**APOLLO 15 TRAVERSE MAPPING.** P. J. Stooke¹, ¹Department of Geography, and Centre for Planetary Science and Exploration, University of Western Ontario, London, Ontario, Canada N6A 5C2, pjstooke@uwo.ca, http://publish.uwo.ca/~pjstooke.

**Introduction:** Apollo 15 landed at the Hadley-Apennine site on 30 July 1971. David Scott and Jim Irwin explored the site for three days using a lunar roving vehicle (LRV) before re-joining Al Worden in orbit. The LRV traverses were portrayed in a map by the Defense Mapping Agency in 1975 [1], but that representation has long been known to be somewhat inaccurate (see the Apollo Lunar Surface Journal coverage of Apollo 15, [2]). In particular the map showed EVA 2 passing west of the crater Earthlight when evidence suggested it passed to the east. Rover navigation system readings were too sparse to help very much, and the crucial 16 mm camera which was to record the traverse did not operate for most of the surface mission. This study uses LROC images to map traverses, but even these show no tracks in many areas. Three other methods are used to improve traverse mapping.

**Shadow suppression:** This method merges two images with opposite (morning and afternoon) lighting. The rationale is that topography-related shading and highlights will cancel each other out (if only partially) while albedo markings are reinforced. Figure 1 shows an example, revealing tracks almost invisible in the individual images. Good results can be obtained, but not in every situation.

**16 mm image mapping:** While northbound on the western rim of Dune crater, the 16 mm camera worked for a short time, providing a video record of the drive. Individual frames were extracted, contrast-stretched, and roughly reprojected (Figure 2) to compare with LRO images. This enabled detailed mapping of an otherwise completely invisible section of the traverse (Figure 3).

**Crew description:** Step by step comparison of the voice transcript and the LRO images often reveals details of the path. Some examples are plotted on the map in Figure 3. Other examples include statements such as ‘a rather large [crater] out at 1 o’clock [outbound]... a lot of angular blocks on the rim of it’ [just south of Elbow, EVA 1], and ‘A very large depression here... let’s go north of it’ [EVA 3].

**Results:** The three EVAs have been mapped with only short gaps, and though not perfect, and still uncertain in places, the results are probably superior to anything else available. The method has now been applied to Apollo 16 and will be used for Apollo 17 next year. The new maps will be made available to the Apollo Lunar Surface Journal and also published in an updated version of [3].


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**Figure 1.** Merging two LROC images with opposite lighting to suppress shadows and enhance tracks.

**Figure 2.** 16 mm frames enhanced and roughly rectified for mapping. West rim of Dune crater, looking north.

**Figure 3 (next page):** Section of Apollo 15 EVA 2 map showing the area around Dune crater. White arrows indicate unmapped parts of the traverse.