

Tectonic geomorphology on the sea floor,



If I understand sedimentation and erosion, I may invert the topography for its active tectonic driver.

Sedimentation patterns and erosion processes are relatively well known







what's in it for me?

Wave erosion on the Santa Cruz coast, CA

In 1996, Ruff & Tichelaar propose that coastlines sit above the downdip end of seismic coupling based on EQ outlines. Crustal buoyancy and subduction angle would explain it.

What Controls The Seismogenic Plate Interface In Subduction Zones?

Larry J. Ruff and Bart W. Tichelaar¹

Department of Geological Sciences, University of Michigan, Ann Arbor, Michigan

Subduction: Top to Bottom Geophysical Monograph 96 Copyright 1996 by the American Geophysical Union 4. DOES THE COASTLINE CONTROL THE DOWNDIP EDGE OF SUBDUCTION EARTHQUAKES?

Maps of the downdip edge of the seismogenic plate interface show a rather curious coincidence. Projection of the downdip edge onto the surficial features show that the coastline and downdip edge are in close proximity for many subduction zones. In particular, the coastline and downdip edge plot close together for much of the Chile, Colombia-Ecuador, Mexico, and northern Honshu subduction zones [see detailed maps in Tichelaar and Ruff, 1993]. In some subduction zones, the coastline is complex and hence difficult to define (e.g., Alaska and southern Chile). In

But the position of the coastline at active margins primarily depends on sea level and erosion. What gives?

What are the morphological and active tectonic elements at a subduction?



What's a subduction margin anyway? Geometries can vary widely according to subduction type,



but one element is common: strain associated to seismic coupling.

Is the near universal downdip end of locking indeed reflected in morphology?



The locking depth appears to co-locate with the shelf break, not the coastline Let's compile large megathrust EQs and see how they align or not with the shelf break and the coastline at erosive continental shelves.



The shelf break is a much better predictor of the downdip end of large EQ than the coastline. Does the relationship hold by adding all information from interseismic coupling studies?





depth, using all compiled data all data (left) or using a higher confidence selection (right)

Uplift landward of the locking depth would feed rock into the domain of wave-base erosion. The shelf break would reflect a hingeline in long-term tectonic uplift (many earthquake cycles).

How to link locking depth and uplift pattern I hear?

Assuming that a small fraction of the interseismic deformation is not recovered during the coseismic rupture, it becomes an important driver of mountain building. And its location is linked to the location of the locking depth.



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