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-Resolution Mapping of Surface-Wave Velocities Across Asia Using Automated Inter-Station Measurements

The rapid recent expansion of broadband seismic networks around the world has paved the way for a new generation of tomographic models of the Earth. These models will yield high resolution — previously achievable only in small-scale regional studies — at large, continental scales, advancing our understanding of the structure and dynamics of the Earth's tectonic plates. Importantly, they will also facilitate the continued improvement in the accuracy of regional seismic travel time prediction and event location, through their accurate representation of seismic-wave velocities within the crust and upper mantle. Here, we apply new, automated techniques for inter-station measurements of surface-wave phase velocities to a very large data set, including seismic data from the CTBT IMS network and the broadband data available from international data centres. The many thousands of new surface-wave dispersion curves are then inverted for tomographic phase-velocity maps. The resulting whole-Asia model of surface-wave velocities provides a significant advance in resolution compared to previously available models. The detailed seismic images of the lithosphere offer new insights into fascinating geological processes that formed Asia. The high-resolution tomographic models will also be used for accurate modelling of seismic wave propagation in regions of particular interest in the CTBTO framework.

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