

Supplementary Information

Widespread ground motion distribution caused by rupture directivity during the 2015 Gorkha, Nepal earthquake

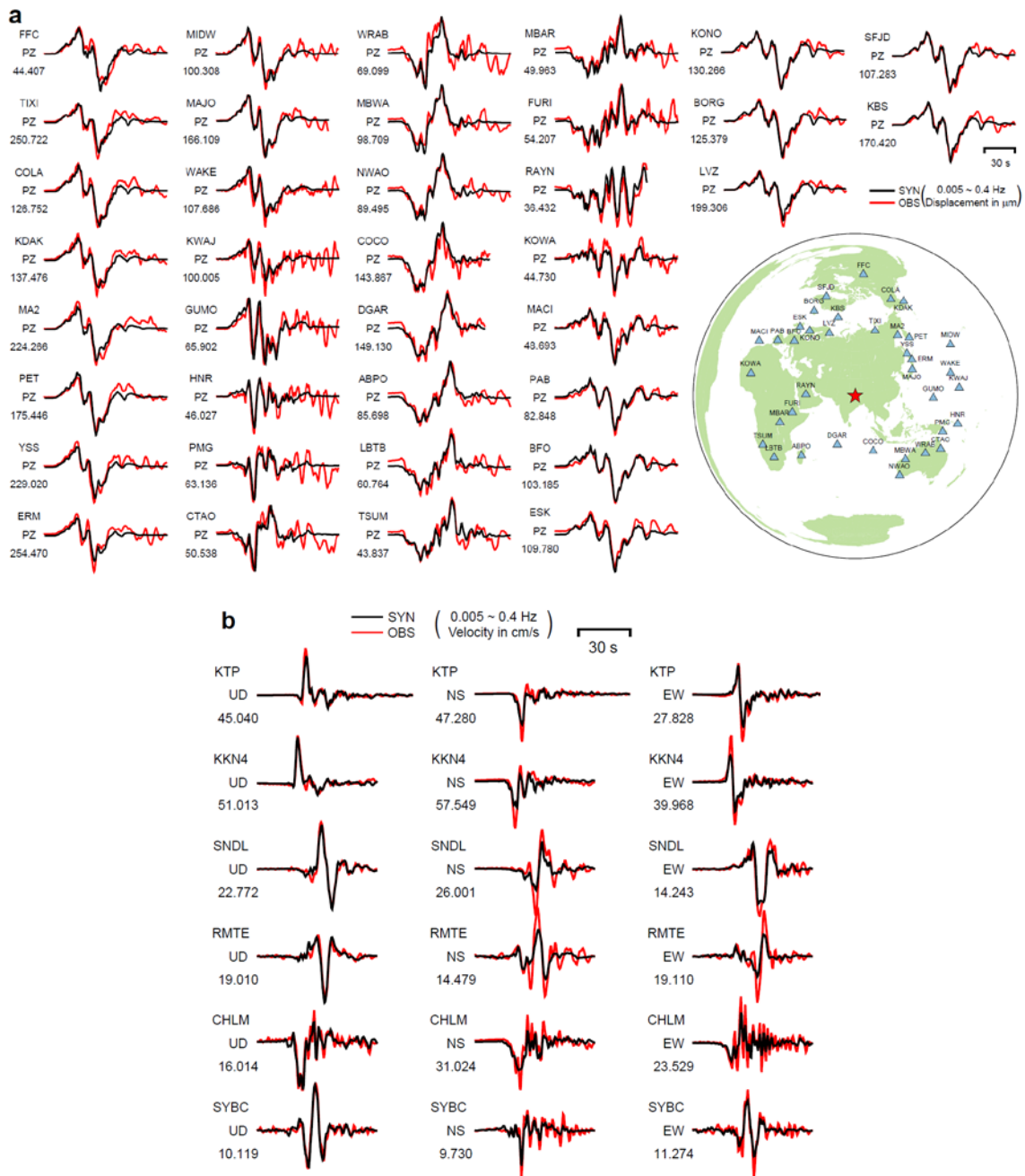
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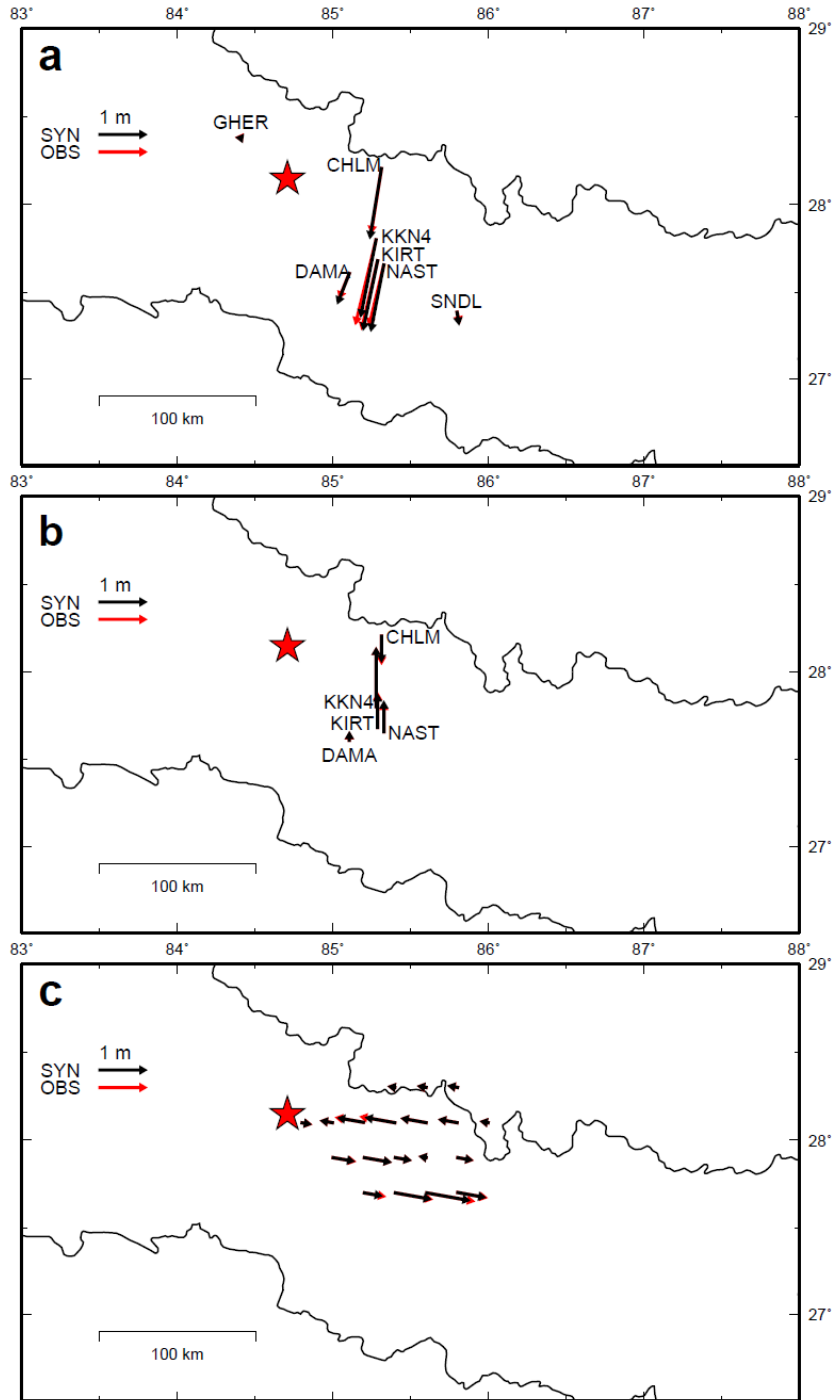
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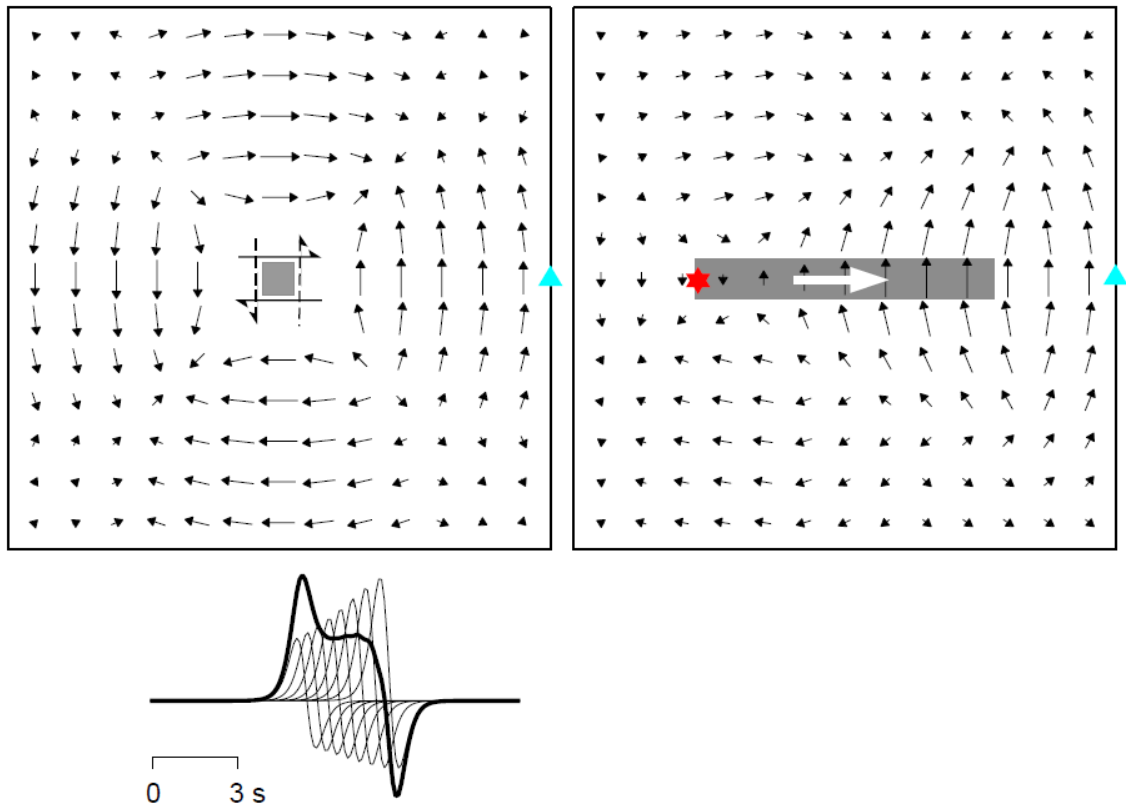
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Supplementary Figure 1 | Comparison of observed and synthetic seismograms. a, Seismograms at global teleseismic stations shown in the lower right map. Red star denotes main shock. Peak displacements in μm are written on the left of the seismograms. **b,** Seismograms at strong motion¹ and high-rate GPS² stations in Nepal. Peak velocities in cm/s