USING LUNAR QUICKMAP FOR SYNTHETIC LUNAR IMAGE MODELING

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Introduction: ACT-REACT-QuickMap™ is a commercial product developed by Applied Coherent Technology Corporation (ACT). QuickMap provides an easy-to-use yet powerful web interface for cartographic products. Designed with the end-user in mind, it offers seamless access to numeric data layers without the tedium of handling file format details and data ingestion and archive structures.

Mission Proven - QuickMap has directly supported NASA's MESSENGER, MRO/CRISM, and LRO missions by providing immediate access to available data for early analysis and cross-validation. Additionally, the public has access to higher-level products delivered to the NASA/PDS by the active missions.

Lunar QuickMap was developed in collaboration with the NASA LRO project, Arizona State University (ASU), and ACT and has similarities to other web-based lunar data viewers, but it differs by exposing features such as:
Interactive visualization of numeric data layers

- Extraction of probes, data profiling, and sub-cubes
- Layer based algebraic expression
- Extraction of cartographic sub-cube with all geophysical parameters of interest in the system
- Loading user data: GeoTIFF/GeoJSON/…
- Supports both stack and grid view of layers
- Advance search/display of LROC/NAC images
- (beta) Synthetic Lunar Image Modeling

During CY2021, Lunar QuickMap had an average of 1200 unique daily users. The new version of QuickMap is rich in LRO map products, and data from many other missions. The user has access to over 1.5 PBytes of lunar products. The current capabilities of QuickMap provide sophisticated decision support capabilities (**DST**) [1].

Synthetic Lunar Image Modeling: Depicting lunar illumination conditions at a future time in the polar regions is of critical importance for Artemis mission planning. QuickMap capabilities now include Terrain Shadows (**QTS**) 2D & 3D visualization. These modules incorporate the best DEM available, core SPICE kernels, and fast ray tracing capabilities to generate detailed cartographic maps of illumination conditions (including shadows), or interactive 3D maps with fine control on visualization options. A beta version is enabled in the Lunar QuickMap.

QuickMap Terrain Shadows 2D (QTS-2D): QTS-2D is optimized for the complex map geometry of the polar regions. It computes precision shadows using DEM data located inside and outside of the output map region of interest. Depending on the topography and Sun position, shadows can originate from mountain peaks further than 100Km away.

Figure 1: QTS-2D sample output near south pole

QuickMap Terrain Shadows 3D (QTS-3D): QTS-3D is an interactive simulation engine for quick inspection of terrain topography and illumination. It provides options to speed up results by trading off accuracy in the resulting view. Shadows are computed using the subset of the topographic model loaded for a given camera perspective.

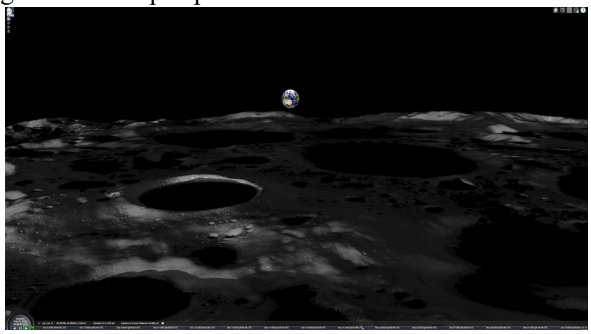

Figure 2: Sample of QTS-3D near south pole

Conclusion: The new Synthetic Lunar Image Modeling capabilities can be used to assess future illumination conditions and perform flyby simulations.

References:[1] Malaret et al., 2022, LPSC Abstract #2792, Using Lunar QuickMap to Assess the VIPER Site Selection.

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