

WHAT HAPPENS WHEN ROCKS MELT?

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According to plate tectonic theory, continental crust overrides oceanic crust when the plates collide, because the continental crust is less dense than the ocean floor. As the ocean floor sinks, it encounters increasing pressures and temperatures within the crust. Ultimately, the pressures and temperatures are so high that the rocks in the subducted oceanic crust melt. Once the rocks melt, a plume of molten material begins to rise in the crust (See figure). As the plume rises it melts and incorporates other crustal rocks. This rising body of magma is an open system with respect to the surrounding crustal rocks.¹ Convection currents stir the magma. Volatiles (e.g., water vapor and carbon dioxide) increase the pressure within the magma chamber and contribute to the mixing of the system.

It is possible that these physical processes have an impact on the determined radiometric age of the

rock as it cools and crystallizes. Time is not a direct measurement. The actual data are the ratios of parent and daughter isotopes present in the sample. Time is one of the values that can be determined from the slope of the line representing the distribution of the isotopes. Isotope distributions are determined by the chemical and physical factors governing a given magma chamber.

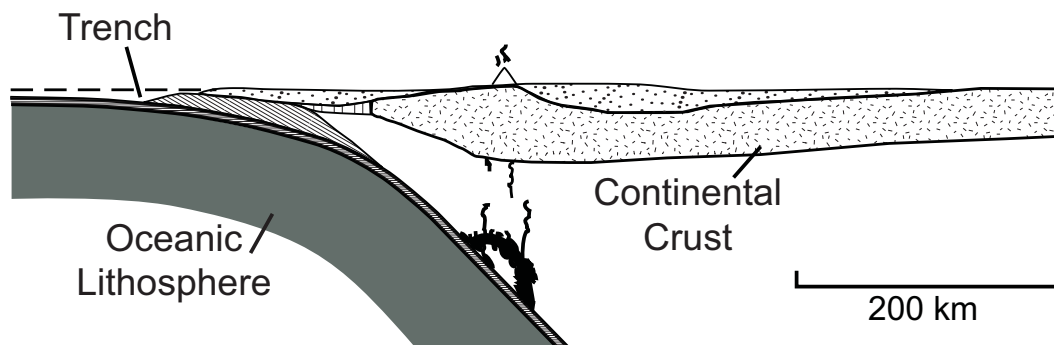
Contamination and fractionation issues are frankly acknowledged by the geologic community.² For example, if a magma chamber does not have homogeneously mixed isotopes, lighter daughter products could accumulate in the upper portion of the chamber. If this occurs, initial volcanic eruptions would have a preponderance of daughter products relative to the parent isotopes. Such a distribution would give the appearance of age. As the magma chamber is depleted in daughter

products, subsequent lava flows and ash beds would have younger dates.

Such a scenario does not answer all of the questions or solve all of the problems that radiometric dating poses for those who believe the Genesis account of Creation and the Flood. It does suggest at least one aspect of the problem that could be researched more thoroughly.

Endnotes

1. Davis GH, Reynolds SJ. 1996. Structural geology of rocks and regions. 2d ed. NY: John Wiley & Sons, p 564-617.
2. Faure G. 1986. Principles of isotope geology. NY: John Wiley & Sons. 589 p.



Continental plate overriding the subducting oceanic plate. Diagram modified from Dickinson 1977.