ID: Type: **Oral**

Regional Seismic Travel Time (RSTT) Tomography

The Regional Seismic Travel Time (RSTT) tomography model has been developed to improve travel time predictions for regional phases (Pn, Sn, Pg, Lg/Sg) in order to increase seismic location accuracy. The RSTT model is specifically designed to permit the use of regional phases for location, especially when combined with teleseismic arrivals. Previously, the RSTT model was calibrated for specific geographic regions (North America, Eurasia) only. In a cooperative project with the Comprehensive Test-Ban-Treaty Organization, we are currently expanding the RSTT model to full global calibration using a base set of ~3 million arrivals for summary rays (806,796 Pn, 193,786 Sn, 78,152 Pg, and 39,204 Lg/Sg). We fully describe the tomography methodology required to create the RSTT model, including smoothing and damping constraints. The RSTT model is defined on a tessellated grid, with a velocity profile at each node: crust, upper mantle, and upper mantle gradient allowing for the presumption of diving rays. Crustal phases are similarly determined by solving for a mid-crustal slowness, allowing for downgoing/upgoing components of the rays in the crust. We also solve for an overall crustal modifier that accounts for small variations in the crust beyond the starting velocity model.

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Track Classification: Theme 1: The Earth as a Complex System