# Upper crustal structure across the Endeavour ridge segment

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Reflection imaging, 1D traveltime modeling, and 2D traveltime tomography were carried out using 2002 Juan de Fuca ridge multichannel seismic data to determine upper crustal structure along the 300 km long transect crossing the Endeavour ridge segment. Reflection analysis resulted in an image of the sedimentary column, top of the igneous basement, layer 2A/2B boundary, AMC and Moho, and provided a high-quality velocity model of the sedimentary column to be used as input for traveltime modeling and tomography. 1D traveltime modeling on common mid-point supergathers was done subsequently to determine layer 2A structure at ~3 km intervals. 2D traveltime tomography was applied last to determine the velocity structure of the uppermost section of layer 2B. Sediments show a gradual increase in velocity with increasing depth. Layer 2A velocities increase with crustal age. For east Endeavour flank that is blanketed with a sealing sedimentary cover, the velocity increase is double that observed on the sparsely and discontinuously sedimented west flank over the same crustal age range of ~5 Ma. The computed thickness gradients show that layer 2A does not thin and disappear with increasing crustal age or sediment blanketing, but persists as a relatively low seismic velocity layer capping the deeper oceanic crust. However, layer 2A on the fully sedimented east Endeavour flank is on average thinner than on the sparsely and discontinuously sedimented west flank (330±80 vs. 430±80 m). The change in thickness occurs over a 10-20 km distance coincident with the onset of sediment burial. 2D tomography results indicate that uppermost layer 2B evolves quickly with increasing crustal age and reaches mature layer 2B velocities within some 10 km away from the ridge axis. Locally, propagator wakes can have atypical layer 2A thickness and velocity. However, further analysis, in particular of the 2D traveltime tomography results is required to fully investigate the effects of local structure on crustal velocity. Integration of the gathered results in future work should be beneficial, in particular to larger scale tomography studies of the whole curst and uppermost mantle.