LUNA 17 / LUNOKHOD 1 AND LUNA 21 / LUNOKHOD 2 LANDING SITES AS SEEN BY THE LUNOKHOD AND LRO CAMERAS. A.M. Abdrakhimov[1], A.T. Basilevsky[1], J.W. Head[2] and M.S. Robinson[3], [1]Vernadsky Institute, 119991 Moscow Russia, [2]Department of Geolocical Sciences, Brown University, Providence, RI, 02912, USA, [3]SESE Arizona State Univesrsity, Tempe, AZ , 85287, USA

Introduction: The Lunar Reconnaissance Orbiter Camera (LROC) [1] is taking images with resolution as high as 0.5 m/px and allowed one to see on the surface the Soviet landers and rovers Lunokhod 1 and 2 [2]. In this work LROC images were used to identify the traverses of Lunokhod 1 and 2 starting from the Luna 17 and Luna 21 landers to the rovers final locations.

We identified the rover tracks on the LROC NAC images. Using topographic schemes of the Lunokhod regions [3,4] and NAC images the majority of Lunokhod routes were reliably identified from the start to finish points of the rover traverses (solid line on Fig. 2 and 3). But some minor segments were not apparent (dashed line on Fig. 2,3) due to illumination, image resolution or regolith properties.

Using LROC NAC images we calculate the crater cumulative density for 3 areas: Luna17/Lunokhod 1 landing site (mare), Luna 21/Lunokhod 2 landing site (mare), SW Lunokhod 2 traverse part (highland) and compared with the published average data derived from the Lunokhod 1 surface panorama study [3]. The measured values for both mare areas are close to those of Lunokhod 1 (Fig. 1). Lunokhod 2 highland crater density values are slightly less than those of the mare. We interpret this to mean that the average crater life on highland slopes is less than on mare plains.

Conclusions: LROC image data for the first time permits the Soviet rover traverses to be tied to specific areal features at high resolution and to a more specific geographic coordinate system. Preliminary cumulative crater densities were measured in LROC images for the areas considered. The next tasks in this analysis are to refine the more difficulty recognized parts of the traverse, to compare Lunokhod surface images to the corresponding sites on LROC images, to compare modern lunar orbital data with chemical data and physical regolith properties, measured by the rovers.

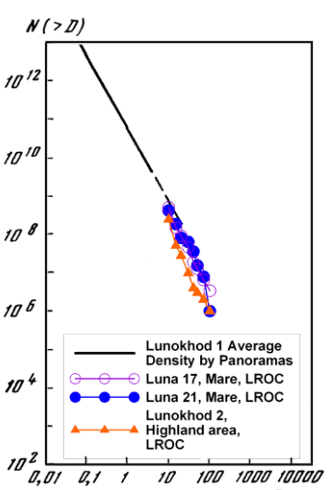

Fig. 1. Crater cumulative density for 3 areas (1x1 km^2) compared to Lunokhod 1 surface image data [3].

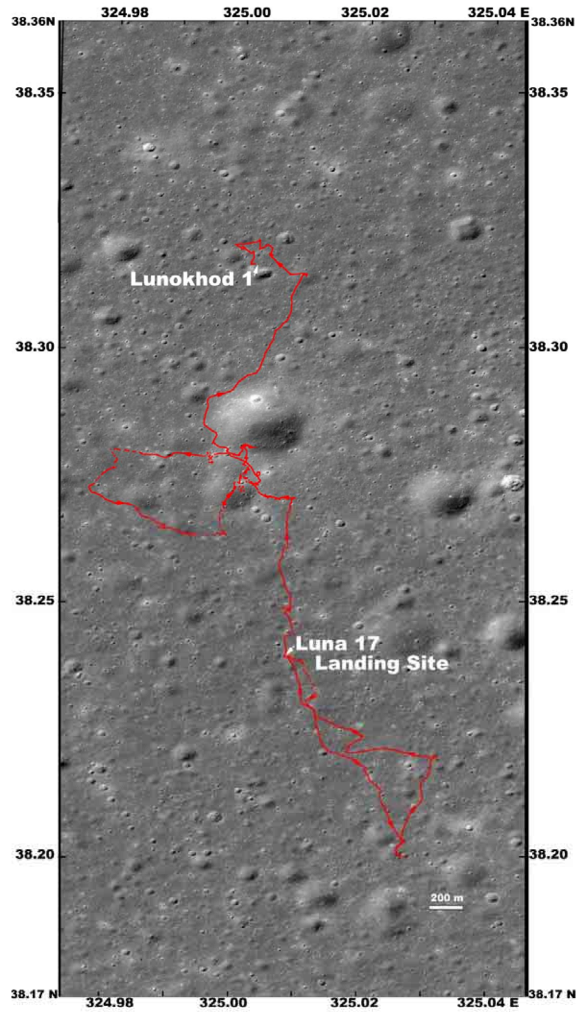

Fig. 2. Part of M127159138L (NASA/GSFC/ASU) with the traverse of Lunokhod 1 identified in LROC images (M127159138L, M131881859L, M135418902R).

