

Deep Seismic Reflection Images of the Aleutian Island Arc

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In most island arc settings, seismic reflection imaging of the middle and lower crust is challenging due to the presence of long-period water-layer multiples. In contrast to many arcs, the seafloor is relatively shallow along much of the Aleutian arc, providing a window into the deep crust that can be exploited by seismic reflection surveys. In 1994, the *R/V Ewing* shot two lines across and one line along the Aleutian arc using a hydrophone streamer with a maximum offset of 4255 m. These data have been reprocessed with the aim of enhancing reflections at late times. Although commonly affected by coherent noise generated by shallow scattering around the seismic line, 1-2 s duration reflection arrivals from the subducting Pacific plate can be clearly identified on all lines along and across the arc; in the case of the strike line, these reflections originate updip and out of the plane of the section. Subhorizontal reflections up to 5 s duration, which terminate close to the Moho inferred from wide-angle reflections, can also be identified in part of the forearc, and may arise from a thick sill complex that arose early in the evolution of the arc. Reflections, which are not from the subducting oceanic plate, are commonly observed at times greater than the time corresponding to the refraction Moho. These deep reflections are interpreted as a thick crust-mantle transition zone beneath the eastern arc that extends in places to depths >50 km. These reflections are interpreted to be variably intruded interlayered mafic/ultramafic cumulates, but are not observed beneath the central Aleutian arc.