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Active Deformation of the Oregon Continental Shelf I

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We began a new study of the active tectonics of the Oregon continental shelf in July of 1992, supported by NEHRP (USGS) and the National Undersea Research Program (NOAA). The main focus of this program is to investigate active structures on the Oregon shelf and to determine their relationship to previously studied accretionary wedge active structures and the active deformation of the Oregon coastal region. Industry multichannel seismic reflection profiles were combined with a field program of high-resolution 50 kHz Klein sidescan sonar surveys and DELTA submersible dives to locate, ground truth and map in detail the active structures. Two left lateral strike-slip faults, Wecoma fault and fault B (Goldfinger, et al., 1992), cut the lower to upper slope in central Oregon. Both are displayed in SeaBeam swath bathymetry and seismic records in this area. We were unable to find surface expression of the Wecoma fault at our target site on the outermost shelf, but fault B was mapped in the upper slope/outer shelf region where it truncates Daisy Bank. SeaBeam swath bathymetry and sidescan sonar images of Heceta Bank, to the south, identified two Pleistocene shorelines (i.e., wave cut platforms and seacliffs) in water depths of 115-130 m, and 190-210 m. The shorelines are about 25 km in length, and the latter is better defined than the former. The shallower shoreline approximates the latest Pleistocene eustatic sea level lowstand at about 20 Ka. The deeper shoreline lies some 65-85 m below this lowstand and is tilted down to the south. Sediment samples were collected on the platform with the aid of the submersible for dating. Paleo water depths of sedimentary rocks indicate that Heceta Bank has undergone an average of 1000 m of post-Miocene uplift (Kulm and Fowler, 1974), thus the anomalously deep shoreline suggests the vertical movements of Heceta Bank, and possibly other tectonically active areas of the shelf are complex.