

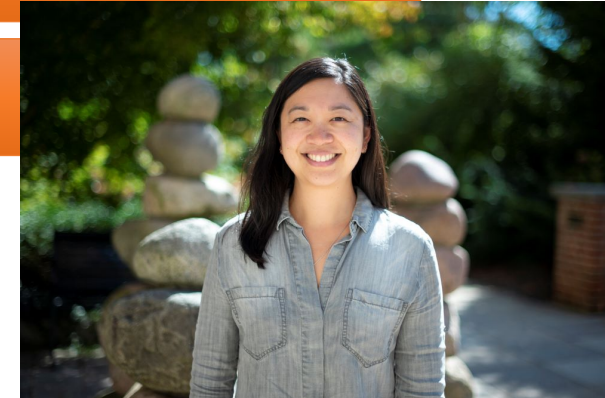
## Department Colloquium Series Spring 2022

Monday, April 4<sup>th</sup> 2022 @ 12pm (noon time) & Zoom\*  
Geo Mus 102 (Haller Hall) – A boxed lunch will be served

***Kim Lau***

Penn State, College of Earth and Mineral Sciences, Department of Geosciences

“Promises and Pitfalls of Paleoredox Proxies in Carbonate Rocks”



**Abstract:** The redox state of the oceans strongly influences organic carbon burial, habitability for marine biota, and biogeochemical cycling of nutrients and critical redox-sensitive elements. There are various methods for reconstructing oxygenation and deoxygenation through Earth history: Of these, inorganic geochemical proxies offer the potential to track redox conditions across a range of temporal and spatial scales. Carbonate rocks and sediments are a popular archive for geochemical paleoredox proxies because they have been deposited nearly continuously for over 3.8 billion years. Because their precipitation can be directly linked to seawater chemistry, their geochemistry can record time intervals of elevated organic carbon accumulation and/or heterogeneous redox conditions on both global and regional spatial scales. The fidelity of these paleoredox records—which include carbonate-associated sulfur isotopes, ‘stable’ uranium isotopes, chromium isotopes, iodine-to-calcium ratios, and the cerium anomaly—in tracking the degree of oxygenation depends on assessing the post-depositional, or diagenetic, alteration of the studied carbonate sediments and rocks. In this talk, I will discuss two case studies: one of how U isotopes can help elucidate the end-Permian mass extinction and another of how diagenetic modeling can help advance interpretations of these records. These results present an updated framework for evaluating carbonate geochemical tracers for tracking ancient anoxia and the carbon cycle.

**Short bio:** Kimberly Lau is an Assistant Professor at Penn State. She received her B.S. in Geology and Geophysics from Yale University and her Ph.D. in Geological Sciences from Stanford University, and completed an Agouron Geobiology Postdoc at the University of California, Riverside. She was previously at the University of Wyoming. Her research focuses on understanding the causes and consequences of redox changes in Earth’s ancient oceans, using a combination of lab, modeling, and field methods

\*Zoom link: <https://harvard.zoom.us/j/98884783575?pwd=ais5ek9MaGRQYy9ScEh3Zm5YdTRwQT09>