Longest continually erupting large igneous province driven by plume–ridge interaction

Q. Jiang1, F. Jourdan1*, H.K.H. Olleook1,2, R.E. Merle3, M.F. Coffin4,5, J.M. Whittaker6

1 John de Laeter Centre and School of Earth and Planetary Sciences, Curtin University, Perth, WA 6845, Australia
2 Centre for Exploration Targeting – Curtin Node, School of Earth and Planetary Sciences, Curtin University, Perth, WA 6845, Australia
3 Swedish Museum of Natural History, S-104 05 Stockholm, Sweden
4 Institute for Marine and Antarctic Studies, University of Tasmania, Hobart, Tasmania 7001, Australia
5 School of Earth and Climate Sciences, University of Maine, Orono, Maine 04469-5790, USA and Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543, USA

*presenting author

Large igneous provinces are usually emplaced in one short pulse of ~1–5 million years, or several punctuated, ~1–5 million year pulses. Here, our new plagioclase $^{40}$Ar/$^{39}$Ar plateau ages for the main construct of the Kerguelen large igneous province — the Southern and Central Kerguelen Plateau, Elan Bank and Broken Ridge — show continuous volcanic activity from range from 122.2 ± 2.6 Ma to 89.9 ± 1.0 Ma and more specifically from ~122 to ~90 Ma for the Southern Kerguelen Plateau, from ~111 to ~106 Ma for Elan Bank, from ~109 to ~93 Ma for the Central Kerguelen Plateau, and from ~99 to ~98 Ma for Broken Ridge, i.e. a long lifespan of > 32 million years. This suggests that the Kerguelen large igneous province records a previously undocumented emplacement tempo for large igneous provinces. Distinct from short-lived and multiple-pulsed large igneous provinces, we propose that Kerguelen is a new type of large igneous province that formed due to long-term plume–ridge interaction and jump(s) of the spreading ridge towards the plume. Such a process allows for transport of magma products away from the eruption centre, thus creating space for the magma to continuously rise, and results in long-lived, continuous magmatic activity.