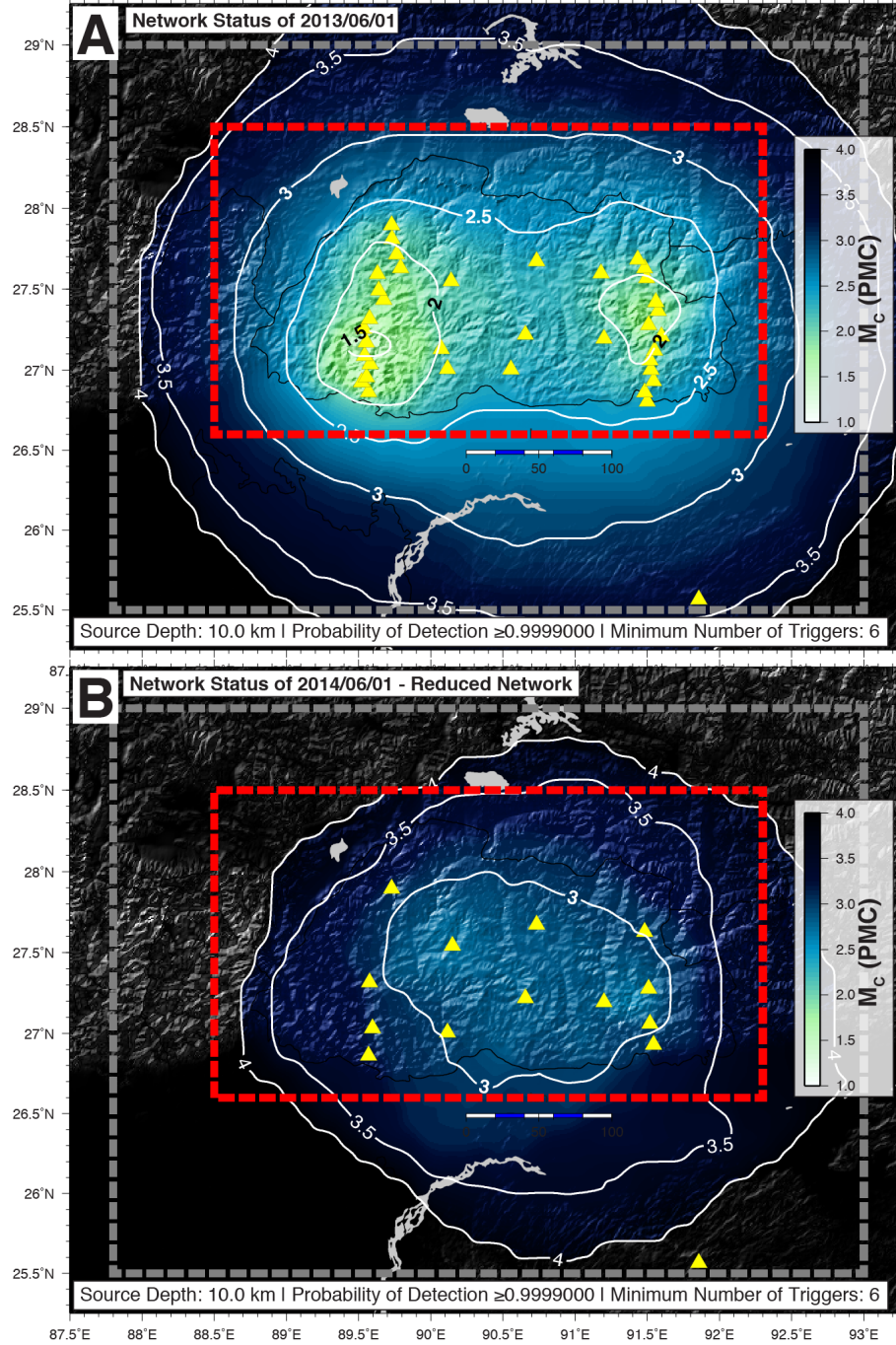


Figure S1. Maps of probability-based magnitude of completeness M_C (PMC) achieved with the GANSSER seismic network complemented by two regional stations in northern India (IN.SHL) and Tibet (IC.LSA) for two different time periods. A: Network configuration operating between 2013/01 and 2014/04. B: Network configuration operating between 2014/04 and 2014/11. Minimum required number of triggers for automatic detection with the SeisComP3 monitoring software is six. M_C (PMC) is estimated assuming a source depth of 10 km and probability of detection ≥ 0.9999 . M_C (PMC) is 2.5 for most parts of Bhutan in A and 3.0-3.5 in B. Regions outlined by gray and red dashed lines are used for statistics in Figs. 2 and S2.

