

The zircon-scale insights into early Cretaceous volcanism in the central Sulu orogenic belt, eastern China : Implications for magma processes

**TENGFEI ZHOU^{1,2}, YAOQI ZHOU¹, NINA SØAGER²,
PAUL MARTIN HOLM², ZHENKAI ZHANG³**

¹ Department of Geology, School of Geosciences, China
University of Petroleum, Qingdao, 266580, P.R.China

² Department of Geosciences and Natural Resource
Management, University of Copenhagen, Øster Voldgade
10, 1350 Copenhagen-K, Denmark

³ Shaanxi Center of Mineral Geological Survey, Shaanxi
Institute of Geological Survey, Xi'an, 710068, P.R.China

Zircon has an outstanding capacity to record geochronological and geochemical information about magma evolution. We report U-Pb age results and trace element concentrations of more than 200 zircons in 6 samples of early Cretaceous volcanic rocks from the central Sulu orogenic belt, eastern China. The period of volcanic activity was found to have been from 123.4 ± 3.2 to 111 ± 2.0 Ma, and the activity can be divided into 5 groups based on zircon rim U-Pb ages and whole rock geochemistry. The magmas have different types. The content of SiO₂ varies from 52% to 82% and ALK varies from 6.0% to 12%.

The chronological map of zircons (including cores and rims) from the felsic volcanic rocks shows that more than 90% of the zircons have early Cretaceous ages, and the oldest inherited zircon is 921 ± 28 Ma. The population contains a small group of zircons whose U-Pb ages range from 190 to 214 Ma, with Th/U 1.48~2.53 (average 1.80). However, a group of old zircons with ages from 1505 to 2355 Ma with Th/U 0.06~1.86 (ave. 0.63), appears in the chronological map of zircons from basic-intermediate igneous rocks, which also contain old inherited zircons with age peaks around 700-900Ma, 329-503Ma, and 188-261Ma, with ave. Th/U of 0.81, 0.80, and 1.84, respectively. The U/Yb-Y, U/Yb-Nb/Yb and U-Yb diagrams for igneous zircons in combination show that our early Cretaceous zircons consist of both continental zircons and ocean crust zircons. In particular, the zircons with ages of 1505-2355Ma belong to the continental type, which should be part of the old crust of North China Craton.

This indicates that the different series of magmas underwent different magmatic processes with crystallization and contamination in different parts or levels in the crust.