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PRECISE (Purdue Resources Empowering Coordinated Investigations for Sample Exploration): A new NASA Planetary Science Enabling Facility

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Purdue Resources Empowering Coordinated Investigations for Sample Exploration (PRECISE) is a Planetary Science Enabling Facility (PSEF) located at Purdue University. PRECISE provides access to 13 unique analytical laboratories and expert-level support in the analysis of planetary and analog materials at no-cost to users. We have state-of-the-art instrumentation that spans three themes: Solar System Isotopes and Chronology; Coordinated Composition, Microstructure, and Magnetism; and Bridging the Gap between Remote Observations and Laboratory Science.

Within the Solar System Isotopes and Chronology theme, facilities include the Isotopx Phoenix thermal ionization mass spectrometer (TIMS), a Thermo Fisher Neoma multicollector inductively coupled mass spectrometer (MC-ICPMS) and a Thermo Fisher iCAP MSX ICP-MS, an Isotopx NGX multi-collector noble gas mass spectrometer, and the Purdue University accelerator mass spectrometer (AMS) in the PRIME Lab. These instruments can provide a coordinated analytical dataset for elemental and isotopic analysis.

Within the Coordinated Composition, Microstructure, and Magnetism theme, capabilities include scanning electron microscopy (SEM), transmission electron microscopy (TEM), focused ion beam (FIB-SEM), field-emission electron probe microanalysis (FE-EPMA), X-ray computed tomography (XCT), a liquid chromatography mass spectrometer (LC-MS), a superconducting quantum interference device (SQUID) microscope, a Mag-Instruments ultrasensitive spinner magnetometer (USM), and a quantum diamond microscope. These instruments can provide a robust coordinated dataset on planetary materials down to the atomic scale.

Finally, within the Bridging the Gap Between Remote Observations and Laboratory Science theme, PRECISE offers access to both handheld and tabletop laser induced breakdown spectroscopy instrumentation, hyperspectral VNIR/SWIR reflectance spectroscopy instruments including HySpex by Neo microscopic imaging cameras, and FTIR capabilities (under development). Field portable instruments can also be loaned to PRECISE users to conduct planetary analog fieldwork. Observations made with this instrumentation enable users to connect measurements from remote sensing spacecraft to laboratory observations.

Requests for access to instrumentation are submitted through our website [1]. Depending on the analytical techniques, samples can be sent to Purdue University for analysis, or community members can make measurements on site at PRECISE. Proposers are encouraged to reach out to the team prior to submitting a proposal to discuss the feasibility of their work.

[1] PRECISE: https://www.eaps.purdue.edu/precise/