Geology of the Grimaldi Basin on the Moon: Shreds of evidence for volcanism and tectonism during the Copernican period

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Abstract:

The Grimaldi Basin, centered at (5.2° S, 68.6° W), is a ~ 400 km diameter highly degraded, Pre-Nectarian double-ring impact structure on the Moon located near the western edge of the Oceanus Procellarum. Hyperspectral data from Moon Mineralogy Mapper (M3), Kaguya Lunar Multiband Imager (MI) derived FeO weight percent map [1] and TiO₂ weight percent map derived from WAC 321/415 nm ratio [2] have been used to study the mineralogical composition of the Grimaldi mare basalt. Morphological studies and crater chronology have been carried out using moderate to very high-resolution images from Lunar Reconnaissance Orbiter (LRO) to decipher the geological evolution of the Grimaldi Basin. Grimaldi mare basalts have been found to be composed of clino-pyroxenes with lateral as well as depth-wise variations in the Fe content. Cross-cutting of small Copernican craters by fresh wrinkle ridges and lobate scarps have been observed at several places in the basin suggesting occurrence of tectonism within the past ~100 Ma. Also, it has been found that the Basin experienced Copernican volcanic resurfacing in the lower central part resulting in the formation of basalts with high FeO and TiO₂ content. Thus, similar to the adjacent Oceanus Procellarum region [3], Grimaldi Basin was also geologically active during the Copernican period. The results will be presented and discussed in detail.

References: