



## 2025-2026 EOAS Colloquium Series

# Metamorphic Sulfur Release As A Driver Of Sustained Cooling And Mass Extinction

The emplacement of large igneous provinces may drive catastrophic volatile release, both directly through volcanic degassing and indirectly through heating of carbon and sulfur-bearing host sediments. It is broadly assumed that sulfur injection must reach the stratosphere to drive long-term cooling, thus these indirect metamorphic sulfur emissions have been almost entirely ignored. Here we demonstrate that plausible carbon and sulfur emissions from contact metamorphism may be sustained long enough to cause centennial-scale sulfate aerosol-driven cooling spikes of several Kelvin superimposed on millennial-scale warming from the carbon dioxide greenhouse effect. We use modeling of sediment metamorphism along with simple carbon cycle and planetary energy balance models of the climate response to explore this relationship. Our results suggest that a metamorphic sulfur source should be considered as a driver of sustained global cooling during large igneous province emplacement, with potential implications for Phanerozoic biotic crises such as the End-Triassic Mass Extinction.



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**Location:** EOA 1044

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