



# The Python interface to MoonDB, the online lunar sample geochemical and petrological database

Alessandro Frigeri (1), Kerstin Lehnert (2), Peng Ji (2)

(1) Istituto di Astrofisica e Planetologia Spaziali, Istituto Nazionale di Astrofisica, Roma, Italy (2) Lamont-Doherty Earth Observatory, Columbia University, New York, USA

## 1 Introduction

More than 2000 samples were collected from the Moon during Apollo and Luna missions. Petrological and geochemical data has been extracted from these samples during the last 50 years, building the scientific knowledge of the Earth's satellite we have nowadays.

However, analytical data from lunar samples are fragmented. Some data exists only in analog format, other is published in the form of tables in journal articles or is distributed in form of pdf catalogs (e.g. [1]).

In 2015 a collaboration between the Lamont Doherty Earth Observatory of the Columbia University and NASA gave birth to the MoonDB project[2].

The MoonDB aims to restore and synthesize lunar geochemical and petrological analyses into a congruent data system. Data is structured into a relational database management system which holds data and metadata on missions, landmarks, specimens, bibliographic references, and analyses.

Through its website <http://www.moondb.org>, MoonDB offers online access to the data as well as to an Application Programming Interface (API) to access data directly from client applications.

Here we present the python interface to MoonDB developed at IAPS-INAF in Italy.

## 2. The python-moondb

Python is a dynamic object-oriented programming language. Developed in the Netherlands in the late 1980s by Guido van Rossum[3], Python holds a powerful and flexible syntax which enables fast prototyping, code readability, and code reusability. For these reasons, this language is considered one of the ideal platform for scientific computing.

Python-moondb module enables access to the MoonDB data system from python. The module allows to include analytical geochemical and petrological data directly into scientific codes or to produce customized queries.

The module has been developed using Object Oriented programming which offers a clear way to define abstract data types and facilitates reuse of code for future developments.

At the time of writing this abstract, the version 0.1 is being prepared to be published online on INAF's Git distributed version-control website, where users can download the code and examples, submit issues or contribute to the code seamlessly through a process called forking. The software will be published as Free Open Source Software (FOSS).

## 3. Summary

MoonDB collects geochemical and petrological data from fragmented sources into a common data system and offers an infrastructure to submit new analyses.

The MoonDB complies with funders' and publishers' policies for FAIR data (Findable, Accessible, Interoperable, Reusable)[4], offering a modern and agile method for accessing and referencing scientific information.

The python-moondb module enables access to data contained in MoonDB from within Python scripting language, which is particularly popular among scientists and researchers.

## References

- [1] Meyer, C.: Lunar Sample Compendium. 41st Lunar and Planetary Science Conference, LPI Contribution No. 1533, 2010
- [2] Lehnert, K., Markey, K., Cai, Y. et al. MoonDB: 50 Years of Lunar Sample Data Ready for the Data Revolution. 50th Lunar and Planetary Science Conference 2019, LPI Contrib. No. 2132, 2019
- [3] Van Rossum, G., A Tour of the Python Language, Tools-97, IEEE, 1997
- [4] Wilkinson M. D. et al.: The FAIR Guiding Principles for scientific data management and stewardship, Scientific Data, Vol. 3, 2016