The crustal structure of the Hawaiian Islands from marine multichannel seismic reflection data

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The structure of the Hawaiian volcanic edifice and the Cretaceous oceanic crust on which it was built can illuminate controls on the formation and growth of the Hawaiian Chain. During September-October 2018, we used R/V *Marcus G. Langseth* to acquire deep-penetration, multichannel seismic reflection data across and along the Hawaiian Island Chain. For acquisition of this data, we used a nominal 6600-cu-in tuned air gun array and a 15-km-long hydrophone streamer cable. Two ~500-km-long profiles cross the Hawaiian Chain west of the Big Island and west of Oahu; additional profiles along and around the islands characterize structure of the surrounding Pacific crust, including the Molokai Fracture Zone, and the flexure moats flanking the islands. Deep imaging of the Moho of Pacific oceanic crust indicates a spatial, reflectivity, and depth variations towards the islands and the Molokai Fracture Zone that may indicate the role of Hawaiian volcanism in modification of the oceanic crust. Profiles on the flanks near the Big Island and Oahu show volcanic spreading structures that sole into a decollement at the base of the volcanic edifice and top of oceanic crust. Newly imaged structures interpreted to arise from volcanic spreading are similar to features recognized off the eastern Big Island, suggesting common structures and processes over a large part of the Hawaiian Islands. These data show potential controls on formation and later gravitational collapse as the edifice continues to grow.