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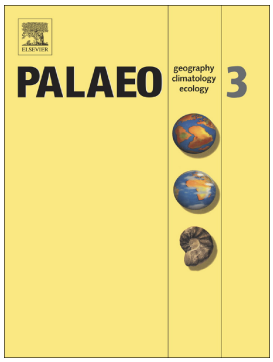

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PII: S0031-0182(17)30788-5
DOI: doi:10.1016/j.palaeo.2017.11.062
Reference: PALAEO 8564

To appear in: *Palaeogeography, Palaeoclimatology, Palaeoecology*

Received date: 1 August 2017
Revised date: 28 November 2017
Accepted date: 29 November 2017

Please cite this article as: Zachary D. Richard, David Pollard, Lee R. Kump, Timothy S. White , Anomalously low δ18O values of high-latitude Permo-Triassic paleosol siderite. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Palaeo(2017), doi:10.1016/j.palaeo.2017.11.062

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Anomalously low $\delta^{18}O$ values of high-latitude Permo-Triassic paleosol siderite

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Abstract

The most severe extinction in Earth history occurred during a time of extreme climate change, caused in part by a massive release of carbon into the atmosphere. Isotopic measurements of siderite occurring in paleosols during intervals of global warming suggest high-latitude depletions in $\delta^{18}O$ of precipitation, often attributed to an amplified hydrologic cycle. Here, Late Permian and Early Triassic paleosol siderite from Alaska, Antarctica, eastern Australia, Siberia, and South Africa indicate similar or greater meridional gradients in siderite $\delta^{18}O$ compared to other past warm intervals.

An isotope-tracer-enabled version of the Global Environmental and Ecological Simulation of Interactive Systems (GENESIS) general circulation model (GCM) was used to compare to siderite $\delta^{18}O$ data. The model, when deriving siderite $\delta^{18}O$ at a specified paleoatmospheric CO_2 concentration of 12.7X the preindustrial atmospheric level (PAL), matches a small subset of relatively less depleted high-latitude siderites but does not produce the

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