Lunar Orbiter Mosaic of the Moon. T. Becker, L. Weller, L. Gaddis, D. Cook, B. Archinal, M. Rosiek, C. Isbell, T. Hare and R. Kirk, U. S. Geological Survey, Astrogeology Team, 2255 N. Gemini Drive, Flagstaff, AZ 86001, USA, tbecker@usgs.gov.

Overview: As part of a program of digitization and cartographic processing of Lunar Orbiter (LO) photographic data of the Moon [e.g., 1, 2], a preliminary Near Side mosaic at ~59 m/pixel (512 deg/pixel) resolution has been completed at USGS and is now available via PDS Map-a-Planet at http://www.mapaplanet.org/explorer/moon.html prior to formal release to PDS (**Figure 1, 2**). The Near Side mosaic extending to both poles was constructed from 117 LO IV HR frames and geodetically controlled to the Unified Lunar Control Network (ULCN) 2005 [3, 4]. Efforts are underway to complete global coverage by continuing geodetic processing of the remaining Far Side frames. The LO global mosaic provides a valuable tool for targeting of data acquisition for upcoming lunar missions, including the Lunar Reconnaissance Orbiter Camera (LROC) [5] and the Moon Mineralogy Mapper [6].

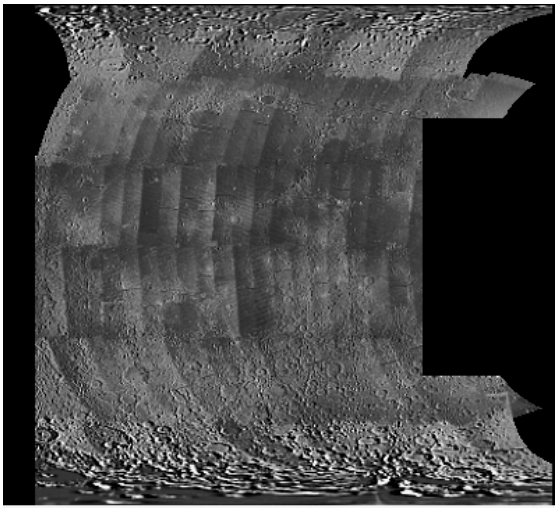

Figure 1. *Near Side mosaic of Lunar Orbiter IV frames. View is pole to pole, Equirectangular projection centered at 0° longitude, 90W to 45E longitude range.*

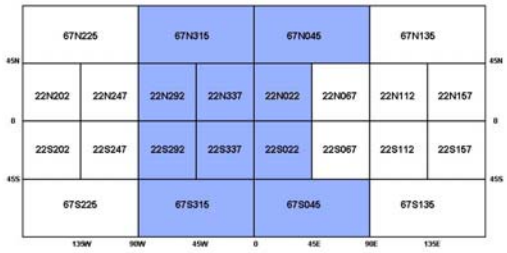

Figure2*. LO mosaic tile layout.*

Along with the Near Side LO mosaic, the USGS PIGWAD site also provides access to geodetically warped Clementine UVVIS and NIR mosaics (http://webgis.wr.usgs.gov/pigwad/maps/the_moon.htm) [Hare et al., this volume; Archinal et al., this volume]. These coregistered lunar datasets are tied to the Unified Lunar Control Network 2005 [3, 4], the most accurate control network available.

While the LO Near Side Equirectangular mosaic includes the LO IV polar data (**Figure 3, 4**), the LO South Pole (in Polar Stereographic projection) is also available at http://webgis.wr.usgs.gov/pigwad/maps/the_moon.htm (see 'South Pole Viewer').

