

# The Polar Rock Repository: an invaluable resource for climate analyses

ERICA LYNN MALETIC AND ANNE M GRUNOW

Byrd Polar and Climate Research Center

Presenting Author: [maletic.2@osu.edu](mailto:maletic.2@osu.edu)

While Antarctica is a prime place to study many geochemical processes in cold environments, its location provides unique challenges in terms of logistical accessibility and environmental impacts. The Polar Rock Repository (PRR) was created by the NSF Office of Polar Programs to preserve and freely provide access to rock, terrestrial core, unconsolidated till/soil, and marine dredge samples from Antarctica and the Southern Ocean for scientific research, including using destruction techniques. The PRR online database has 60,000+ samples ([prr.osu.edu](http://prr.osu.edu)) and includes information useful to climate studies by noting locations with weathering salts/calcite skins, Fe-oxide staining, biological features, coral, soil residues, inclusions, etc., which are included as multi-field searchable criteria on the PRR website. Samples can be ordered online for research use.

Multiple publications from high-impact journals (e.g., *Nature*) have used samples and data from the PRR in recent years for geochemical studies addressing climate related questions:

- Millennial scale climate cycles in the East Antarctic ice sheet since the Pleistocene have been documented using U-series methods on subglacial precipitates.
- Provenance studies using PRR samples, in conjunction with IODP cores, suggest a large West Antarctic Ice Sheet can explain early Neogene sea-level oscillations.
- Trace metal paleotemperature proxies are being developed from coral samples found on PRR dredge samples in the Ross Sea and Southern Ocean.
- Magmatic dynamics and eruption forecasting are being studied from PRR volcanic samples at Deception Island, one of the most active volcanoes in Antarctica.
- CO<sub>2</sub> fluxing and magma transport are being evaluated using volcanic bombs from Mt. Erebus as well as hyaloclastites cored during the Dry Valleys Drilling Project.

Since its creation, the PRR has loaned thousands of samples for geochemical analyses. The PRR is currently adding geochemistry data associated with PRR samples to the PetDB catalogue to make polar information more accessible through community online databases, facilitate global correlations, and potentially reduce redundant analytical costs. With easy access to samples, images, and geochemical data, the PRR is a vital resource for studying a variety of geochemical processes in Antarctica.