ハワイ島沖ロイヒ、キラウエア深海底ガラス中の揮発性物質濃度と水素同位体比

Volatile concentrations and hydrogen isotope ratios of submarine glasses from Loihi and Kilauea, off the coast of the Hawaii Island

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Volatile (H_2O, CO_2, F, Cl and S) concentrations and hydrogen isotope ratios were analyzed for fresh quenched glasses of Hawaiian submarine volcanoes from Loihi (eight samples) and the East Kilauea Rift (three samples) using Cameca IMS-1280HR at the Kochi Institute for Core Sample Research, JAMSTEC. H_2O, CO_2, F, Cl and S concentrations of these glasses are 0.4-2.5 wt%, 47-342 ppm, 392-874 ppm, 140-1447 ppm, and 899-2490 ppm, respectively. Three glass samples from Loihi with high H_2O content of >2 wt% are high in Cl/F (>2.5), indicating that they are affected by seawater or brine assimilation. Hydrogen isotope ratios (δDsmow) of the glasses range from −84 to −118 ‰, except for bine assimilated glasses (δD of −64 to −62). Low δD values of all the Hawaiian volcanic glasses are distinct from those of mid ocean ridge basalts, MORBs (−60 ±5 ‰; Clog et al., 2013). The glasses with the lowest δD (−118 and −111 ‰) are from Loihi whose S contents are high (2367 and 2490 ppm, respectively). Whereas, glasses from Kilauea are higher in δD (−84 and −98 ‰) and lower in S content (900 and 1600 ppm).
Since 3He/4He ratios of MORBs, basalts from Kilauea and Loihi are ˜8 Ra, 13-15 Ra and 20-35 Ra, respectively (Kaneoka et al., 2002), hydrogen isotope ratios may negatively correlate with 3He/4He. The present result implies that the hydrogen isotope of the high 3He Hawaiian mantle is low (δD < −120 ‰), but it may not be as low as <−220 ‰, which is recently suggested by olivine melt inclusions from the Baffin Island picrites (Hallis et al., 2015).

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