

Geochemistry and Geochronology of OIB-type Early Jurassic Magmatism in the Zhangguangcai Range, NE China, as a Result of Continental Back-arc Extension



FENG Guangying^{1,*}, Yildirim DILEK², NIU Xiaolu¹, LIU Fei¹ and YANG Jingsui¹

¹ Center for Advanced Research on Mantle, Key Laboratory of Deep-Earth Dynamics of Ministry of Natural Resources, Institute of Geology, Chinese Academy of Geological Sciences, Beijing, 100037;

² Department of Geology and Environmental Earth Science, Miami University, 208 Shideler Hall, 250 S. Patterson Avenue, Oxford, Ohio, USA

Citation: Feng et al., 2020. Geochemistry and Geochronology of OIB-type Early Jurassic Magmatism in the Zhangguangcai Range, NE China, as a Result of Continental Back-arc Extension. Acta Geologica Sinica (English Edition), 94(supp. 1): 13. DOI: 10.1111/1755-6724.14433

Abstract: The Zhangguangcai Range in the Xing'an(Hinggan) Mongolian Orogenic Belt, NE China, contains Early Jurassic (c. 188 Ma) Dabaizigou (DBZG) porphyritic dolerite. Compared with other island-arc mafic rocks, the DBZG dolerite is characterized by high trace-element contents, relatively weak Nb and Ta enrichments, and no Zr, Hf or Ti depletions, similar to OIB-type rocks. Analysed rocks have (⁸⁷Sr/⁸⁶Sr)_i ratios of 0.7033–0.7044, relatively uniform positive $\epsilon_{\text{Nd}}(t)$ values of 2.3–3.2 and positive $\epsilon_{\text{Hf}}(t)$ values of 8.5–17.1. Trace-element and isotopic modelling indicates that the DBZG mafic rocks were generated by partial melting of asthenospheric mantle under garnet-to-spinel-facies conditions. The occurrence of OIB-like mafic intrusion suggests significant upwelling of the asthenosphere in response to lithospheric attenuation caused by continental rifting. These processes occurred in an incipient continental back-arc environment in the upper plate of a palaeo-Pacific slab subducting W–NW beneath East Asia.

Key words: Early Jurassic, continental back arc, geochemistry, OIB-type mafic intrusion, palaeo-Pacific Ocean, Mesozoic

tectonics of NE China

Acknowledgements: The research was funded by grants from the National Natural Science Foundation of China (41773029; 41672063; 41573022; 41720104009; 41373029), the Geological Survey (DD20160023-01) and the Foundation of MLR (201511022). We thank WU Cailai, WANG Zheng, LEI Min, SHI Bin and XU Xiangzhen for their assistance with Lu–Hf isotopic analysis and Zircon CL methods. We thank Professor Yujiro OGAWA and editor Susie BLOOR for their editorial help and consideration, and two anonymous reviewers for their constructive reviews.

About the first author

FENG Guangying, female, born in 1983 in Handan City, Hebei Province; PhD; associate researcher of Institute of Geology, Chinese Academy of Geological Sciences. She is now interested in the study of petrogenesis of mafic magmatic rocks and mantle peridotites. E-mail: fengguangying198@163.com; phone: 010-68990674, 18611245102.

* Corresponding author. E-mail: fengguangying198@163.com