NEW LUNAR CRATER SEARCH USING LROC-NAC VS LOIRP LUNAR ORBITER IMAGES. N. G. Moss[1] and T. M. Harper[2], M. B. Motta[3], A. Epps[4] [1]LOIRP Project P.O. Box 375 Moffett Field, CA 94035, Neulynm@yahoo.com, [2] LOIRP Project P.O. Box 375 Moffett Field, CA 94035, travis.martin.harper@gmail.com. [3]LOIRP Project P.O. Box 375 Moffett Field, CA 94035. Mbmotta@yahoo.com., [4]Skycorp, Building 596, NASA Ames Research Park, Moffett Field, CA 94035, Austin.epps@gmail.com

Introduction: In 1966 and 1967 NASA sent five Lunar Orbiters to photograph nearly the full surface of the moon. Each orbiter launched took images of different areas of the moons surface, or very high resolution images corresponding to lower resolution images previously taken. Lunar Orbiter Image Recovery Project (LOIRP) is one of the several projects using these images for research. We are in possession of 1,478 2" original analog tapes from 3 Deep Space Network ground stations. We have taken hundreds of those analog tapes and converted them to digital form; with the majority of them being from Lunar Orbiter II which took images with .8 to 1 meter resolution.

With them in digital form we are able to assemble the framelets in high quality and overlay them with Lunar Reconnaissance Orbiter Narrow Angle Camera (LROC_NAC), which has a similar resolution of .5 to 1 meter. The overlays enable us to compare the two images looking for change, specifically new craters. The finding of new craters will help us determine the age of older craters by looking at the baseline color of the regolith from known dates between the Lunar Orbiter and LROC images. The craters found per unit area will also provide a boundary on the current small body population of the inner solar system.

Images Compared: Lunar Orbiter II and the LROC_NAC images both cover the near side equatorial region of the moon. We utilized the LROC_NAC images because they used very high resolution, similar to that of Lunar Orbiter II. We constrained our image selection to those who's lighting characteristics were similar in order to improve the chances of detection of new craters.

We were able to match up the two sets of images with little error. Then we compared them with hopes of discovering changes to the surface of the moon.

Comparison Process: The three student lead authors compared the images manually. Austin Epps provided the overlay images. The images were overlaid and searched via Photoshop. The three lead authors zoomed in on one overlay image at a time and slowly scanned it while simultaneously switching back and forth between the LROC_NAC image and the Lunar Orbiter II image in order to compare the two surfaces thoroughly. This was done at meter scale so that even the smallest craters at the edge of the resolution of the images could be found. Figure 1 is an example of a Lunar Orbiter II subframe overlaid on a LROC_NAC image.

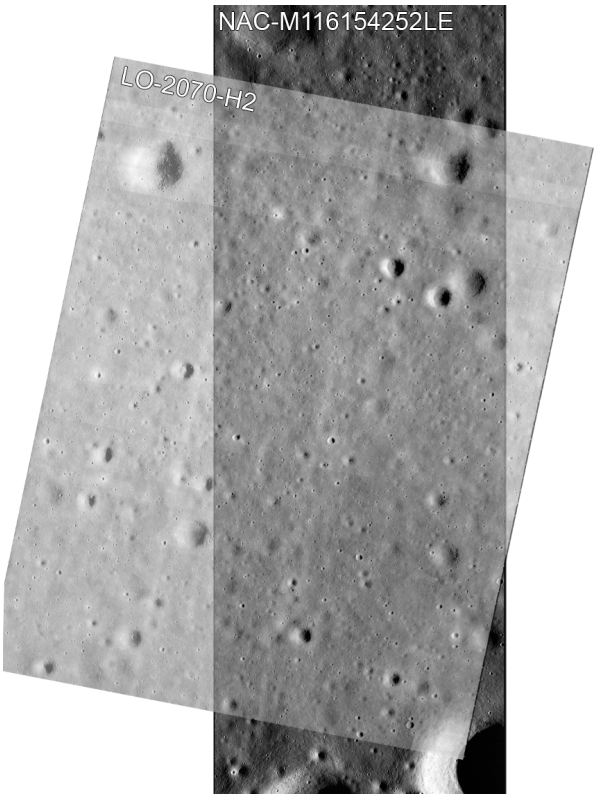

Figure 1: Lunar Orbiter II sub-frame 2070H2 superimposed on LROC NAC image M116154252LE.

Results: We have been unable to locate any new craters within approximately 300,000,000 m^2 (300 $km^{2)}$ of the moons surface. This was the amount of overlap between the LROC_NAC and our LOIRP derived Lunar Orbiter II Images of the LROC_NAC images released as of 9-16-2010.

We are currently working to integrate the LROC_NAC images released in December 2010 into our LOIRP Lunar Oribiter II database of images.

References: [1] D. R. Wingo. K. L. Cowing. A. Epps. M. Sandler. (2010) NLSI summer conference July 2010