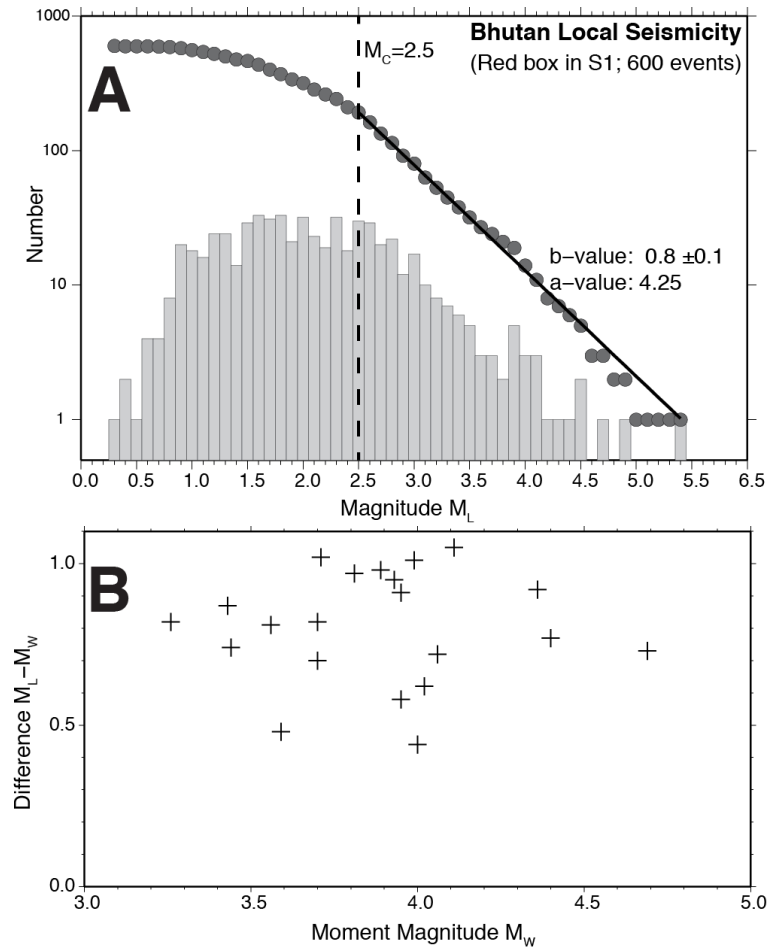


Figure S2. Statistical properties of the GANSSER earthquake catalog. A: Frequency–magnitude distribution (FMD) for events in and close to Bhutan (epicenters within red dashed box in Fig. S1). The non-cumulative FMD (histogram) suggests a magnitude of completeness M_C of 2.5 (e.g., Woessner and Wiemer, 2005), in agreement with the value derived by the PMC method in Fig. S1A. The b-value derived from a maximum-likelihood technique (e.g., Woessner and Wiemer, 2005) for Bhutan is 0.8 ± 0.1 and describes the relative size distribution of events. B: M_L - M_W scaling relationship for the GANSSER catalog. M_W is derived from full-waveform moment-tensor inversion and is compared to the corresponding M_L value. The M_L - M_W difference suggests that M_L in Bhutan is offset by 0.5 to 1.0 units (mean: 0.8 ± 0.2) with respect to M_W (in the range $3.2 < M_W < 4.7$).

