A model of rollback and mantle flow (but not mantle convection)

The continental lithosphere moves to the left as (a) it slips to the left into the void resulting from rollback of the trench, and as (b) it rides to the left on the underlying flowing asthenosphere.

Outline of position of slab in Step 1

Volume of asthenosphere on east side of slab that must move westward to fill volume left by sinking slab.

Volume of asthenosphere on west side of slab that must be vacated via flow to west

Volume of asthenosphere on east side of slab that must be vacated via flow to east

Volume of asthenosphere on east side of slab that must move upward to fill volume left by motion of lithosphere.

Volume into which asthenosphere can or must flow (or overriding lithosphere must move) in time elapsed from Step 1 to Step 2

Volume from which asthenosphere must flow in time elapsed from Step 1 to Step 2

Lithospheric movement

Asthenospheric flow

Step 1

Step 2

660 km discontinuity

Trench

Continent

Mid-ocean ridge

Mid-ocean ridge

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