are written on the left of the seismograms. The map was generated using Generic Mapping Tools⁵ 4 (<http://gmt.soest.hawaii.edu/>).



Supplementary Figure 2 | Comparison of observed and synthetic ground deformations. **a**, Horizontal deformations at seven GPS stations. **b**, Vertical deformations at five GPS stations. **c**, Line-of-sight deformations were derived from the processed InSAR images³. Red stars denote the main shock epicentre. The maps were generated using Generic Mapping Tools⁵ 4 (<http://gmt.soest.hawaii.edu/>).



Supplementary Figure 3 | Schematic illustration of rupture directivity for a strike-slip earthquake⁴. Upper left and right diagrams show ground motion patterns of point and finite source models (grey zones), respectively. White arrow indicates rupture direction. Red star is rupture initiation point, and sky blue triangle denotes a station. In lower diagram, thick curve represents constructive interference of ground motions from fault segments (thin curves), illustrating mechanism of rupture directivity pulse from strike-slip finite source.

Supplementary References

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2. Galetzka, J., *et al.* Slip pulse and resonance of the Kathmandu basin during the 2015 Gorkha earthquake, Nepal. *Science* **349**, 1091-1095 (2015).
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4. Koketsu, K. Damaging earthquakes in California and 1995 Kobe earthquake, *Science Journal* **66**, 93-97 (1996).
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