

# RE-MAPPING THE APOLLO 17 LRV TRAVERSES

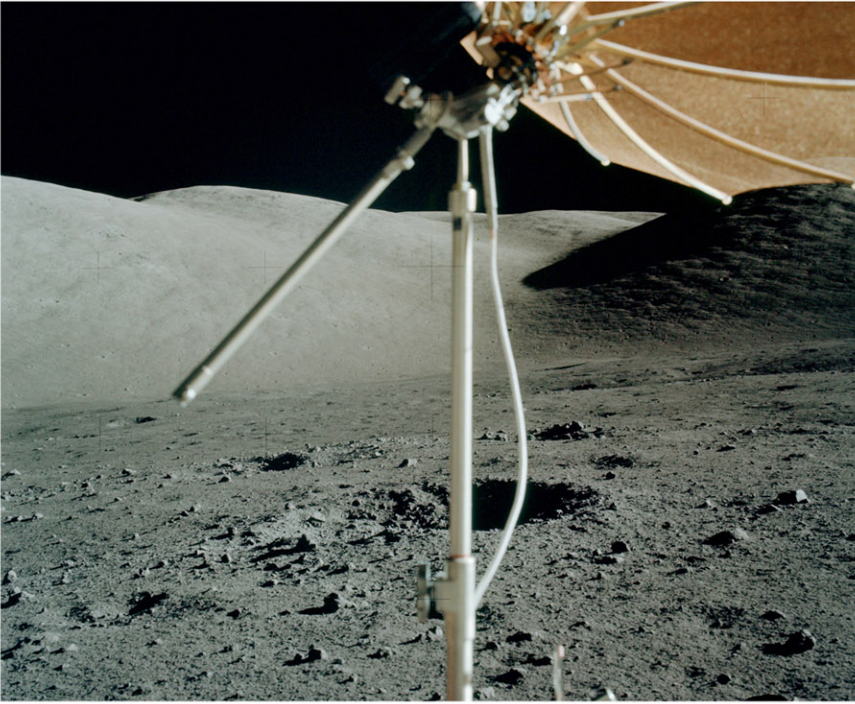
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## Introduction

This poster describes new mapping of the Apollo 17 rover traverses, part of a project to re-map all Apollo foot and LRV traverses using LRO images. Maps published at the time were never more than approximations and contain only generalized information because Apollo Panoramic Camera images lacked the resolution to show tracks or to compare with images taken during the drives. Apollo 15 mapping was described in [1]. Apollo 17 mapping has now been completed and will be made available via the Apollo Lunar Surface Journal, the PDS and elsewhere. Mapping presented here is divided into sections to fit book pages for an updated version of [2], but continuous mapping will also be made available.

Figure 1. Apollo 17 Hasselblad image AS17-134-20434, taken by astronaut Gene Cernan on EVA 1 at the seismic charge 7 location.



## 1. Data sources

Data used for Apollo 17 include LROC NAC ortho-images (used for control), individual NAC frames, voice transcripts and Hasselblad images taken by the crew, chiefly by astronaut Harrison Schmitt, during traverses. 16 mm video which was attempted on Apollo 15 and used on Apollo 16 was not taken on Apollo 17. Some Hasselblad images show tracks made earlier (e.g. at Hole in the Wall on EVA 2, or in panoramas at science stations) and these are also incorporated into the mapping.

## 2. Image processing

Image processing methods include extreme contrast enhancements of 16-bit NAC images and image shadow cancellation methods described in [1] in which images with opposite lighting are merged to suppress shadows and enhance albedo markings (this proved only marginally useful for Apollo 17). Hasselblad frames were contrast-stretched, particularly images taken facing up-sun or down-sun where topography is difficult to discern. The processed frames were approximately reprojected (perspective only, not correcting for relief distortion) to make comparison with LROC NAC images easier. Figures 2 and 3 show an example of this processing and comparison.

Figure 2. Apollo 17 Hasselblad frame AS17-141-21544, taken by astronaut Schmitt at the LRV-9 sample location on EVA 3.

