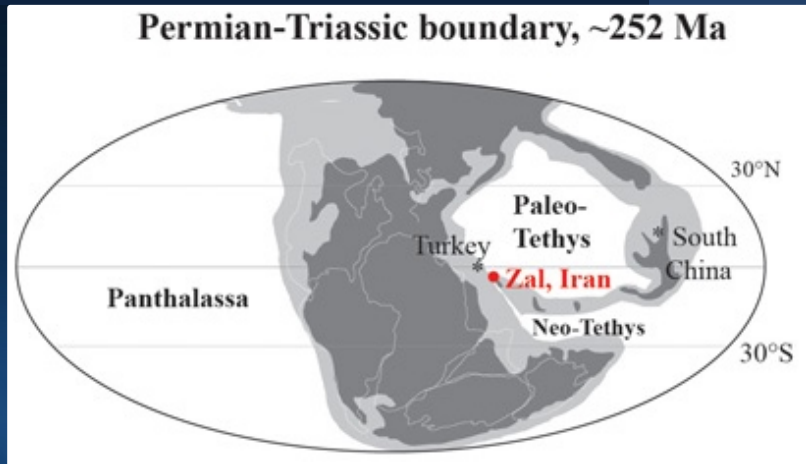


Global Conditions at Earth's Largest Mass Extinction Event



Using uranium isotopes to understand global conditions during Earth's past provides a more comprehensive picture of the Late Permian biotic crisis, and insight into the long delay in recovery.

- The extinction event at the end of the Permian 252 million years ago was the largest since the rise of animals. The extended recovery period of 6-8 million years, was longer than any of the other known events, and has been tied to lack of oxygen in the oceans.
- Most records of past ocean redox only measure local

conditions, but Uranium isotopes ($^{238}\text{U}/^{235}\text{U}$) are well-mixed and measure average redox conditions in the global ocean, since different isotopes are preferentially incorporated in to minerals in oxic and anoxic environments.

- This most recent study reports on a new location, and reports consistent measurements with three previous studies from other locations, but also extends the length of the record and at higher resolution. This record, from Zal, Iran which was on the border of the Paleotethys ocean, shows a good correlation between the extinction rates of the ammonite cephalopods and U-isotopes in five peaks over six millions years starting in the late Permian and extending through the recovery.
- Significant events in the history of life on Earth, such as the Late Permian extinction, depend on feedbacks between life and the global environment, and understanding how conditions correlated to the recovery delay in this event is important for better understanding how life and the earth have co-evolved.



Ammonite cephalopods were among those that suffered heavy losses at the PTB. This Goniatite ammonoid is from a group that was completely wiped out during the extinction.