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Tectonic structure of the Arabian Peninsula is revealed by analysis of modern broadband (BB) waveform data from the region. This presentation will report inferences of seismic structure of the Arabian Peninsula using various techniques and interpretations of its tectonic significance. Several studies have been undertaken using data from the Saudi Arabian National Digital Seismic Network (SANDSN) which consists of 38 (26 BB, 11 SP) stations, mostly located on the Arabian Shield. Additional data were taken from the 1995-7 Saudi Arabian IRIS-PASSCAL Deployment (9 BB stations) and other stations across the Peninsula. Crustal structure, inferred from teleseismic P-wave receiver functions, reveals thicker crust in the Arabian Platform (40-45 km) and the interior of the Arabian Shield (35-40 km) and thinner crust along the Red Sea coast. Lithospheric thickness inferred from teleseismic S-wave receiver functions reveals very thin lithosphere (40-80 km) along the Red Sea coast which thickens rapidly toward the interior of the Arabian Shield (100-120 km). We also observe a step of 20-40 km in lithospheric thickness across the Shield-Platform boundary. Seismic velocity structure of the deep upper mantle inferred from teleseismic P- and S-wave travel time tomography reveals large differences between the Shield and Platform, with the Shield being underlain by slower velocities, ±3% for P-waves and ±6% for S-waves. Shallower upper mantle structure inferred from Rayleigh wave phase velocities and indicates that low-velocity material is channeled beneath the Red Sea below 150 km and pools beneath the Arabian Shield above this depth. Seismic anisotropy inferred from shear-wave splitting, reveals a splitting time of approximately 1.4 seconds, with the fast axis slightly east of north. The shear-wave splitting results are surprisingly consistent across the Peninsula, with a slight clockwise rotation parallel for stations near the Gulf of Aqaba. In summary, these results allow us to make several conclusions about the tectonic evolution and current state of the Arabian Plate. Lithospheric thickness implies that thinning near the Red Sea has accompanied the rupturing of the Arabian-Nubian continental lithosphere. The step in the lithospheric thickness across the Shield-Platform boundary likely reveals

a pre-existing difference in the lithospheric structure prior to accretion of the terranes composing the eastern Arabian Shield. Tomographic imaging of upper mantle velocities implies a single large-scale thermal anomaly underlies the Arabian Shield and is associated with Cenozoic uplift and volcanism. Hot material from the Afar Hot Spot is channeled along the Red Sea by lithospheric topography.

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