

Helium-3 - all is not lost

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Is there a reservoir of primordial rock deep within the Earth, left over from the birth of our planet? Geochemical data have traditionally indicated 'yes', but evidence from seismology seemed inconsistent with the survival of such a reservoir. This week in *Nature*, Cornelia Class and Steven Goldstein present a theory that may allow geologists to resolve this contradiction.

The question arose because the rocks of ocean islands like Hawaii contain relatively large amounts of helium-3, an isotope that must be mainly left over from the days when the Earth first formed, because it is not generated from the radiogenic decay of other elements. Researchers believed that helium-3-rich minerals should only come from untouched primordial rock that has welled up from deep within the mantle and has not previously been 'degassed' when partially melted near the Earth's surface.

But seismologists look upon this evidence with dismay. They see no evidence that large portions of the mantle have escaped the mixing and melting that drives plate tectonics and makes volcanoes.

Class and Goldstein show that the other minerals in ocean island rocks tell a different story - the most helium-3-rich rocks also contain elements that resemble the composition of rock that has melted before, such as that found at mid-ocean ridges. The best explanation for all this, they say, is simply that the mantle loses less of its helium than expected during melting. Their model, which will need physical experiments to back it up, explains how this might happen. A News and Views article by William M. White accompanies this research.

Source: Nature Publishing Group

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