XSPACE: AN LPI-ARES (JSC) FACILITY FOR CLASSIFICATION AND CURATION OF METEORITES

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Introduction: The XSPACE (eXterrestrial SamPle, Analyses, Curation, and Exploration) laboratory, a partnership of the Lunar and Planetary Institute (LPI) and the Astromaterials Research and Exploration Science (ARES) division of NASA, Johnson Space Center (JSC), is a new facility (XSPACE (usra.edu)) dedicated to the classification and curation of non-Antarctic meteorites. The mission of this meteorite collection is to classify non-Antarctic meteorites and make them available to the scientific community following protocols and standards similar to those used for the U.S. Antarctic Meteorite Collection.

Classification: New meteorites submitted to XSPACE will first be examined and documented in hand sample at LPI (USRA-Houston) using optical microscopy and/or the LPI Phenom XL SEM (LPI Science Labs and Equipment (usra.edu)) operating in low-vacuum mode (for unpolished, uncoated samples). Those deemed worthy of further study will be transferred to ARES for additional preparation and analyses needed for classification. The analyses that will be done will be determined by what type of meteorite each sample appears to be, based on the hand sample observations. Ordinary chondrites may be classified at JSC by magnetic susceptibility (e.g., [1]) with minimal sample preparation or modification. For samples that are potentially achondrites, unequilibrated chondrites, or any unusual types, one polished section will be made and used for the electron microprobe analyses necessary for classification. Typically thin sections will be made, but friable samples may be prepared as thick sections or probe mounts. All sample preparation and analytical techniques will be the same as those established for the U.S. Antarctic Meteorite Collection at JSC [2-4]. Samples will only be analyzed by additional techniques if deemed necessary for classification (e.g., triple oxygen isotopes may be measured at JSC in rare cases when necessary for classification, but this will not be standard practice). Proposed meteorite classifications will be submitted to the Nomenclature Committee of the Meteoritical Society for approval and official naming [5].

The XSPACE Collection: The XSPACE collection is housed in a dedicated curation room in the LPI (USRA-Houston) building. The room is equipped with Viking Preservation Model 920 Series curation cabinets and humidity-controlled dessicators. The collection (XSPACE - Meteorite Database (usra.edu)) currently consists of a small number of donated meteorite samples, with additional donations anticipated. Several new meteorites are currently being classified and will become part of the collection. We have submitted an application to the Nomenclature Committee to become an official repository. In addition, XSPACE will be the official curation site for samples on loan from the University of Khartoum (UoK) collection of stones from the 2008 Almahata Sitta meteorite fall [6]. Policies and procedures for requesting allocation of samples from the XSPACE collection can be found at XSPACE - Requesting Samples (usra.edu).

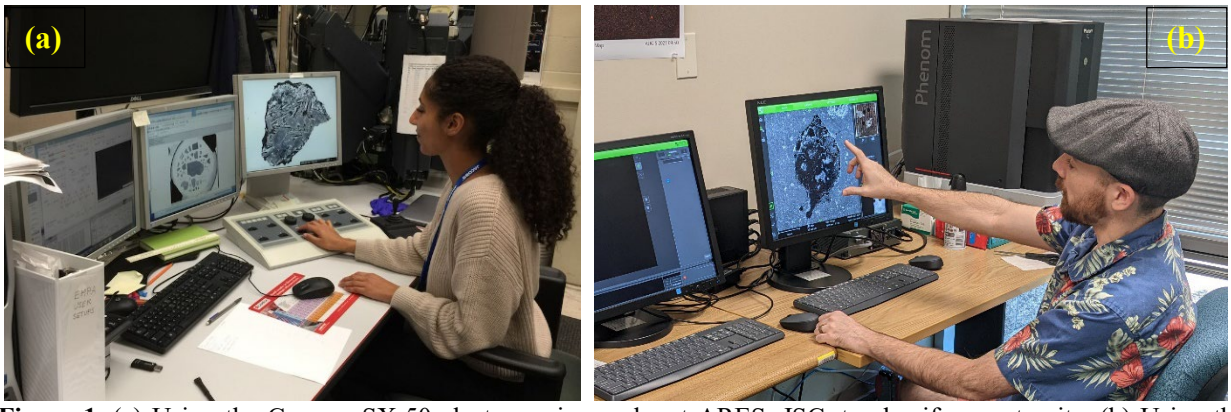

Figure 1. (a) Using the Cameca SX-50 electron microprobe at ARES, JSC, to classify a meteorite. (b) Using the Phenom XL SEM at LPI to classify a meteorite.

References: [1] Rochette P. et al. (2003) *Meteoritics & Planetary* Science 38:251-268. [2] Harrington R. & Righter K. (2014) *LPSC XLV*, Abstract #1103. [3] Harrington R. & Righter K. (2017) *Annual MetSoc* 80, Abstract #6304. [4] Lunning N. G. et al. (2021) *Annual MetSoc* 84, Abstract #6195. [5] Guidelines for meteorite nomenclature. https://www.lpi.usra.edu/meteor/docs/nc-guidelines.htm. [6] Shaddad M. H. et al. (2010) *Meteoritics & Planetary Sciences* 45:1557-1589.