Geologic Aspects of the M = 8.8 February 27, 2010 Chile Earthquake

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Mw8.8 at a Depth of 35km
OVERALL, a tectonic plate descends, or “subducts,” beneath an adjoining plate. But it does so in a stick-slip fashion.

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BETWEEN EARTHQUAKES the plates slide freely at great depth, where hot and ductile. But at shallow depth, where cool and brittle, they stick together. Slowly squeezed, the overriding plate thickens.

After Atwater et al. (2005)
DURING AN EARTHQUAKE the leading edge of the overriding plate breaks free, springing seaward and upward. Behind, the plate stretches; its surface fails. The vertical displacements set off a tsunami.

After Atwater et al. (2005)
Estimated Coseismic Vertical Displacements

- Pichilemu
- Iloca
- Constitucion
- Dichato
- Concepcion
- Lebu

Estimated coseismic vertical displacements:
- 3.5 m
- 3 m
Tectonic Uplift and Subsidence

Pichilemu

Arauco Peninsula
Tectonic Uplift

Lebu
Tectonic Subsidence

(-0.5 m)
Estimated Coseismic Vertical Displacements
Uplift Influenced Areas of Inundation
Landsliding: Highest concentrations--
Coastal bluffs on Arauco Peninsula
Logging roads in coastal mountains

Dry late summer =
Low soil moistures