

SHEN Shuzhong, ZHANG Hua, XIANG Lei, HENDERSON C. M., ZHENG Quanfeng, YUAN Dongxun, CAO Changqun, WANG Yue and CHEN Jun, 2013. Unraveling the Last Moment of the End-Permian Mass Extinction. *Acta Geologica Sinica* (English Edition), 87 (supp.): 914.

Unraveling the Last Moment of the End-Permian Mass Extinction

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The end-Permian mass extinction has been universally documented as the largest extinction during the Phanerozoic. In the immediate aftermath the marine ecosystem is prevailed by microbial and monotonous communities dominated by disaster taxa. Recent plausible scenarios include an extremely fast, explosive release of methane or other gases such as carbon dioxide and hydrogen sulfide. Siberia flood volcanism has been suggested as the most possible mechanism to trigger the massive release of greenhouse gases from volcanic eruptions and carbon from thick organic-rich deposits or rapid venting of coal-derived methane or massive combustion of coal. $\delta^{13}\text{C}$ isotopic excursion, rapid disappearance of carbonate benthic communities and $\delta^{18}\text{O}$ excursion based on conodont apatite suggest rapid global warming.

The end-Permian mass extinction has been recently suggested as happened within 200,000 years. This extinction interval is constrained by two ash beds (Beds 25 and 28) at the Meishan section. However, the extinction patterns remain controversial. Geochemical signals and their interpretations from the Meishan section are also

various. Thus, the level of achievable stratigraphic resolution becomes crucial to determine the nature of the event and a detailed study of the extinction interval corresponding to beds 25 and 28 is essential to unravel the extinction pattern and causes. However, this extinction interval at Meishan is 22 cm thick only and contains distinct gaps at the Permian-Triassic boundary (PTB) and probably the base of Bed 25 of the Meishan Section. Thus, it is impossible to clarify a detailed extinction pattern based on such kind of extremely-condensed section. Studying expanded sections is crucial to understand the last moment of the rapid P-Tr events. In this report, we show a highly-expanded Permian-Triassic boundary section in Guangxi Province, south China. The last 4.5 m between beds 22 and 28 of the Meishan Section is represented by a sequence of ~560 m at the section and the extinction interval between beds 24e and 28 at Meishan is represented by an interval about ~95 m which contains abundant benthic fossils. This expanded section provides an unprecedented window to understand the last moment of the end-Permian mass extinction.

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