

Investigation of young (< 100 million years) lunar surface features: Evidence for outgassing or basaltic volcanism?

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Lunar-Orbiter/Apollo images and Clementine UVVIS observations identified four regions, including Ina, of small-scale, low relief patches of rubble with a maximum age of ~10 Ma [1]. Recent observations by the Lunar Reconnaissance Orbiter Camera (LROC) onboard NASA's Lunar Reconnaissance Orbiter (LRO) have expanded this list of unusual morphologic features by identifying similar features termed meniscus hollows [2] or irregular-bounded mare patches (IMPS) on the lunar near side with ages < 100 Ma [3]. The IMPs have two morphologically distinct deposits, uneven and smooth deposits [1-3]. The uneven deposits have a rough surface texture and contain a range of block densities, whereas the smooth deposits have a fairly uniform surface texture and almost no blocks. Most importantly, the boundary scarps have very low relief indicating recent formation. Two hypotheses for the origin of the irregular mare patches (IMPs) have been suggested: (1) recent, episodic outgassing from deep within the lunar interior [1] and (2) small basaltic eruptions that occurred after mare volcanism had ended [3].

These young features have implications for the cooling and volatile content of the lunar interior and/or may provide insight into the compositional evolution of magmatic materials over time. In this study we investigate the composition of the irregular mare patches using near infrared observations from the Moon Mineralogy Mapper (M³) and thermal infrared observations from LRO's Diviner Lunar Radiometer Experiment (Diviner).

- [1] Schultz P. H. et al. (2006) *Nature*, **444**, 184-186.
[2] Stooke, P. J. (2012) *LPS XLIII*, Abstract # 1011.
[3] Braden S. E. et al. (2014) *Nature Geosci.*, **7**, doi:10.1038/NGEO2252.