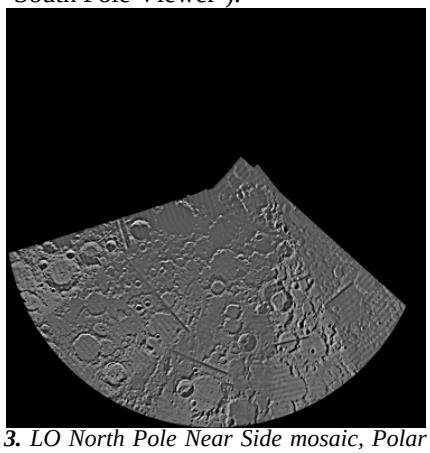

Figure 3. *LO North Pole Near Side mosaic, Polar Stereographic projection, latitude range 70N to 90N.*

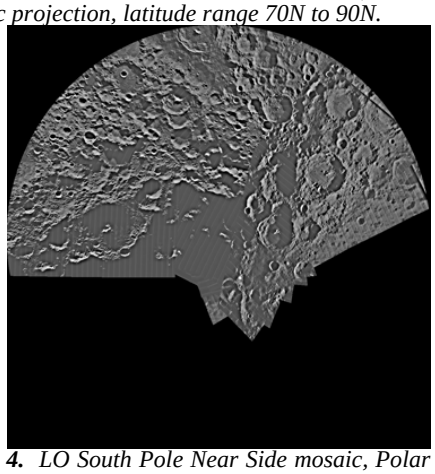

Figure 4. *LO South Pole Near Side mosaic, Polar Stereographic projection, latitude Range 90S to 70S.*

The LO mosaic complements the ongoing release of individual LO frames at moderate, high and very high resolution (see http://astrogeology.usgs.gov/Projects/LunarOrbiterDigitization/).

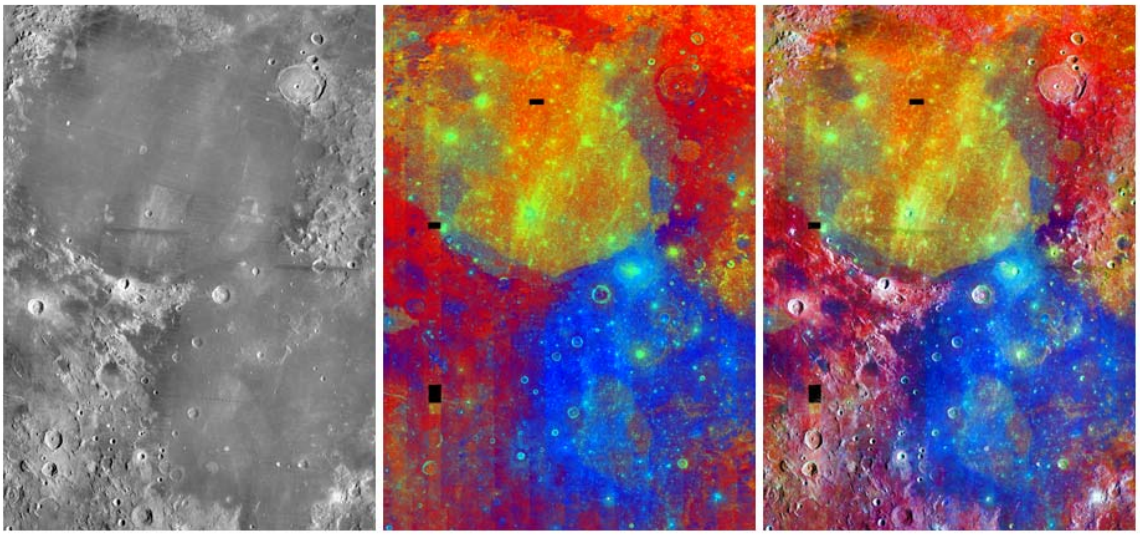

Figure 5. *Views of Mare Serenitatis and Mare Tranquillitatis. (Left) Digital Lunar Orbiter mosaic (incl. LO-IV H frames 78, 79, 85, 86, 90, 91, 97, 98); (Center) Clementine color ratio data (red=750 nm/415 nm; green=750/950; blue=415/750); (Right) Coregistered LO and Clementine data. Mature crater Delambre (bottom, just left of center) is 52 km in diameter.*

