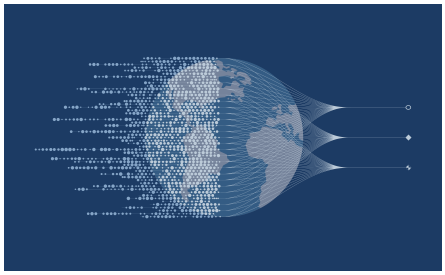

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data driven, grid refinement approach to improve global scale regional seismic travel time prediction

Regional seismic travel time (RSTT) is a global model (Myers et al. 2010, Begnaud et al. 2021) that rapidly predicts travel times of regional seismic phases (Pn, Sn, Pg and Lg), while accounting for key effects of the three-dimensional crustal and upper mantle structures. RSTT is currently used by the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization for regional travel times. Previous versions of the RSTT utilized a constant 1° model grid. A recent RSTT study by Babikoff et al. (2022) for the eastern Mediterranean showed that iterative data-driven grid refinement improves the resolution of P wave (Pn and Pg) tomography in the tectonically complex region. We are refining these methods to improve regional travel-time tomography globally to explore the effects of model parameterization with the decreasing grid sizes as well as trade-offs relating to the retrieved upper mantle velocity and gradient structures. We have iteratively tested grid spacings from 0.5 degrees to 0.125 degrees globally to determine optimal grid refinement, as well as using L-curve tests (i.e., plotting model roughness against travel time residual) to optimize the smoothing and damping values during the iterative grid refinement. Our initial results indicate the need for stricter data quality control with decreased model grid spacing.

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