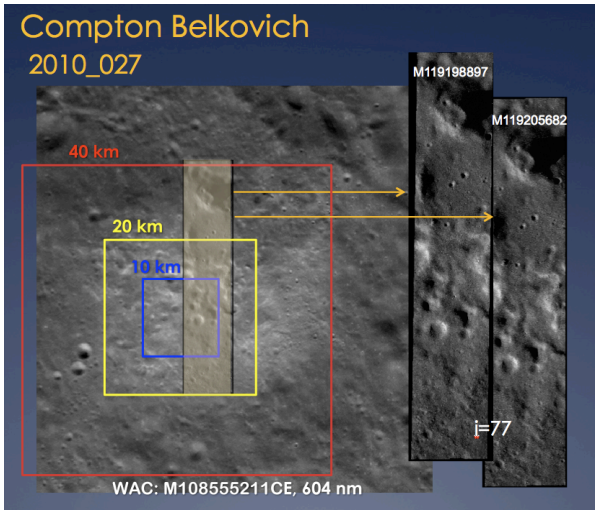
IMAGING CONSTELLATION REGIONS OF INTEREST WITH THE LUNAR RECONNAISSANCE ORBITER CAMERAS. B. L. Jolliff[1], S. Wiseman[1], C. Lauber[1], S. J. Lawrence[2], M. Robinson[2], R. Beyer[3], L. Gaddis[4], and the LROC Team. [1]Department of Earth and Planetary Sciences, Washington University, St. Louis, MO; [2]School of Earth and Space Exploration, Arizona State University, Tempe, AZ; [3]NASA Ames Research Center, Moffett Field, CA; [4]US Geological Survey, Flagstaff, AZ. (blj@wustl.edu)

Introduction: Among the highest priorities for targeting the LRO Narrow-Angle Cameras (NAC, 0.5 to 2 m/pixel) during the first year or *ESMD Phase* of the LRO mission has been the 50 Constellation Program Regions of Interest (ROI) [1, 2]. These sites cover a broad range of locations around the Moon, including the poles, different geomorphic terrains, and areas with resource potential. All are areas of high scientific interest [3] and provide reference sites for future mission planners in terms of landing-site safety, accessibility, and science value [4-6].

Observations: Each Constellation ROI consists of three nested square areas 10, 20, and 40 km in size (Fig. 1). The 10-km ROIs are priority-1 targets and include overlapping or repeat observations suitable for geometric and photometric stereo. The 20-km ROIs have the same planned observations, but at priority level 3. The 40-km ROI's have priority level 4 and are "best effort" targets for full NAC coverage. The 10- and 20-km ROIs are targeted to the extent possible at both high and low Sun angles to characterize albedo variations as well as to maximize feature identification and definition of fine-scale morphologies, boulders, and small craters.

Geometric Stereo: During the ESMD Phase, emphasis has been placed on targeting to maximize geometric stereo coverage of the 10 km ROIs whenever illumination conditions were favorable (i.e., when shadows are at a minimum). Most stereo pairs are taken under similar illumination conditions (same incidence angle) by twice imaging an area in subsequent orbits. This method requires slewing the spacecraft for one or both observations on sequential orbits to provide emission angles that differ enough for a good stereo solution (e.g., Figure 1, i=77º). Limits on the number of slews possible and the time required for data read-out mean fewer opportunities to target ROIs that occur along the same longitude in the same day.

Figure 1. *A sample Constellation ROI at Compton Belkovich showing overlapping NAC observations made on day of year 2010-027. Both NAC images are left-right pair mosaics with geometric stereo coverage; WAC for context.*



Coverage Results. At present, NAC images obtained for Constellation ROIs number ~1500 frames (left and right image pairs, 0.5 to 1 m/pixel) for the 46 non-polar sites and many thousands for the polar sites. For the nominal mission phase (excluding data from the early commissioning phase), 46 of the sites have 100% coverage of the 10-km ROI, and for the 20-km ROI 22 have 100% coverage, 15 have >90%, and 13 have >70%. For geometric stereo coverage in the 10-km ROI, 10 sites have 100% coverage, 10 have >90%, 8 have >75%, 12 have >50%, and 6 have <50%. Imaging for stereo coverage in August and September 2010, near the end of the ESMD Phase, will focus on those sites with <100% geometric stereo coverage. Commissioning phase images provide additional stereo coverage for many of the sites but with lower resolution in many cases (1 to 2 meters/pixel). ROIs lacking full coverage mostly lie along longitudinally 'busy' or crowded orbital tracks.

Conclusions: The LROC images for the Constellation ROIs will be leveraged for many years by lunar scientists and exploration planners. With the coming transition of the LRO mission from ESMD to SMD, the targeting strategy for the Constellation sites will shift emphasis from landing-site assessment to discovery-driven, compelling science targets surrounding the central regions of interest to provide a scientifically useful data set that will further benefit future exploration. Members of the scientific community are encouraged to participate in this process by submitting NAC targeting suggestions at the LROC site: http://lroc.sese.asu.edu.

References: [1] Gruener and Joosten (2009) LRO Sci. Targ. Mtg., #6036; [2] Jolliff et al. (2009), LPSC #2343. [3] Lawrence et al., this conference. [4] Taylor and Spudis (1990) NASA Conf. Pub. 3070 [5] NASA JSC Solar System Exploration Division (1990) *A Site Selection Strategy for a Lunar Outpost* [6] Lucey et al. (2009) LRO Sci. Targ. Mtg. #6022.