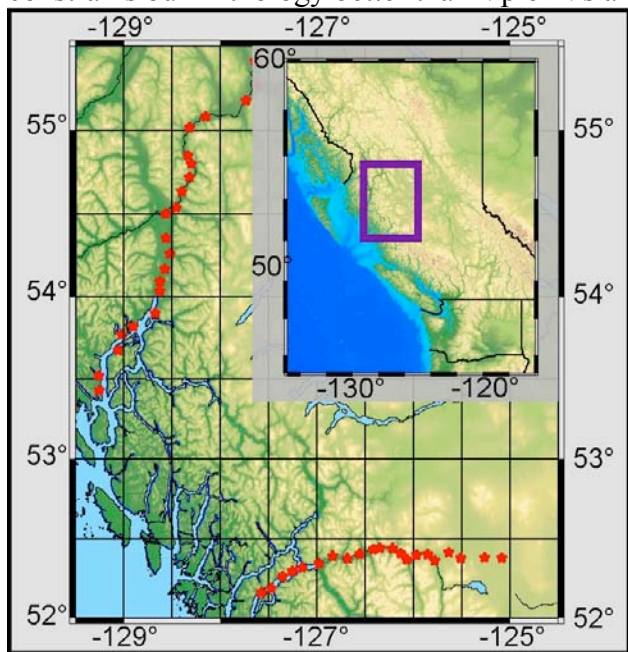


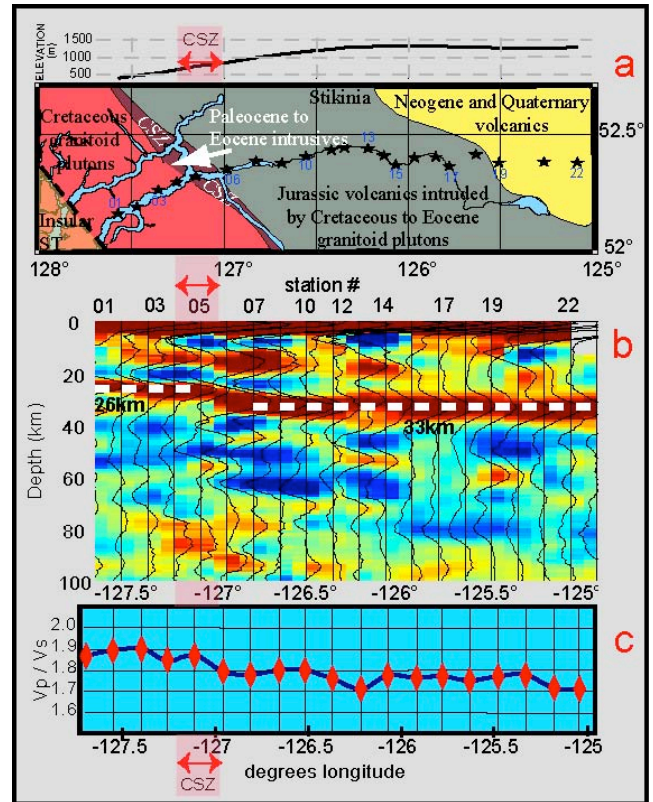
**The Batholiths Passive Seismic Project:  
Imaging the Roots of the Coast Mountain Batholith**  
George Zandt (Arizona), Ken Dueker (Wyoming)  
UA students: Josh Calkins, Andy Frassetto

One of the overarching goals of the interdisciplinary Batholiths Continental Dynamics project is to investigate the structure and composition of the crust and upper mantle in search of evidence of a currently existing or previously delaminated ultramafic root beneath the Coast Mountains Batholith (CMB) in central western British Columbia. The passive seismic component of the project consisted of 42 portable broadband seismometers deployed in two transects between June 2005 and October 2006. The southern transect began near the eastern edge of the Insular superterrane, crossed the coast shear zone (CSZ), and continued eastward through Bella Coola and onto the Chilcotin Plateau south of the Anahim volcanic province (Figs. 1 & 2).

Over 100 teleseismic earthquakes with broad azimuthal coverage, magnitudes > 5.5 and good signal to noise ratio were recorded during the 14 month deployment. Preliminary results of a receiver function study using this teleseismic P wave data as recorded by the southern line provide robust crustal thickness and Vp/Vs estimates across the CMB. The Vp/Vs ratio is a particularly useful indicator of crustal composition (via its relation to Poisson's ratio,  $\sigma$ ) and constrains bulk lithology better than Vp or Vs alone.



**Figure 1:** Map of the Batholiths study area with seismic stations in red. Purple rectangle on large-scale inset outlines area of detail.



**Figure 2:** Southern line receiver function results. (a) Shows the generalized local geology with broadband stations represented as black stars and smoothed topography above. (b) Common conversion point stacks of receiver functions show a flat, bright Moho with a sharp offset near the Coast Shear Zone (CSZ). Receiver function stacks were migrated using the calculated Vp/Vs ratios plotted in (c). Pink boxes show approximate extent of the CSZ.

The most striking observation is the abrupt change in both Vp/Vs and Moho depth across the CSZ (Fig. 2). To the west of the CSZ, the crust has an average thickness of ~25 km and a Vp/Vs of 1.88 ( $\sigma = .30$ ), indicative of a bulk mafic composition. To the east, the crust thickens to a nearly uniform 33 km and has a more intermediate lithology with a Vp/Vs of 1.76 ( $\sigma = 0.26$ ). These observations support interpretation of the coast shear zone as a major, crustal-scale geologic boundary (Calkins et al., 2006, *Eos Transactions*).

We are currently extending our receiver function study to include data recorded on the northern line, and ongoing tomographic (Peck et al., 2006, *Eos Transactions*) and shear wave splitting investigations will illuminate the composition and fabric of the lower crust and upper most mantle beneath the CMB.