

American Geophysical Union, Fall Meeting, 1990
EOS, v. 71, p. 1580

Neotectonics and Possible Segmentation of the Juan de Fuca Plate and Cascadia Subduction Zone off Central Oregon

C. Goldfinger (Department of Geosciences, Wilkinson Hall 104, Oregon State University, Corvallis, OR 97331)

M.E. MacKay (Dept. of Geology and Geophysics, SOEST, University of Hawaii, Honolulu, HI, 96822)

L.D. Kulm (College of Oceanography, Oregon State University, Corvallis, OR 97331)

R.S. Yeats (Department of Geosciences, Wilkinson Hall 104, Oregon State University, Corvallis, OR 97331)

Sidescan sonar surveys, SeaBeam bathymetry and single/multichannel seismic records show surficial and basement faults in the accretionary wedge and adjacent abyssal plain off central Oregon. At least four NW-trending faults intersect the deformation front between 44° 30'N and 45° 12'N (A, B, C, and D). The most prominent fault (A) extends at least 17 km seaward of the front, may offset the basement approximately 200 m vertically, and offsets late Pleistocene to Holocene channels 150-400 m in a left-lateral sense. Fluid venting observed from ALVIN and fresh seafloor scarps suggest an active structure. This fault corresponds to a regional lineament observed on GLORIA sidescan images; it may extend 38 km seaward of the deformation front. Landward of the fault's intersection with the deformation front, several splays fan eastward into the lower slope. The three other faults (B, C, and D) offset the deformation front and/or anticlinal ridges on the continental slope in a left-lateral sense. Fault B, imaged on SeaMARC sidescan, is associated with a change in vergence of the dominant north-south trending thrusts in the lower slope. Two of these faults (A, B) are associated with north-plunging, breached anticlines in the abyssal plain near their intersections with the deformation front. These structures were previously believed to be mud volcanos; however, they involve upwarping of the basement and entire sedimentary section. Both anticlinal structures are truncated on their southern flanks by splays of the strike-slip faults in complex positive flower-structures. Landward of the deformation front, these two NW-trending faults can be traced 120 km SE across the continental slope onto the inner shelf, and project onshore near Yaquina and Alsea bays. The length of these faults and evidence of basement involvement suggest they may be segment boundaries in the subducting Juan de Fuca Plate.