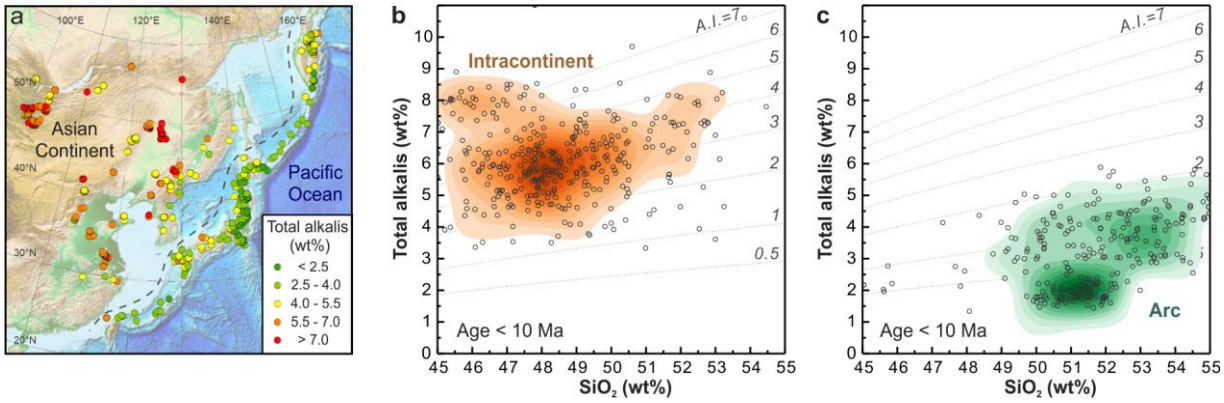
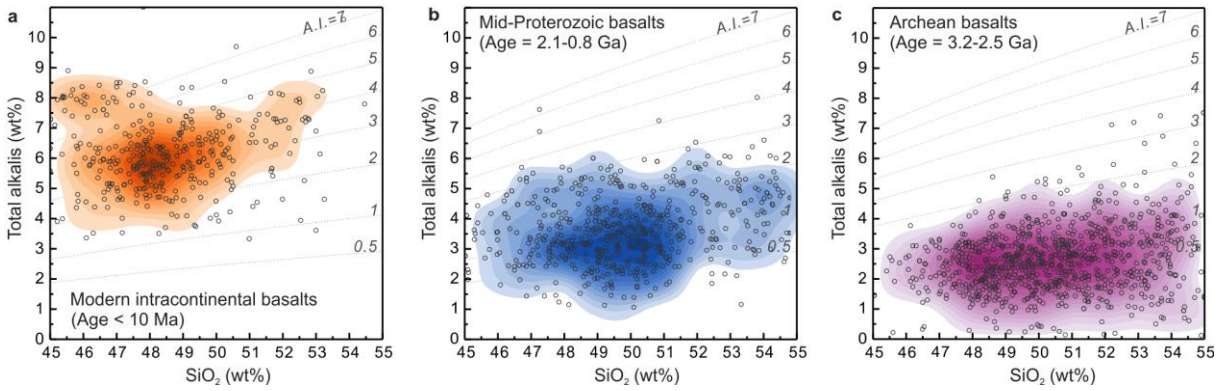
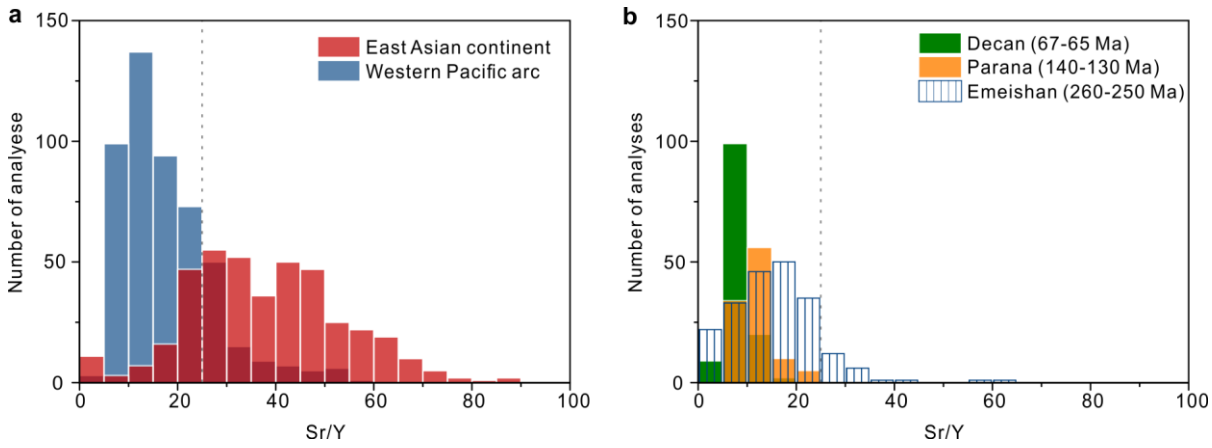