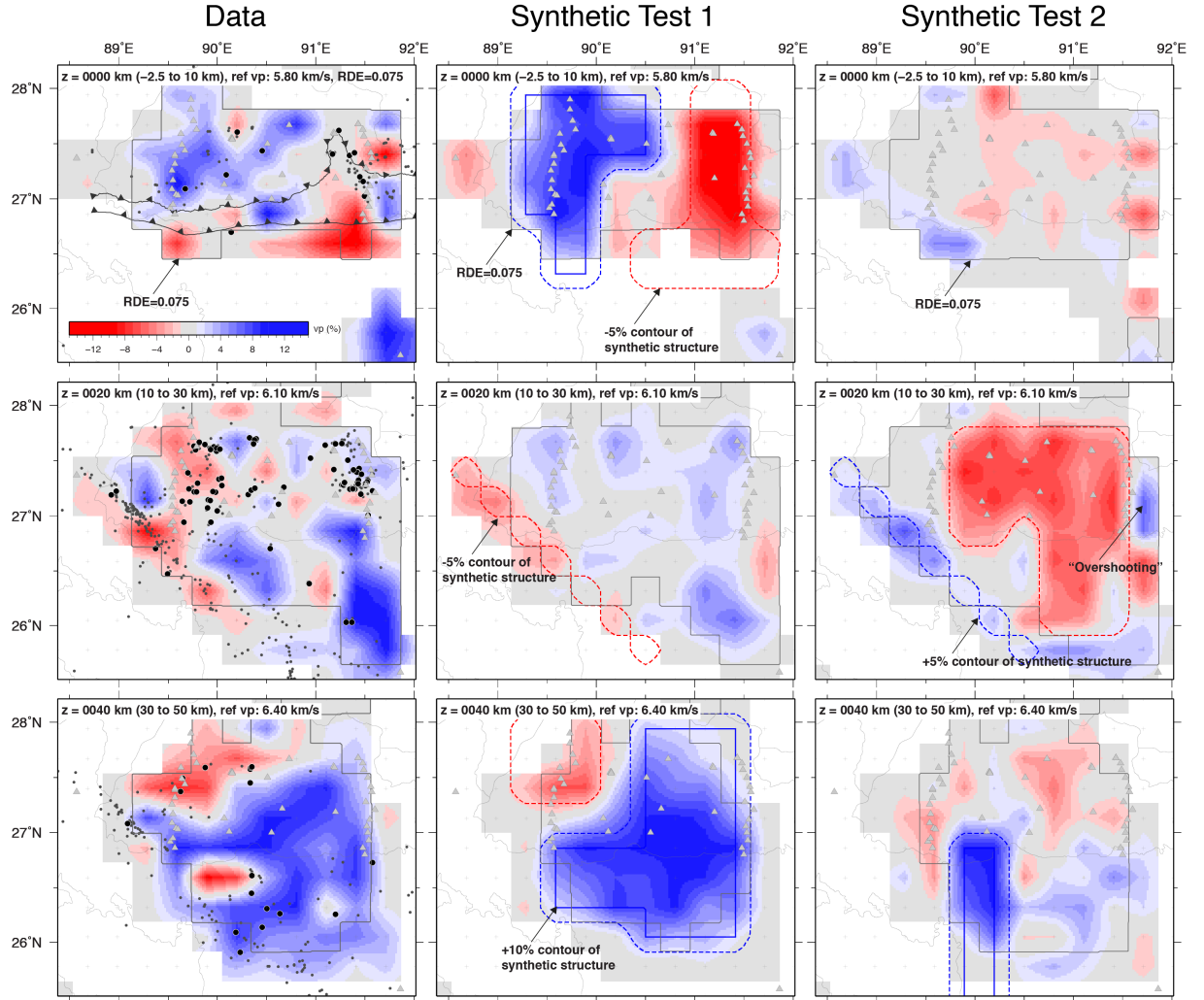


Figure S3. Synthetic tests to assess the resolution of the tomographic 3-D V_p model. Left column: Final inversion results of real data set for three depth levels (rows) (same as Fig. 4). Center and right columns: Two different synthetic recovery tests with low and high input anomalies (± 10 per cent). Geometry of input anomalies are outlined by solid lines ($\pm 10\%$ contour of input anomaly) and dashed ($\pm 5\%$ contour of input anomaly), respectively. Recovery is mostly well to fairly-well in regions with resolution diagonal elements ≥ 0.075 , which are outlined by gray solid lines. As for all resolution tests, synthetic travel times through the input model are calculated using a finite difference solution to the eikonal equations and the same source–receiver distribution as the real data set. Random noise is added to the synthetic travel times using an equally distributed error for each pick quality class. The corresponding range is defined by the error interval of the associated pick quality class as shown in Table S1. We use the same inversion parameters (initial model, parameterization, damping and number of iterations) for the inversion of the synthetic travel times as we used for the real data.

References :

Woessner, J., Wiemer, S., 2005. Assessing the quality of earthquake catalogues: estimating the magnitude of completeness and its uncertainty. *B. Seismol. Soc. Am.* 95, 684–698. doi:10.1785/0120040007.