[1] Robinson M.S. et al. (2010) Space Science Reviews, 150, 1-4, 81-124 [2] http://lroc.sese.asu.edu/news/index.php?/archives/210-LROC_Coordinates_of_Robotic_Spacecraft.html [3] Peredvijnaya laboratoriya na Lune Lunokhod-1(in Russian). Nauka. (1977). [4] Florensky K. P. et al. (1978) LPSC IX, 1449-1458.

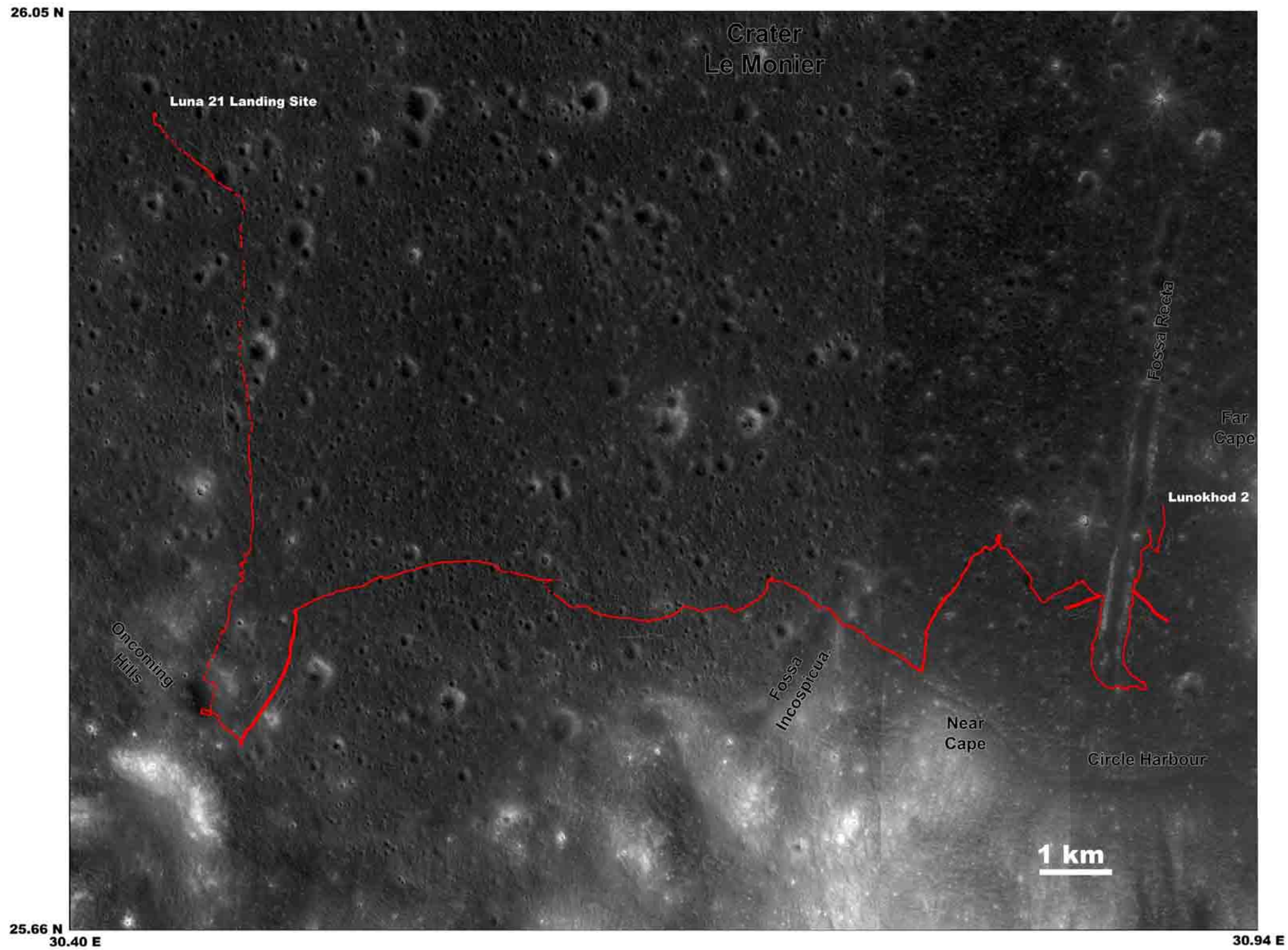

Fig. 3. LROC NAC images mosaic (M106669064, M109039075) (NASA/GSFC/ASU) with the Lunokhod 2 traverse identified by using topographic scheme [4] and LROC images (M122007650, M106669064, M109039075, M119646179).