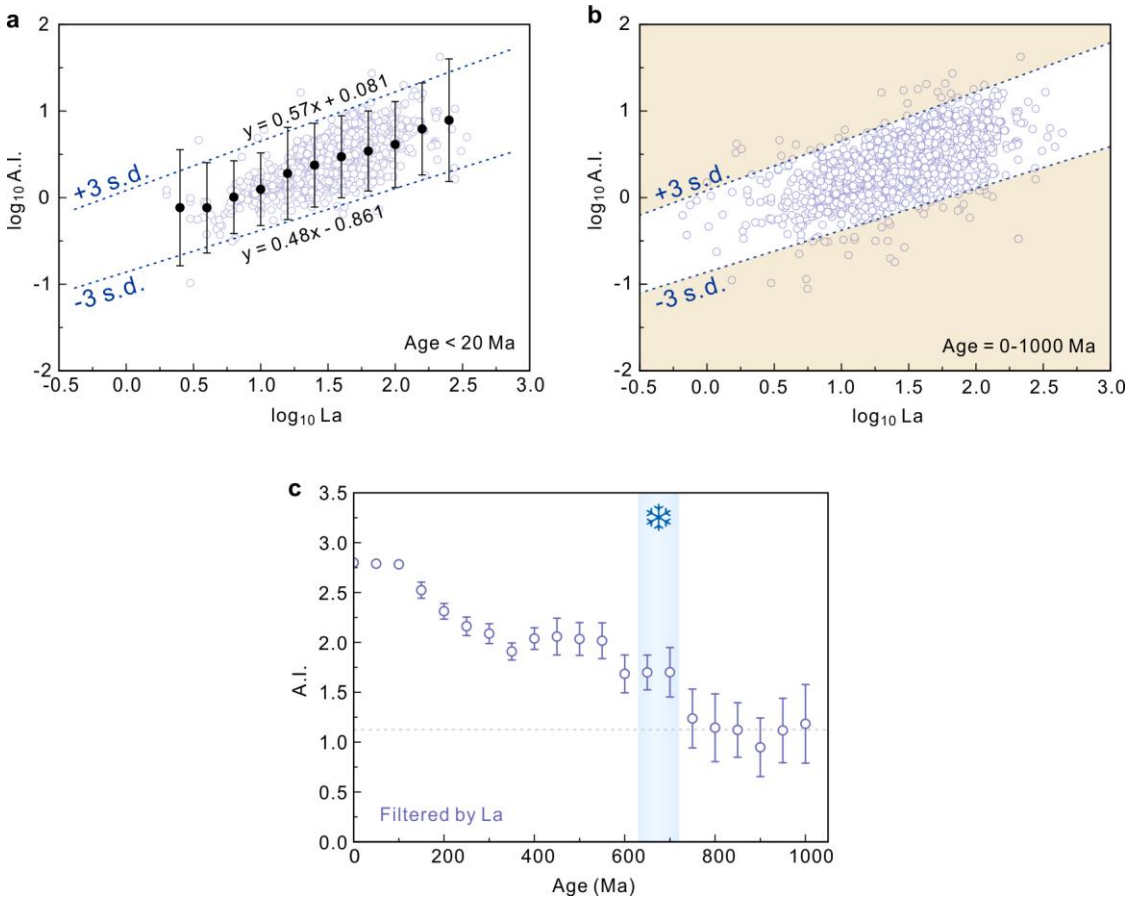
Supplementary Fig. 1 The total alkali vs SiO_2 content of basalts from intracontinental and arc setting. a. Plot of the total alkali ($Na_2O + K_2O$) content in basalts (younger than 10 Ma) from eastern Asia. **b–c**. Scatter plots and density contours of the total alkali vs SiO_2 content of intracontinental and arc basalts, respectively. Data were extracted from the EarthChem database (www.earthchem.org/portal). The background relief map was downloaded from the NOAA website (https://www.ngdc.noaa.gov/)[1].



