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Testing the Regional Seismic Travel-Time (RSTT) Model in the Middle East Using Calibrated Earthquake Locations

One-dimensional velocity models used in earthquake location do not account for lateral heterogeneities found in the crust and upper mantle. The regional seismic travel-time (RSTT) model (Myers et al., 2010) was developed to account for the effects of crust and upper-mantle structure on regional seismic phase travel-times. The IDC propose to implement RSTTs in their production of earthquake locations. We use travel-time station corrections for a set of calibrated earthquake locations in the Middle East to test the RSTT predictions in this region. Multiple event relocation (Douglas, 1967) is used to calibrate clusters of earthquakes, using several kinds of ground truth information, including near-source seismic observations, InSAR modelling and mapped faulting. Our data set is derived from ten evenly spaced clusters, containing 453 events with arrival times from the IDC, ISC and local in-country networks. We find a weak correlation between RSTT and station corrections, with the RSTT corrections generally larger. In specific areas, regional station corrections vary significantly depending upon cluster location, while in other places they show no dependance. RSTT corrections show a smaller dependance upon cluster location. Teleseismic station corrections for each cluster are comparable and also compare well to patch/station corrections described by other studies.

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