

The Permian-Triassic boundary event and eruption of the Siberian flood basalts: an inter-laboratory U-Pb dating study

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The eruption of the Siberian flood basalts in northern Russia has long been implicated as the major cause of the end-Permian mass extinction event. In the absence of direct paleontological evidence to demarcate the boundary within the volcanic sequence, the best way to show a relation between the two events is to prove that they occurred at the same time. U-Pb dating by ID-TIMS methods offers the highest precision available to demonstrate synchronicity.

Significant issues that prevent assessment of synchrony within the database of published U-Pb ages are the possibilities of inter-laboratory bias and open system behaviour such as Pb loss. These problems are well demonstrated by the efforts of three laboratories to date the Permian-Triassic (P-Tr) boundary [1-4] and the Siberian flood basalts [5-6]. As part of the EARTHTIME initiative, inter-laboratory calibration has established that inter-laboratory bias exceeds analytical precision. Recalibration of tracer/spike solutions against common gravimetric solutions, and application of an annealing and etching method [7] to zircon to eliminate Pb loss have determined that inter-laboratory bias can be significantly reduced.

This study presents new high precision U-Pb zircon ages from two laboratories for marine P-Tr sections in south China at the Meishan, Heshan, and Shangsi localities, and for the Siberian flood volcanic event. These data show that the major pulse of biotic extinctions is ~300-500 Kyrs older than the youngest part of the volcanic sequence. Inter-laboratory reproducibility has been established at <0.1% and each lab has independently demonstrated the near overlap of the events, which provides the most powerful indication so far for a temporal link.

References

- [1] Bowring et al. (1998) *Science* **280**, 1039-1044.
- [2] Mundil et al. (2001) *EPSL* **187**, 131-145.
- [3] Mundil et al. (2004) *Science* **305**, 1760-1763.
- [4] Kamo (2005) *GCA* **69**, A318.
- [5] Kamo et al. (1996) *GCA* **60**, 3505-3511.
- [6] Kamo et al. (2003) *EPSL* **214**, 75-91.
- [7] Mattinson (2005) *Chem Geol* **220**, 47-66.