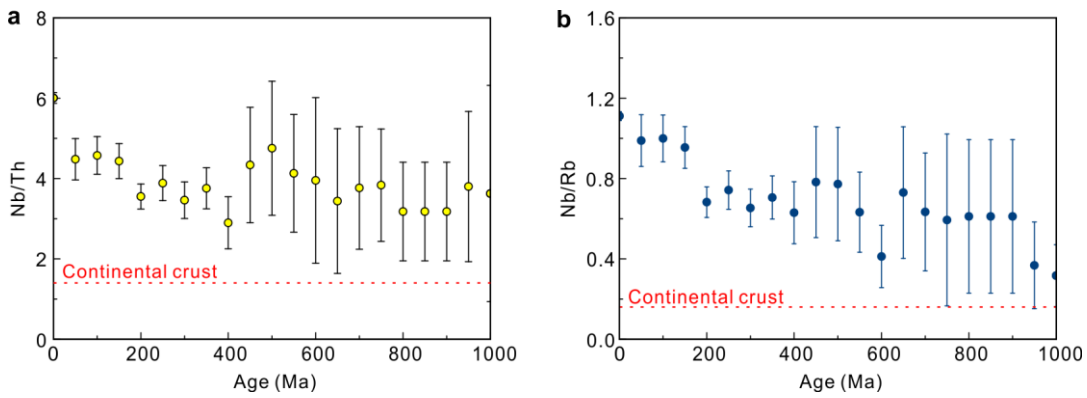
Supplementary Fig. 2 Comparison of the Alkali Index (A.I.) vs silica content in modern intracontinental, mid-Proterozoic, and Archean basalts. Plots and density contours of the total alkali ($Na_2O + K_2O$) vs SiO_2 content of modern intracontinental basalts (<10 Ma), mid-Proterozoic (2.1–0.8 Ga), and Archean basalts (3.2–2.5 Ga). The locations of the modern intracontinental basalts are shown in Supplementary Fig. 1a.



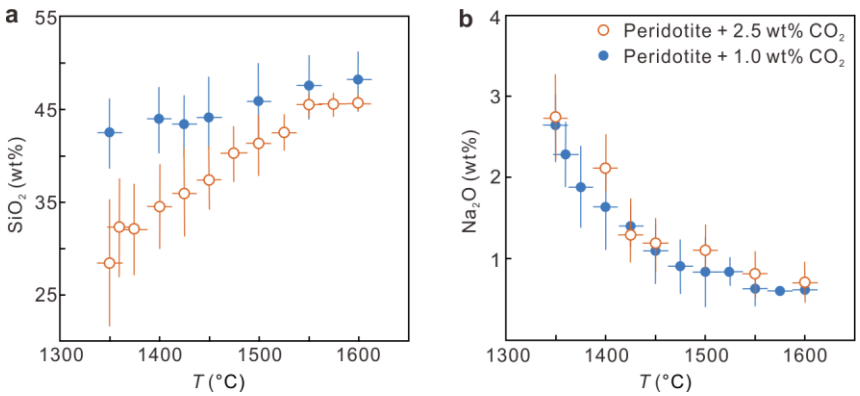
Supplementary Fig. 3 The Sr/Y systematics of intracontinental, arc, and large igneous province basalts. a. Histograms showing the Sr/Y ratios of <10 Ma basalts from the East Asian continent and western Pacific arc. Locations of samples are shown in Supplementary Fig. 1a. **b.** Histograms showing the Sr/Y ratio of basalts from the Decan, Parana, and Emeishan large igneous provinces (LIPs). Data were extracted from the EarthChem database (www.earthchem.org/portal). The ages of the samples are shown in the legend. The dashed vertical lines in both figures denote Sr/Y = 25.



