

High-Resolution Rock Magnetic Cyclostratigraphy and the Duration of the Shuram C-isotope Excursion

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Using rock magnetic cyclostratigraphy we were able to identify astronomically-forced climate cycles in three globally distributed occurrences of the Shuram C-isotope excursion, Death Valley CA, South Australia, and South China. The Shuram excursion may record the oxidation of the world ocean in the Ediacaran, just before the Cambrian explosion of metazoans. Paleomagnetism successfully yielded a magnetostratigraphy at two of these localities, the Johnnie Formation in Death Valley CA and the Wonoka Formation in South Australia. The rock magnetic cyclostratigraphy indicated a duration for the Shuram excursion of 8.2 ± 1.2 Myr and 8.0 ± 0.5 Myr, respectively. In South China, rock magnetic cyclostratigraphy allowed identification of Milankovitch cycles and a duration for the Shuram excursion of 9.1 ± 1.0 Myr in the Doushantuo Formation, but the paleomagnetism of the detrital magnetite in the rocks was remagnetized in the Cretaceous, thus no magnetostratigraphy could be developed. At Death Valley and South Australia our results indicate that the nadir of the Shuram C-isotope excursion occurs at a reversed to normal geomagnetic field polarity transition, thus strongly supporting synchronicity of the excursion globally and, with similar durations worldwide, a primary origin for the excursion.