Was terrestrial end-Permian mass extinction linked to explosive magmatic arc volcanism?

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The end-Permian mass extinction was the most severe life crisis during the Phanerozoic and was associated with dramatic global environmental changes. Large perturbation of carbon cycle, rapid temperature rise, oceanic acidification and anoxic condition have been widely documented from the coeval marine records. Magmetism from the Siberian Traps LIP has been overwhelmingly regarded as the trigger of the extinction and associated dramatic environmental changes. However, it remains controversial whether or not an end-Permian terrestrial extinction happened or whether the time and pattern between the terrestrial and marine extinctions are consistent or not. Here we presented detailed analyses of high-resolution biostratigraphical, high-precision CA-ID-TIMS geochronologic and geochemical data from terrestrial sections in South China. Our data indicate that the terrestrial mass extinction is strongly demonstrated by the mass disappearance of the *Gigantopteris* megaflora and abundant charcoal fossils at the extinction interval in South China. The extinction interval is characterized by a dramatic shift from olive/grey/black mudstone, siltstone, fine to coarse sandstone of fresh lake-swamp or river flat environment to uniformly maroon mudrocks with poorly-sorted breccia, calcic palaeosols and calcareous nodules. This depositional change indicates a dramatic collapse of soil and vegetation system associated with rapid deforestation, climatic warming and seasonal drying. The extinction is associated with a ca 5‰ negative shift of $\delta^{13}C_{org}$, a copper- and mercury-rich horizon likely derived from nearby volcanic eruptions and sharp excursions of both mercury and copper isotope ratios. All above data suggest that a possible link between terrestrial end-Permian mass extinction and nearby explosive volcanism of magmatic arc origin in South China needs to be seriously considered and further explored.