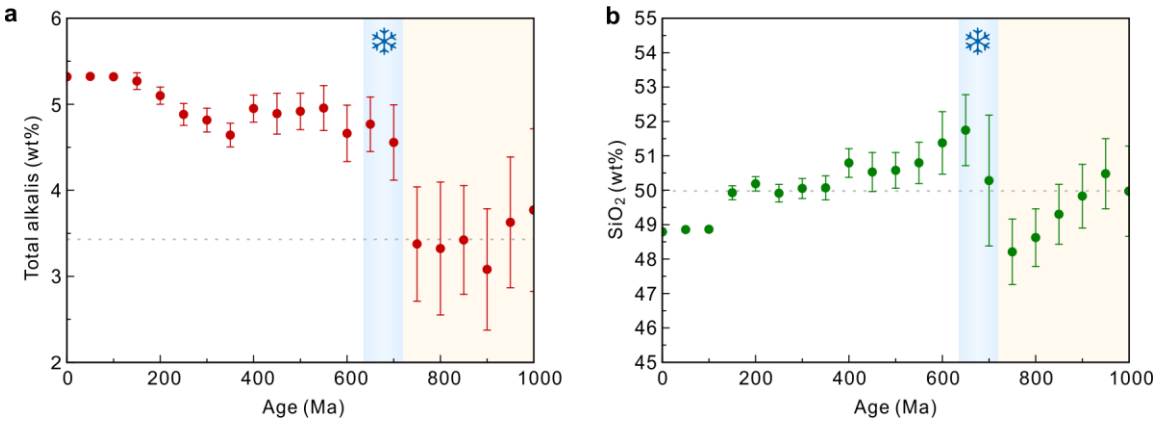
Supplementary Fig. 4 Plots showing the processes of data filtering to minimize the influence of alteration and metamorphism on the intracontinental basalts. a. Plot of $\log_{10}$ A.I. vs $\log_{10}$ La for <10 Ma basalts. **b.** The plot of $\log_{10}$ A.I. vs $\log_{10}$ La for all intracontinental basalts. The data within the areas covered by the yellow polygons were removed prior to performing the statistical analysis. **c.** Secular variations in A.I. for the La-filtered data.



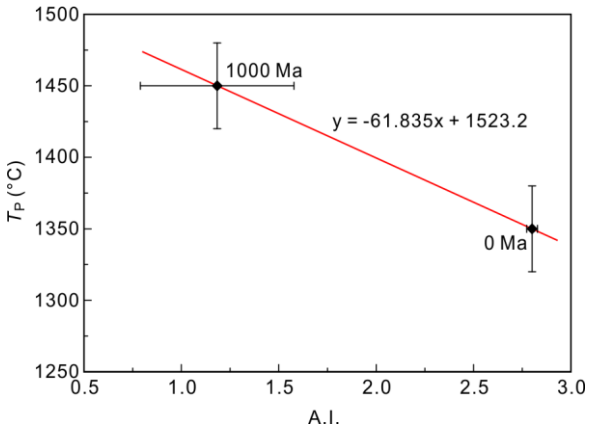
Supplementary Fig. 5 Secular variations in Nb/Th and Nb/Rb ratios in intracontinental basalts since the Neoproterozoic (1000–0 Ma). a. Secular variation in Nb/Th. **b.** Secular variation in Nb/Rb. The horizontal red dashed lines show the Nb/Th or Nb/Rb ratios of the bulk continental crust (from ref. [2]).



