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Active Deformation of the Oregon Continental Shelf II

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Using seismic reflection, sidescan sonar images and submersible observations, we found that flexural-slip thrust faults are a common feature of active folding on the Oregon shelf. DELTA dives confirmed the active nature of these faults off Tillamook Bay and southeast of Daisy Bank in water depths ranging from 180-150 m. Goldfinger et al (1992) postulated these folds and associated faults may be partly or solely responsible for co-seismic subsidence of Oregon's coastal bays. We documented several active flexural slip thrust faults with overhanging scarp morphology developed in poorly consolidated material. These scarps offset the Holocene transgressive sediments (i.e., post-20 ka features); it is unlikely they survived the inner shelf erosive wave action during the last low stand of sea level. The observed active nature of these folds and onshore mapping of structures by other investigators supports the premise that upper plate folding and faulting play an important role in vertical tectonics of certain coastal bays. Two active strike-slip faults were confirmed by sidescan and dives. Fault B was previously identified by Goldfinger et al. (1992) on the continental slope and the Coquille fault was mapped in detail in 1992 off Bandon on the southern Oregon coast. Fault B truncates the southern flank of a structural uplift, Daisy Bank. This fault zone is a WNW-trending vertical shear zone with vertical scarps locally 10 m in height. A second similar fault bounds the northern slope of the bank. The orientation of secondary shear fractures on both fault segments suggests left-lateral motion; the uplift of Daisy Bank may be due to the compressional zone between the two faults. We mapped several more active WNW trending left lateral strike-slip faults on the inner shelf between the Siuslaw River and Coos Bay. Deformation of unconsolidated Holocene sediments indicates present activity on these faults. The Coquille fault is similarly active, with open fractures and scarps observed in 85 m water depth. Analysis of the main fault and secondary structures confirm that it is a right-lateral strike-slip fault. Nearby seismic reflection profiles suggest 5-10 km of right lateral separation of offset fold axes.