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Recent Acoustic Studies of Western Canadian Continental Margin

A regional survey of the western Canadian continental margin from the central Queen Charlotte Island, 52°40′N, to the Strait of Juan de Fuca, 47°40′N, has been completed with the acoustic imaging system SeaMARC II. These data, combined with single-channel and multichannel seismic reflection data, reveal many new insights concerning the deep structure of the subduction margin off Vancouver Island. Clearly evident in the imagery are the deformation of sediments at the base of the slope, the surface expression of seismically active faults, the mass wasting of sediment frequently observed at the base of the slope, and the erosional canyons and sediment transport channels on the slope and adjacent abyssal plain. The variability in the surficial and deep structures along the length of the margin is great and corresponds well with the postulated variations in the local ocean/continent motion vectors: motion along the southern Queen Charlotte Islands margin is primarily transform (about 55 mm/year) with a small component of convergence (about 10 mm/year); motion south of the triple junction at the Wilson Knolls is convergent but at a very slow rate (about 10 mm/year); and motion along the central and southern Vancouver Island margin is nearly orthogonal to the coast and more rapid (about 40 mm/year).