

The gift that keeps on giving: ocean crust recycling and the evolution of Earth's mantle

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Hofmann and White proposed in the early 1980s the -at the time- somewhat radical idea that the lead isotope characteristics of mantle plumes could be explained by the recycling and long term storage of oceanic crust. We will discuss how well this idea has stood the test of time amidst new geochemical techniques and geophysical observations of deep mantle heterogeneity. Recycling of dense oceanic crust over the age of the Earth provides a natural explanation for the characteristics of the large low shear wave velocity provinces at the core-mantle boundary and scattering characteristics throughout the mantle. Combined geodynamical and geochemical modeling along with a plentitude of new geochemical data provides strong quantitative support in multiple isotope systems including noble gases and stable isotopes.