# Upper Crustal Evolution Along the Juan de Fuca Ridge Flanks from Travel Time Tomography of Seismic Layer 2

We are performing 2-D travel time tomography using data from long (150-300 km) multi-channel seismic lines, collected in 2002 across the Endeavor and Cleft segments of the Juan de Fuca Ridge (JdFR), to examine upper crustal evolution along the ridge flanks. 1-D velocity models have previously been computed at ~3 km intervals on super CMP gathers and are here used to define the initial velocity models for inversion. The 1-D models, which provide good regional constraints of the upper crustal velocity, show little increase in velocity with crustal age on the unsedimented west flank of the JdFR whereas velocities close to double on the heavily sedimented east flank by ~4-5 Ma. Superimposed on these large-scale regional changes are shorter wavelength (~5-10 km) variations of seismic layer 2A, possibly associated with basement structure. Continuous 2-D tomography with higher lateral resolution, from the full streamer data, will enable detailed analysis of the upper crustal structure and evolution.

For the 2-D travel time tomography, we picked the first arriving refraction in shot gathers (2B arrival). In our data, this phase is generally visible in the last ~2 km of the 6 km streamer. We are using a modified version of C. Zelt's FAST tomography code to invert for the minimum-structure 2-D velocity models. The dense sampling of sources and receivers allow us to image velocity variations at lateral scales of 1 km or less. We anticipate that our 2-D models will validate the previous 1-D models on a regional scale as well as yield more detailed information about layer 2A and upper layer 2B. In particular, we hope to determine if the there are detectable fine scale variations in upper crustal structure with basement relief, if there is any local effect of propagator wakes on upper crustal velocities and if the alteration observed in layer 2A extends into 2B.