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贵州盘县峨眉山玄武岩系顶部凝灰岩LA-ICP-MS 锆石U-Pb年龄:对峨眉山大火成岩省与生物大规模灭绝关系的约束

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摘要：

在20世纪90年代,有学者认为峨眉山大火成岩省(Emeishan Large Igneous Province, ELIP)大规模火山活动与二叠-三叠系之交(Permian-Triassic Boundary, P-TB)的生物大灭绝事件在时间上有耦合关系,随后的$^{40}Ar/^{39}Ar$同位素测年结果也显示峨眉山大火成岩省是晚二叠世形成的。但是,近些年大量的SHRIMP U-Pb测年结果表明,ELIP大规模火山喷发约在~260Ma;因此有研究认为,ELIP火山活动与中二叠世瓜德卢普期末(end-Guadalupian)的生物灭绝事件在时间上联系更加紧密。至于P-T界线生物大灭绝,现在多数学者认为是,由于西伯利亚大火成岩省火山强烈活动释放大量气体和火山灰所造成环境变化引起的。最近,我们在ELIP东部的贵州盘县峨眉山玄武岩系剖面中发现顶部发育厚度达近百米的凝灰岩层,其LA-ICP-MS U-Pb法测年结果为251.0±1.0Ma,与浙江煤山剖面中二叠系-三叠系边界处黏土层或火山灰层的锆石U-Pb年龄接近。因此,峨眉山玄武岩喷发结束的时间应该在P-T边界,与西伯利亚大火成岩省的主体喷发时间一致。新的测年结果暗示了ELIP火山活动与地球历史上最大的一次生物灭绝事件(P-T边界)可能存在着成因联系。

英文摘要：

In 1990s, some researchers suggested a temporal link between volcanism of the Emeishan Large Igneous Province (ELIP) and the mass extinction at the Permian-Triassic Boundary (P-TB), and were supported by the $^{40}Ar/^{39}Ar$ isotopic dating showing that the ELIP formed in the Late Permian. However, in recent years, a quantity of SHRIMP U-Pb datings suggested that the large-scale volcanism erupted at ~260Ma. Hence, the ELIP volcanism has been attributed to be the cause of the end-Guadalupian mass extinction in the Middle Permian. In contrast, the intense volcanism in Siberian traps has been considered to be the main cause of the P-T boundary great mass extinction which has been ascribed to a global environmental change due to voluminous gases and volcanic ash production. Recently, we have found a ~100m thick tuff layer in the uppermost of Emeishan basalt succession in the Panxian County, Guizhou Province, the eastern ELIP. Our new LA-ICP-MS zircon U-Pb dating on tuff from the uppermost of the Emeishan basalt succession yields an average age of 251.0±1.0Ma, coeval to those from ash or clay beds in the P-TB of the Meishan section in Zhejiang Province. Consequently, the end of the Emeishan flood volcanism is consistent with the main pulse of the P-TB Siberian large igneous province. Thus, our new dating result provides us a clue of a cause-and-effect relationship between the Emeishan large igneous province and the largest mass extinction in the earth’s history (P-TB).

关键词：凝灰岩 峨眉山玄武岩系 LA-ICP-MS U-Pb测年 二叠-三叠系界线 生物灭绝 贵州

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