COARSE: COsortium for an Arizona Reconnaissance Seismic Experiment
Susan Beck (Arizona), Matt Fouch (Arizona St.), Hersh Gilbert (Arizona, now at Purdue), George Zandt (Arizona). UA Students: Andy Frassetto

The COARSE array [right] was deployed to characterize the crust and upper mantle across the Basin and Range and Colorado Plateau transition in Arizona, allowing us to investigate how the lithosphere varies across regions which experienced different levels of tectonic deformation in the Mesozoic and Cenozoic.

Receiver functions [below] determine lithospheric structure, including crustal thickness and Vp/Vs ratio in the Basin and Range. Sharpness of the crust-mantle boundary (M) varies. Stations KITT, LEMN, and SQRL are located atop metamorphic core complexes (MCCs) and reveal significant variation in crustal properties between MCCs and non-MCCs.

Receiver functions from the Colorado Plateau [below] illustrate significant differences when compared to the Basin and Range with thicker and more layered crust and larger Vp/Vs variation.

A crustal thickness vs. elevation analysis [below] reveals thin crust beneath high MCCs, implying that these features are not simply supported by a crustal root.

The high elevations of the MCCs must be supported by a component of relatively light crust or upper mantle. In turn these density differences allow for a relatively flat crust-mantle boundary that underlies the large range of elevations seen across the southern Basin and Range of Arizona.