INTRODUCTION
The Lunar Reconnaissance Orbiter (LRO) spacecraft entered lunar orbit in June of 2009 [1]. One area of scientific interest for the Lunar Reconnaissance Orbiter Camera (LROC) experiment includes permanently shadowed regions (PSRs) [2]. While not designed to image within shadowed regions, the LROC Narrow Angle Camera (NAC) can obtain useful images with long exposure observations of PSRs (Figures 1 and 2) at times of maximum secondary illumination [3]. Acquisition of NAC PSR observations has been refined over several campaigns to optimize the trade-off between signal-to-noise ratio (SNR) and pixel scale, resulting in a comprehensive dataset [4].

PSR ATLAS
- The NAC PSR Atlas includes 313 PSRs larger than 10 km²
- Analysis efforts have focused on craters within 9° of the poles
- Each PSR entry includes:
  - Associated metadata (area, perimeter, features of interest)
  - A context image on color-shaded LOLA topography basemap
  - One or more day-of-year images (Figure 3)
  - A composite best coverage mosaic
  - Controlled mosaic when available
- Atlas images are generated using scripting capabilities within the QGIS Python console [11]
- A total of 6,590 individual PSR observations were collected from the start of the mission to 1 January 2017

CONTROLLED MOSAICS
High resolution controlled mosaics were generated for select areas as a demonstration of the utility of the dataset (Figures 4 and 5) using ISIS routines:
- Control network is generated and bundle adjusted
- Spacecraft ephemeris computed with jigsaw
- Map projected using GLD100 and LOLA derived cross-over corrected CK's
- Manual linear stretch applied prior to generating mosaic
- Cropped to area within PSR boundary

PSR BOUNDARY SHAPEFILES
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DATA PROCESSING
- NAC PSR observations are acquired and delivered to the LROC Science Operations Center and released as Experiment Data Record (EDR) and Calibrated Data Record (CDR) products
- NAC observations processed from Level 0 to Level 3 data products [5], utilizing routines from the Integrated Software for Imagers and Spectrometers (ISIS) [5,7]
- Post processing is performed using QGIS [8], which allows loading of individual observations on top of LOLA topography [9] and LOLA PSR boundary shapefiles (Figure 3)

REFERENCES: