Intergrating morpho-stratigraphic and spectral units on Mercury and the Moon: Updates from the PLANMAP project

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Brooke Hokusai morpho-stratigraphic units spectra



Hokusai morpho-stratigraphic units distribution





Apollo Basin



Apollo Basin



Located in the north-easter side of South Polar Aitken (SPA) basin, the largest (2000-2400 km) and oldest (~4.2–4.3 Ga) impact lunar structure.

It is the most extensive topographic depression within SPA: it is ~3- to 5-km high within the SPA floor domain and ~7-8 km within the SPA rim domain.

➢ Apollo basin age → 3.98 Ga





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Ivanov + 2018, JGR

Apollo basin M³ spectra

Morpho-stratigraphic map



Oppenhei





> Global slope \rightarrow Terrain maturity, grain size, composition.

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- ➢ Band center → Compositional variation.
- \succ Band depth \rightarrow Abundance of the absorbing minerals, grain size, opaque phases.





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Crookes Prf-1Summary

Hokusai quadrangle presents different morpho-stratigraphic units. The most widespead is Smooth Plains (SP), followed by crater materials and intercrater plains (ICP). Other surface features are present, such as pyroclastic deposits and bright rays.

Spectral slopes, together with other relevant parameters (e.g. reflectance) highlight spectral variations across this units.

Large part of the morpho-stratigraphic units has distinct spectral characteristics, this is important to define geological units across the quadrangle.

Maksutov











Crookes Prf-1Summary

Apollo basin morpho-stratigraphic map shows several units, the dark smooth plains on its floor are classified as: Late Imbrian dark plains (LIdp), with an age of 3.80 Ga.

Dark plains are high titanium regions and have a different spectral behavior with respect to the other units inside Apollo area (cyan region in Clementine map).

Dryden

Smooth regions within the basin stand out showing higher band centers and depths values with respect to other areas, indicating compositional variations. This smooth plains correspond with high titanium regions.

Maksutov











Future work

Apollo dataset improvements: calibration, thermal removal, photometric correction.

Definition of spectral units including all the spectral parameters, both for the Moon and Mercury.

Spectral and morpho-stratigraphic units integration.

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Prf-1

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