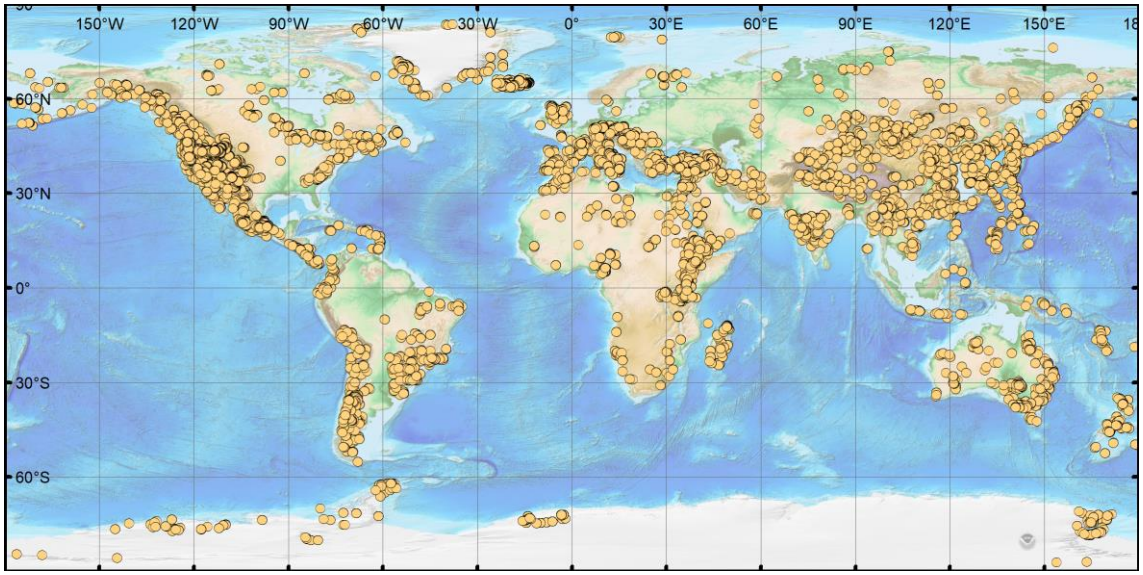
Supplementary Fig. 6 Composition of carbonate-bearing silicate partial melts from PERC (peridotite + 2.5 wt% CO_2) and PERC3 (peridotite + 1.0 wt% CO_2) carbonated peridotite partial melting experiments at 3 GPa (modified from ref [3]). a. SiO_2 content in the melt from partial melting of PERC and PERC3. **b.** Na_2O content in the melt from the partial melting of PERC and PERC3. The increase of CO_2 in the mantle source leads to a decrease in the SiO_2 content of the melt but has almost no effect on Na_2O content.



Supplementary Fig. 7 Secular variations in the total alkalis and silica content of intracontinental basalts since the Neoproterozoic (1000–0 Ma). The intracontinental basalts are filtered by Sr/Y > 25 as they are mostly generated by high-pressure melting (Supplementary Fig. 3). **a–b.** Secular variations in total alkali (Na_2O+K_2O) content and SiO_2 content, respectively. The moving average has a 200-Myr window. Error bars denote two standard errors on the means (s.e.m.). The light-blue vertical columns with a snowflake symbol represent the Cryogenian Snowball Earth event at ~720–635 Ma[4]. The grey horizontal dashed lines show the average values before the Cryogenian.



Supplementary Fig. 8 Comparison between the alkali index (A.I.) and previously proposed mantle potential temperature (T_P). We compare the data in the previous T_P model at 1000 and 0 Ma with the average A.I. in contemporaneous intracontinental basalts.



Supplementary Fig. 9 Spatial distribution of all basaltic rocks (45–55 wt% SiO_2) used in this study (*n* = 43,836). The data were downloaded from the EarthChem database with appropriate filtering. The background relief map was downloaded from the NOAA website (https://www.ngdc.noaa.gov/)[1].

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