Failing plumes: the Icelandic case

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Seismic observations show both temperature and compositional anomalies in the mantle, especially they are observed in the lowermost mantle. These chemical heterogeneities at the bottom boundary should strongly affect the generation and the behaviour of mantle plumes. Here we discuss the case of Icelandic plume based on laboratory experiments of thermochemical plumes generated out of a dense layer. Fluid mechanics results show that the convective features of thermochemical plumes are strongly time-dependent, that could explain the Icelandic observations, namely the pre-traps track, the hot traps (˜60 Ma, ˜300 K) as well as the mild temperature anomalies (˜100 K) pre- and post-traps, the strong upper mantle component in the present-day Iceland lavas as well as its rare gas anomaly, and the apparent disconnection between slow seismic anomalies in the upper and lower mantle.