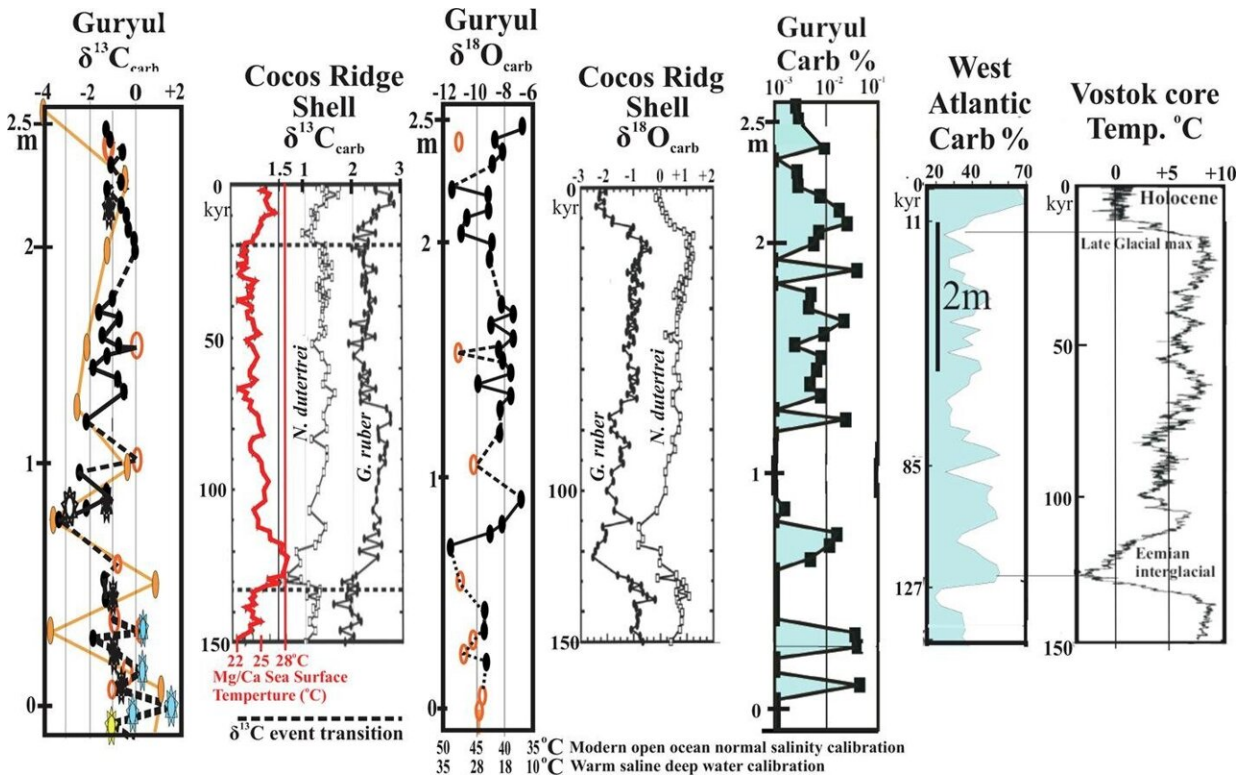
Study indicates link between climate fluctuations and mass extinction

July 7 2022



Graphical abstract. Credit: *Journal of Asian Earth Sciences* (2022). DOI: 10.1016/j.jseaes.2021.105066

Researchers investigating rocks in India have found chemical evidence of a series of rapid fluctuations in climate during the greatest known mass extinction event, around 252 million years ago. Michael Brookfield

at the University of Texas at Austin, U.S., with colleagues in Taiwan, report their findings and interpretations in the *Journal of Asian Earth Sciences*.

The extinction occurred at the boundary between the Permian and Triassic periods in the geological record and is estimated to have eliminated more than 90% of marine species and 70% of land-based species. Colloquially known as the Great Dying, and academically as the Permian-Triassic Extinction, it is one of the most significant events in the history of evolution.

Planetary scientists and biologists interested in the extinction's causes and time-scale are exploring various competing and sometimes overlapping theories. Their work may have relevance to the threat that human activity poses to the current variety of species on Earth.

Brookfield and colleagues studied the variations in levels of specific forms of carbon and oxygen atoms, known as carbon-13 and oxygen-18 isotopes. The carbon isotope levels are believed to indicate the extent to which carbon was being incorporated into living organisms, while the oxygen isotope levels are believed to vary with temperature.

The team collected their samples across a ridge in the Guryul Ravine, in Kashmir, India, whose rocks formed during the transition between the Permian and Triassic periods.

The isotope record suggests previously unrecognized large but geologically short-term fluctuations in temperature, therefore climate, and in biological incorporation of carbon during the period of mass extinction.

The authors conclude that climate-linked changes in the chemistry of the atmosphere and oceans drove major extinction events, at least in the

regions of the Earth providing the data, rather than physical geological changes as suggested by other proposals. Evidence of the power of climate change to drive ancient extinctions may be relevant to the climate change issues facing us now.

More information: Michael E. Brookfield et al, Climatic fluctuations during a mass extinction: Rapid carbon and oxygen isotope variations across the Permian-Triassic (PTr) boundary at Guryul Ravine, Kashmir, India, *Journal of Asian Earth Sciences* (2022). DOI: 10.1016/j.jseaes.2021.105066

Provided by Springer