Upper Mantle Structure beneath the Mid-Eastern US

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While cratons are stable features based on their ages, they apparently can be disturbed by flattened slabs and hidden hotspots. When these slabs break-up they provide a host of volatiles which interact with the old lithosphere producing complicated structures. These have been imaged by a host of techniques involving modeling regional waveforms and an assortment of tomography models. Here we test these models against a recent deep Guatemala event (March 25th, 2013) which produced an excellent set of TA record sections that provide dense sampling of the structure, spanning the ranges from 15° to 35°. Because the structure in the southern Gulf of Mexico is uncertain we allow for some path corrections in timing when we align data and synthetics, by applying the Cut-and-Paste (CAP) method. We use both 1D and 2D synthetics in these tests and some models produce average cross-correlations over .80 at period longer than 10s. Over large paths of data produced by the southern part support the so-called X-phase arrivals which were produced by a 300km transition. This feature breaks down at large distances (>25°) along a northwest-southeast boundary. Data at larger distances indicate a complexity in the 660 transition which appears to be caused by a fast slab at a depth of 700km. Variation in the EF-CD branches of pP and sP display changes of up to 5s and sS up to 10s.