ID: Type: **Poster**

1.2-P08. Global 3-D Tomographic Imaging of the Crust and Mantle for Enhanced Seismic Monitoring

Global-scale tomographic images of the Earth's seismic velocity structure provide key insights into the state and evolution of our planet, and thus the development of such models has been a mainstay in solid Earth geophysics research for more than three decades. Because of their predictive abilities, global-scale 3-D images are also capable of enhancing monitoring applications including accurate seismic event locations based on 3-D travel time predictions. We have constructed new images of the crust and mantle using novel data processing and imaging techniques developed over the past several years. The new techniques include 3-D ray-tracing with multipath considerations, global multiple event location algorithms, and multi-resolution imaging within a spherical tessellation model fram¬ework. The most recent model is a jointly derived model of shear and compressional wave speeds based on a large suite of P- and S-wave phases. The images reveal new details and more focused structures within the Earth, providing clear evidence that these new global-scale models and techniques represent advancements in global seismic tomography. Validation tests demonstrate that these global-scale models reduce the median event location error by 40-70% (relative to a 1-D model) for a suite of 116 validation events with well-constrained true locations.

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Track Classification: 1. The Earth as a complex system