

TO Bownbag Seminar
Tuesday June 3, 2014
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Slab Flattening and Foundering in the Extreme: The young growth of a craton and Flood Basalt excitation below the Western U.S.

Abstract:

Upper mantle imaging with EarthScope seismic data reveals surprising structures. When combined with geologic knowledge, explanations for young (<100 Ma) western U.S. activity can be made that address fundamental continental processes. I will focus on two of these. (1) A large oceanic plateau subducted beneath Caltech on its way to Wyoming, where it is stopped. This under-accreted (or "slab-stacked") slab added new highly-depleted mantle to the Wyoming craton; the ocean crust got away and vertical motions of the surface provide clues as to how this happened. (2) Arrival of the Yellowstone plume to SE Oregon created the small Steens flood basalt event, and it triggered foundering of a remnant piece of flat-subducted Farallon slab. This slab rolled back (delaminated) to the north, entraining plume asthenosphere with it. When the slab rolled past a dense pluton root in NE Oregon, it too foundered. (This is much like what probably happened beneath the southern Sierra Nevada.) This sinking forced a rapid overturn of the hot plume asthenosphere, creating the Columbia River flood basalts.