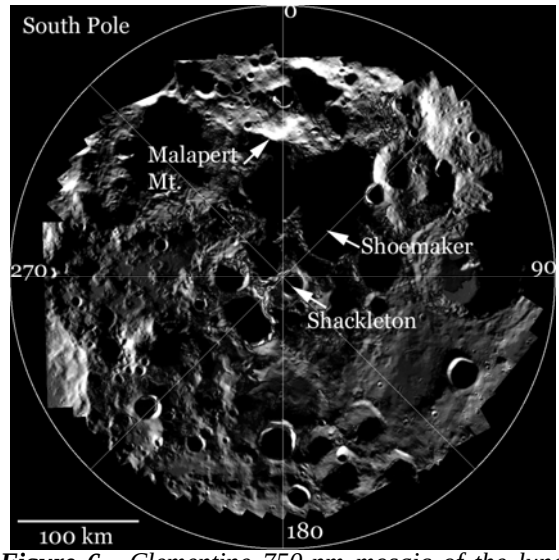

Figure 6. *Clementine 750-nm mosaic of the lunar south pole region (84º to 90º S).*

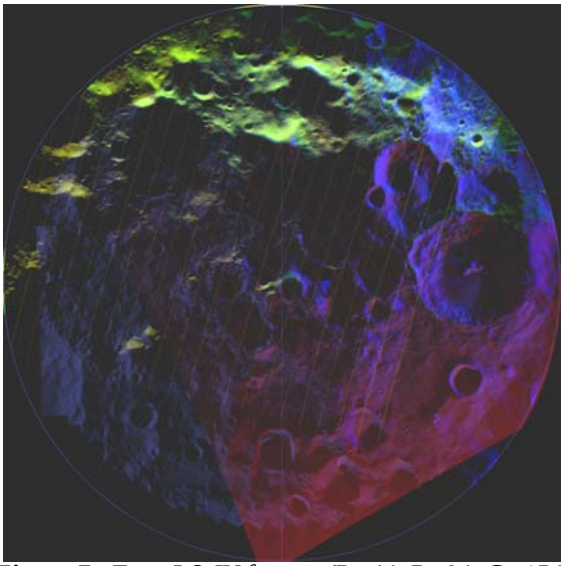

Figure 7. *Four LO IV frames (R=44, B=94, G=154, Y=189) superimposed on Clementine 750-nm mosaic of the lunar south pole (84º to 90º S).*

Summary: The LO mosaic provides an outstanding complement to numerous other digital geochemical, geophysical, and multispectral lunar data. The historic LO photographs provide low-sun-angle views of the Moon that enhance our ability to see subtle topographic and morphologic features. Also, the LO mosaic is strikingly complementary to the Clementine (high-sun) color data (**Figure *5***). LO views have higher resolutions than Clementine and provide complementary spatial and temporal coverage. Sites such as the rim of Shackleton crater (19 km dia., centered near 90º S) and Malapert peak (the 'peak of eternal light') on the lunar nearside can be viewed in multiple LO frames (**Figures 6, 7**).

References: [1] Becker et al., 2005, LPS XXXVI, 1836. [2] Weller et al., 2007, LPS XXXVIII, 2092. [3] Archinal et al., 2006, USGS Open File Report 2006-1367. [4] Archinal et al., 2007, LPS XXXVIII, 1904. [5] Robinson et al., 2005, LPS XXXVI, 1576. [6] Pieters et al., 2005, LEAG, 1576. [7] Bowker, D.E. and J.K. Hughes, 1971, Lunar Orbiter Photographic Atlas of the Moon, NASA SP-206. [8] Hansen, Thomas P., 1970, Guide to Lunar Orbiter Photographs, NASA SP-242.

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