Paper ID: 66553
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24th IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (A5)
Human Exploration of the Moon and Cislunar Space (1)

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IMPROVING THE QUALITY OF LUNAR SURFACE DATA FOR MISSION PLANNERS AND PLANETARY IMAGERY SPECIALISTS

Abstract

In the 2020's, the moon is poised to drive major planetary research and spaceflight missions activities. Mission planners need accurate and detailed surface information to select landing sites and locate resource-rich areas (including minerals or illumination). They rely on information meticulously crafted from raw data by data scientists and engineers. Raw data mostly comes from instruments onboard LRO (NAC, LOLA, Diviner), and also from the Kaguya and Chandrayaan probes, covering various technologies, including visible range camera (LROC NAC) and LIDAR (LOLA), but also multispectral (M3) and radar (Mini-RF, Mini-SAR). These datasets generally provide up to 5m/pixel resolution and at best 1m/pixel resolution in specific areas of interest. Each sensor provides complementary information relative to other sensors due to unique methods of operation, wavelength ranges and to the either passive or active nature of the sensing. As a result, several datasets are often fused to produce usable information to mission planners.

The analysis of raw data and transformation into usable information is a very challenging task. Fusion of several datasets and using at best 1m/pixel resolution means that the information produced requires assumptions and is not sufficient to fully serve mission planners needs. The output information may contain inaccuracies and errors, and the resolution is insufficient for many lunar operations, including rover path planning and landing.

In this paper, the authors propose a new orbital observation platform designed with the "New Space" philosophy. The platform can deliver raw data in relevant wavelength ranges with a resolution significantly superior to existing datasets. The goal of the platform is to provide data that can be transformed into information deemed "sufficient" for mission planners purposes.