

## 10-1 - CO<sub>2</sub>PIP— A COMMUNITY PROJECT TO ADVANCE AND STANDARDIZE APPROACHES TO PALEO-CO<sub>2</sub> RECONSTRUCTION AND TO BUILD THE NEXT-GENERATION PHANEROZOIC RECORD



Sunday, October 10, 2021



8:05 AM - 8:20 AM



Oregon Convention Center - E143/E144

### Abstract

Atmospheric CO<sub>2</sub> is a fundamental variable in the Earth system as it impacts and responds to a range of processes that regulate planetary function. CO<sub>2</sub> has a primary control on Earth's climate, driving massive shifts between greenhouse and icehouse worlds. It directly affects marine and terrestrial ecosystems through its control on climate and seawater acidity, and is thought to have profoundly influenced the evolution of life. CO<sub>2</sub> levels respond to high-temperature processes occurring in the Earth's crust and mantle as well as to low-temperature processes occurring at the Earth's surface. CO<sub>2</sub> is thus a primary link between the subdisciplines of the Earth Sciences. Yet our quantitative knowledge of CO<sub>2</sub> variations in Earth's past is surprisingly limited. Whereas Cenozoic CO<sub>2</sub> and its uncertainties are increasingly better constrained (paleo-CO<sub>2</sub>.org), CO<sub>2</sub> levels in deeper time are highly uncertain. Here we introduce a new community project *CO<sub>2</sub>PIP* (CO<sub>2</sub> Proxy Integration Project) that will advance the science of paleo-CO<sub>2</sub> reconstruction and build a statistically robust multi-proxy atmospheric CO<sub>2</sub> record for the Phanerozoic. Building on the efforts of the Research Coordination Network '*Improving reconstructions of Cenozoic CO<sub>2</sub> change*', we focus on 1) compiling and updating proxy records for the Paleozoic and Mesozoic, 2) developing improved strategies for quantitative integration of diverse proxy data throughout the geological record.

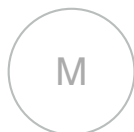
We seek to engage the broader scientific community to collaborate on modernizing existing pre-Cenozoic CO<sub>2</sub> proxy records, which are dominated by paleosol- and fossil leaf-based data. Based on recently developed community criteria, the vast majority of these records do not meet current standards for completeness. The CO<sub>2</sub>PIP vision is to work as a community to add key measurements and metadata for these record, building a FAIR paleo-CO<sub>2</sub> proxy data repository and digital infrastructure for presenting and archiving an interactive proxy data compilation. We will further develop quantified representations (forward proxy system models) of the conditions and processes that govern the CO<sub>2</sub> signal in several of the most commonly used proxies. Integration of the new proxy models with vetted and modernized CO<sub>2</sub> proxy records will generate a robust, quantitative reconstruction of Phanerozoic CO<sub>2</sub> concentrations. We aspire to produce fully accessible products that will facilitate future scientific discovery and analysis by researchers over a wide array of geoscience disciplines and inform the public.

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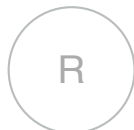
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