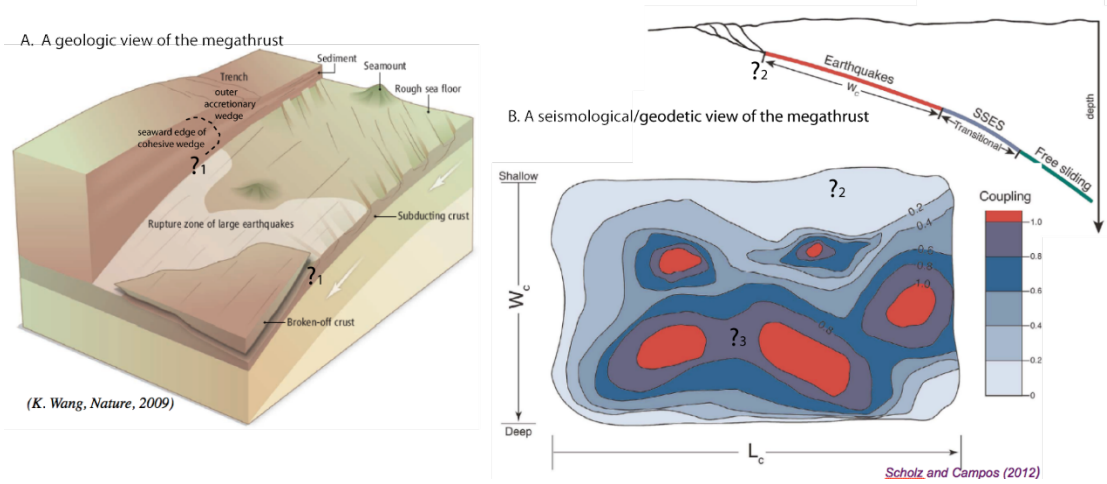
February 26, 2016. Anne Tréhu seminar title and abstract:

## Forearc Crustal Structure And Slip In Megathrust Earthquakes: Looking For Links In Chile And Cascadia.

Slip during subduction zone earthquakes is probably controlled in part by the structure and composition of the crust adjacent to the plate boundary, which affect fault plane mineralogy, fluid pressure and the spatial pattern of inter-seismic stress heterogeneity. Geologic heterogeneity results in patches on the fault that tend to slip in infrequent but large earthquakes and other patches that accommodate a significant amount of plate boundary deformation through slow-slip and creep. Superimposed on these geologic controls may be apparently chaotic behavior resulting from rate dependant friction and the resulting short time scale temperature and pressure perturbations. An overarching objective of my research is to identify the role of crustal structure in this process in order to improve our ability to "read" the geologic record for clues about what to expect in future earthquakes. I will discuss crustal structure in the Cascadia forearc and compare it to what is known about the earthquake history as constrained by paleoseismic observations and to the inter-seismic strain accumulation pattern defined by geodetic data. I will also discuss recent and planned experiments in Chile that take advantage of well-constrained models for the slip history of recent megathrust earthquakes to help elucidate the relationship to crustal structure in these events. Finally, I will discuss how those efforts can be generalized.




*?1 indicates uncertainty about the fate of subducted topography; ?2 refers to uncertainty about the conditions under which the outer wedge can express velocity-weakening behavior; ?3 refers to questions about what controls the along-strike continuity of patches of strong coupling.*