

Pb-in-K-feldspar provenance study of the Pliocene-Quaternary sediments in the Jiangnan Basin: Implications for drainage reorganization of the Yangtze River

ZENGJIE ZHANG^{1,2*}, SHANE TYRRELL³, CHANG'AN LI¹
AND J. STEPHEN DALY²

¹School of Earth Sciences, China University of Geosciences, Wuhan 430074, China

²UCD School of Geological Sciences, University College Dublin, Dublin, Ireland

(*correspondence: zjzycug@gmail.com)

³Department of Earth and Ocean Sciences, National University of Ireland, Galway, Ireland

The Yangtze River is the largest fluvial system draining the Tibetan Plateau yet its timing (Pre-Miocene *versus* Quaternary), and mode of origin have been debated for more than 100 years. In one view, there was an east-flowing Yangtze river ~23 Ma ago, based on zircon provenance studies. This model needs to be more thoroughly tested since the Paleogene and Neogene sediments of the middle-lower Yangtze River show similar zircon U-Pb age patterns, and the presence of evaporites in the Jiangnan Basin precludes an east-flowing Yangtze river in the Paleogene. In contrast, most Quaternary formation models suggest that detritus derived from the upper Yangtze River first appeared in the middle-lower Yangtze River during the early Pleistocene.

In this study we have used laser-ablation Pb isotope compositions of detrital K-feldspar from the late Cenozoic sediments in the Jiangnan Basin to test and reconcile these conflicting models. Our new Pb data suggest that the upper Yangtze River had not cut through the Three Gorges in the late Pliocene, yet it flowed through the Jiangnan Basin east of the Three Gorges in the early Quaternary (~2.4 Ma). Besides the reorganization of the trunk Yangtze River, the Pb isotopic data also record the first delivery of detritus from the Hangjiang River, one of the largest tributaries, into the Jiangnan Basin ~1.4-1.2 Ma ago. We suggest that the capture of the Hanjiang into the Yangtze River system in the early Pleistocene resulted from the southward tilted uplift of the Tongbai-Dabie mountains during the late Cenozoic.