Geophysical Research Abstracts
Vol. 18, EGU2016-7252-1, 2016
EGU General Assembly 2016
© Author(s) 2016. CC Attribution 3.0 License.

Heterogeneous source components of intraplate basalts from NE China induced by the ongoing Pacific slab subduction

Huan Chen (1,2), Qun-Ke Xia (3), Jannick Ingrin (2), and Etienne Deloule (4)

(1) CAS Key Laboratory of Crust–Mantle Materials and Environments, School of Earth and Space Science, University of Science and Technology of China, Hefei, 230026, China, (2) UMET, UMR CNRS 8207, Université de Lille 1, Bât. C6, 59655 Villeneuve d'Ascq, France, (3) Department of Earth Sciences, Zhejiang University, Hangzhou, 310027, China, (4) CRPG, UMR 7358, CNRS Université de Lorraine, 15 rue Notre-Dame-des Pauvres, 54501 Vandoeuvre-les Nancy, France

In recent few years, the recycled oceanic slab has been increasingly suggested to be the enriched component in the mantle source of widespread intra-plate small-volume basaltic magmatism in eastern China. The recycled oceanic slab is a mixture of sediment, upper oceanic crust and lower gabbro oceanic crust, and will undergo alteration and dehydration during the recycling progress. The influence of these different components on the mantle source needs to be further constrained.

The Chaihe-aershan volcanic field in Northeast China is located close to the surface position of the front edge of the subducted Pacific slab and includes more than 35 small-volume Quaternary basaltic volcanoes, which provides an opportunity to study the evolution of mantle source in detail and the small-scale geochemical heterogeneity of the mantle source. We measured the oxygen isotopes and water content of clinopyroxene (cpx) phenocrysts by secondary ion mass spectrometry (SIMS) and Fourier transform infrared spectrometry (FTIR), respectively. The water content of magma was then estimated based on the partition coefficient of H_2O between cpx and basaltic melt. The measured $\delta^{18}O$ of cpx phenocrysts (4.27 to 8.57 ‰) and the calculated H_2O content of magmas (0.23-2.70 wt.%) show large variations, reflecting the compositional heterogeneity of the mantle source. The $\delta^{18}O$ values within individual samples also display a considerable variation, from 1.28 to 2.31‰ suggesting mixing of magmas or the sustained injection of magmas with different $\delta^{18}O$ values during the crystallization. The relationship between the averaged $\delta^{18}O$ values of cpx phenocrysts and the H_2O/Ce, Ba/Th, Nb/La ratios and Eu anomaly of whole-rocks demonstrates the contribution to three components in the mantle source (hydrothermally altered upper oceanic crust or marine sediments, altered lower gabbroic oceanic crust, ambient mantle). The proportions of these three components varied strongly within a limited period (∼1.27 Ma to ∼0.25 Ma). As only the Pacific slab is constantly subducted to the eastern Asia during that time, we suggested that its ongoing subduction is the only reasonable candidate to result in the compositional heterogeneity and rapid variation of enriched components in such a limited and recent time. Combines with previous studies on other basalt localities of eastern China, these new results confirm that the Pacific slab subduction play a key role in the triggering of the wide spread Cenozoic basaltic volcanism in eastern China.