

Crustal and Upper Mantle Structure Reveal Arc-Continent Collision Processes in the Southern Uralides

BROWN, D., CARBONELL, R., ALVAREZ-MARRON, J., TRYGGVASON, A., AND PEREZ-ESTAUN, A.

The southern Uralides contain a well-preserved accretionary complex and volcanic arc related to the Late Devonian collision between the Magnitogorsk arc and the East European Craton. The accretionary complex is composed of offscraped continental slope sediments, arc-derived syncollisional sediments, deeply subducted high-pressure gneisses with eclogite and blueschist, and ophiolite complexes. Reflection seismic profiling integrated with surface geology reveal the internal structure of the accretionary complex and its contact relationship with the underlying East European Craton. The Magnitogorsk arc developed in an intra-oceanic setting from the Early through Late Devonian. The arc and its Late Devonian forearc basin is only weakly deformed and unmetamorphosed. Near vertical incidence reflection seismic profiling image the forearc basin structure, and discontinuous reflectivity in the underlying arc. The Moho is not imaged. The arc-continent suture is imaged as a zone of contrasting reflectivity between the arc and the accretionary complex. In wide angle reflection data, the arc-continent collision zone is shown to preserve a crustal root reaching 53 ± 2 km, and extending from beneath the arc westward to below the continent crust. The Moho in the root zone is an approximately 3 km thick band of reflections with a complex internal structure. Moderately east-dipping upper mantle reflections appear to coincide with the position of the arc-continent suture. Integration of geophysical data with surface geology allows us to determine arc-continent collision processes in the southern Uralides, including insights into deep processes, such as the formation and post-orogenic evolution of a collisional Moho.