RESTORATION AND SYNTHESIS OF LUNAR GEOCHEMICAL AND PETROLOGICAL SAMPLE DATA TO SUPPORT FUTURE SCIENCE (MOONDB).

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Introduction &n Rationale: Over more than 45 years, the nearly 2,200 samples that were collected on the Moon during the Apollo missions have been made available to the global research community for studies that have helped expand our understanding of the history and evolution of the Moon and our solar system. A vast body of petrological, geochemical and geo-chronological data has been amassed that remains highly relevant for current and future science, but that is to a large extent not accessible in a digital format that makes the data easy to access and re-use. Investigators who want to use lunar sample data in their research are currently required to compile and transcribe data from disparate sources including publications in digital or analog format and from PDF files such as those of the Lunar Sample Compendium (Meyer 2012, [LSC]), and/or they need to contact their colleagues for unpublished data or data compilations. This is a serious obstacle for the use and exploration of the lunar sample data to create new scientific insights.

MoonDB Objective & Scope: Over more than a decade, data systems for igneous petrology and geochemistry such as PetDB, GEOROC, and NAVDAT have created and maintained large-scale online geochemical synthesis databases that have revolutionized data access in these fields and established themselves as essential resources for Geoscience research, facilitating new, more quantitative statistical approaches and leading to new discoveries. MoonDB will use the concept and architecture of the PetDB data system (http://www.earthchem.org/petdb) to advance the access and utility of lunar sample data for future research restoring data from the literature as well as unpublished legacy data, integrating them in an online accessible, quality-controlled data system, and providing a user interface with tools to search, filter, and explore the data, and generated customized subsets of the data as needed for a specific science question.

Developement of MoonDB: The development of MoonDB comprises several tasks: 1. adapt the PetDB data system to lunar sample data and metadata. This includes modifications to the database schema, which is based on the Observation Data Model ODM2 [1], [2] to controlled vocabularies, data entry tools, and PetDB's graphical user interface to fully align the system with requirements for lunar sample data storage, search, display, and retrieval; 2. compiling data and relevant metadata from published scientific articles, from the Apollo Sample Compendium, and from datasets contributed by researchers, preparing them for ingestion into the database (formatting, harmonizing terminology), and loading them into the database with appropriate data quality control procedures; 3. linking data in MoonDB to data available in other databases at JSC, at the Lunar and Planetary Institute, and in the Planetary Data System (e.g. imagery of specimens and thin sectios, sample descriptions, physical properties, sampling history, etc.) to advance discovery and access of lunar sample data and the development of a lunar information network; 4. develop the MoonDB Reference Catalog that will integrate references from all relevant databases.

Data Rescue: Many lunar geochemical data are unpublished and in danger of being lost forever as researchers, especially those who generated the initial suite of lunar sample data in the 70's and 80's, retire or pass away. Part of the MoonDB project is an effort to encourage and help investigators who are in possession of unpublished lunar sample data restore, publish, and archive these data for inclusion in MoonDB. This effort will not only enhance MoonDB's comprehensiveness and utility, but also rescue these data for the long term. Eleven senior lunar researchers are part of the project and have committed to contributing their data. Further data contributions will be encouraged through workshops at relevant conferences such as the Lunar and Planetary Science Conference, GSA Annual Meeting, and Goldschmidt Conference. Contributed data will published via the EarthChem Library (http://www.earthchem.org/library), following international best practices including DOI registration and their long-term preservation in appropriate archives such as the Planetary Data System.

Management & Operation: The MoonDB project will be managed within the organizational structure and well-established technical infrastructure of IEDA (http://www.iedadata.org), a data facility that operates and maintains data systems and services for solid Earth data, including the EarthChem data systems and the System for earth Sample Registration. IEDA is a member of the World Data System.

References:
[1] Horsburgh J. et al. (2013 *AGU Fall Meeting Abstracts*, 1197. [2] Lehnert K. A.. et al. (2014) *Geophys. Res. Abstr.* 16, EGU2014-12113.