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

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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.