An abstract and thesis of Gregory George Briggs for the Masters of Science in Geology were presented August 3, 1994 and accepted by the thesis committee and the department.

COMMITTEE APPROVALS:  
Curt D. Peterson, Chair

Marvin H. Beeson  
Scott F. Burns  
Mary L. Taylor

DEPARTMENT APPROVAL:  
Marvin H. Beeson, Chair, Department of Geology

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by Selita M. Fisher on December 5, 1994
ABSTRACT


Title: Coastal Crossing of the Elastic Strain Zero-Isobase, Cascadia Margin, South Central Oregon Coast.

The analysis of marsh cores from the tidal zones of the Siuslaw, Umpqua, and Coos River systems on the south-central Oregon coast provides supporting evidence of coseismic subsidence resulting from megathrust earthquakes and reveals the landward extent of the zero-isobase. The analysis is based on lithostratigraphy, paleotidal indicators, microfossil paleotidal indicators, and radiocarbon age. Coseismic activity is further supported by the presence of anomalous thin sand layers present in certain cores. The analysis of diatom assemblages provides evidence of relative sea-level displacement on the order of 1 to 2 m. The historic quiescence of local synclinal structures in the Coos Bay area together with the evidence of prehistoric episodic burial of wetland sequences suggests that the activity of these structures is linked to megathrust releases. The distribution of cores containing non-episodically buried marshes and cores that show episodically buried wetlands within this area suggests that the landward extent of the zero-isobase is between 100 km and 120 km from the trench.
The zero-isobase has a minimum width of 10 to 15 km. Radiocarbon dating of selected buried peat sequences yields an estimated recurrence interval on the order of 400 years. The apparent overlapping of the landward margin of both the upperplate deformation zone (fold and/or thrust fault belt) and the landward extent of the zero-isobase is interpreted to represent the landward limit of the locked zone. The earthquake magnitude is estimated to be 8.5 based on an arbitrary rupture length of 200 km and a locked zone width of 105 km. The identification of the zero-isobase on the south-central Oregon coast is crucial to the prediction of regional coseismic subsidence and tsunami hazards, the testing of megathrust dislocation models, and the estimation of megathrust rupture areas and corresponding earthquake magnitudes in the Cascadia Margin.