Constraining the formation of the Moon's anorthositic crust

M. Martinot[1], K.L. Donaldson Hanna[1], B.T. Greenhagen[2], P. Peplowski[2], J.T.S. Cahill[2]

[1] *Department of Physics, University of Central Florida, 4111 Libra Drive, Orlando, FL, USA*

[2] *Johns Hopkins Applied Physics Laboratory, Laurel, MD, USA*

melissa.martinot@ucf.edu

Abstract. The Lunar Magma Ocean (LMO) hypothesis predicts that plagioclase starts crystallizing after approximately 70% solidification of the LMO and floats to the top of the magma ocean, thereby forming the lunar highlands anorthosites, also referred to as the primary anorthositic crust[1–3]. However, the lunar crust presents compositional heterogeneities between the nearside and the farside, as well as within the anorthositic Feldspathic Highland Terrane[4]. An in-depth investigation of the lunar highland anorthositic crust using a complementary set of remote sensing observations can provide useful constraints for modeling the lunar primary crust formation.

In this survey, we aim to combine observations from an array of lunar orbiters. The mineralogy will be derived from the reflectance data from the Moon Mineralogy Mapper hyperspectral imager, and the thermal data from the Lunar Reconnaissance Orbiter Diviner Lunar Radiometer. Nuclear spectroscopy from the Lunar Prospector mission will provide insight into the bulk elemental composition of the lunar crust. Crustal thickness estimates derived from gravimetric data from the Gravity Recovery and Interior Laboratory mission will allow us to estimate the portion of the crust observed (shallow crust *vs* deep crust). The local geological context will be viewed with the Lunar Reconnaissance Orbiter Narrow Angle Cameras. The observations provided by this array of datasets will be integrated together to provide a holistic view of the lunar crust, which will allow us to test formation hypotheses.

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