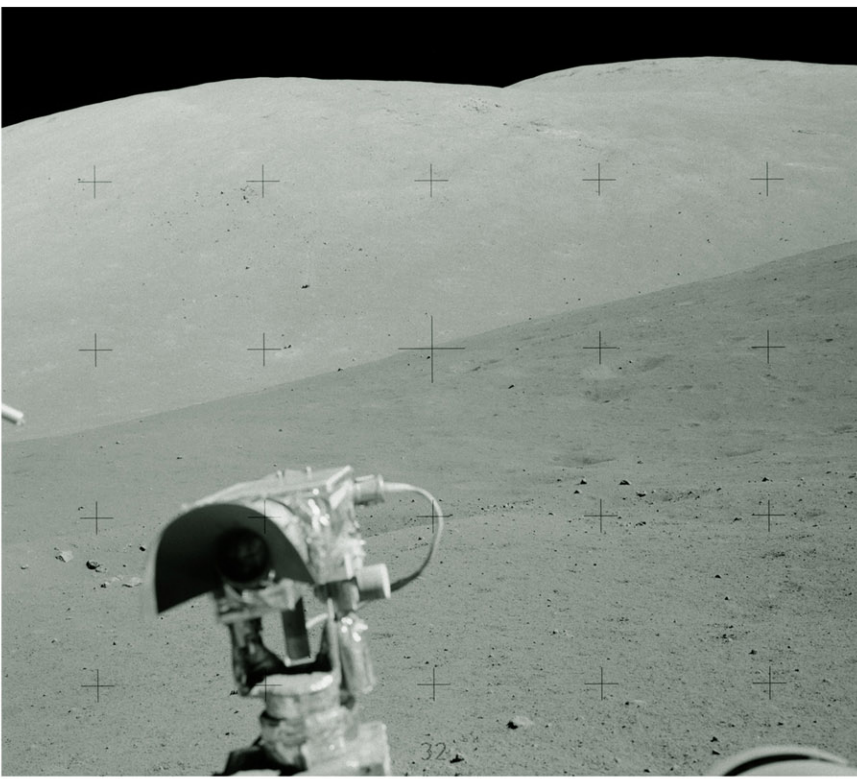
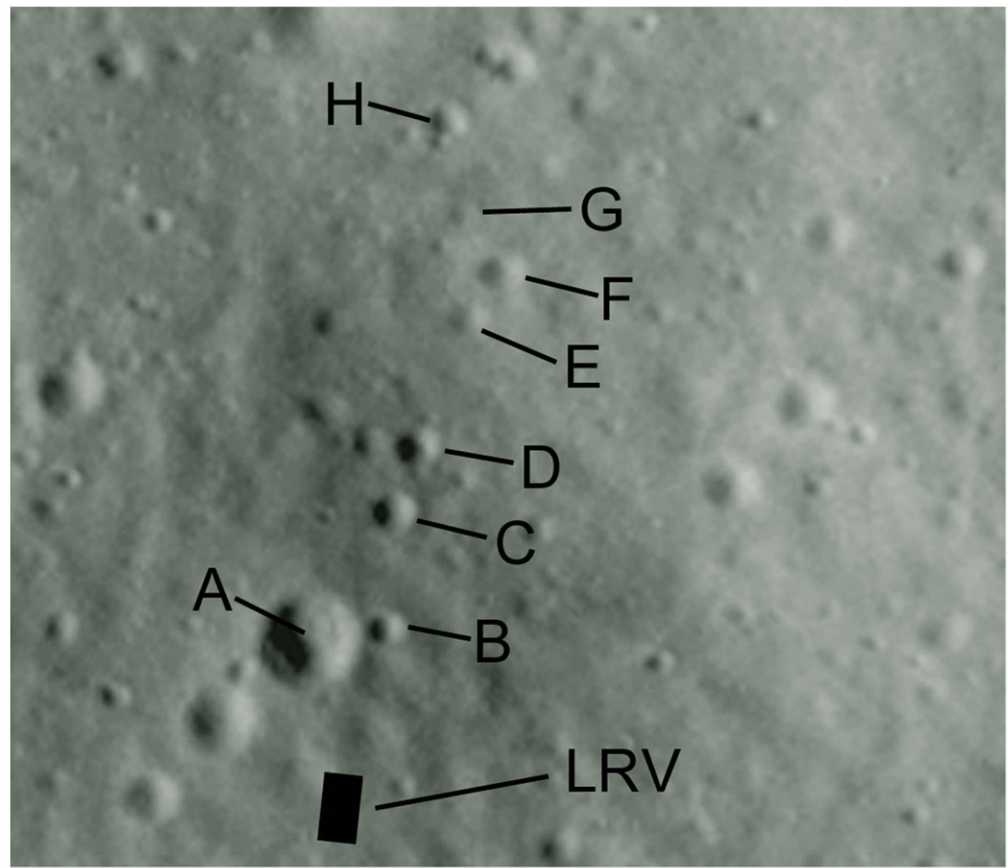
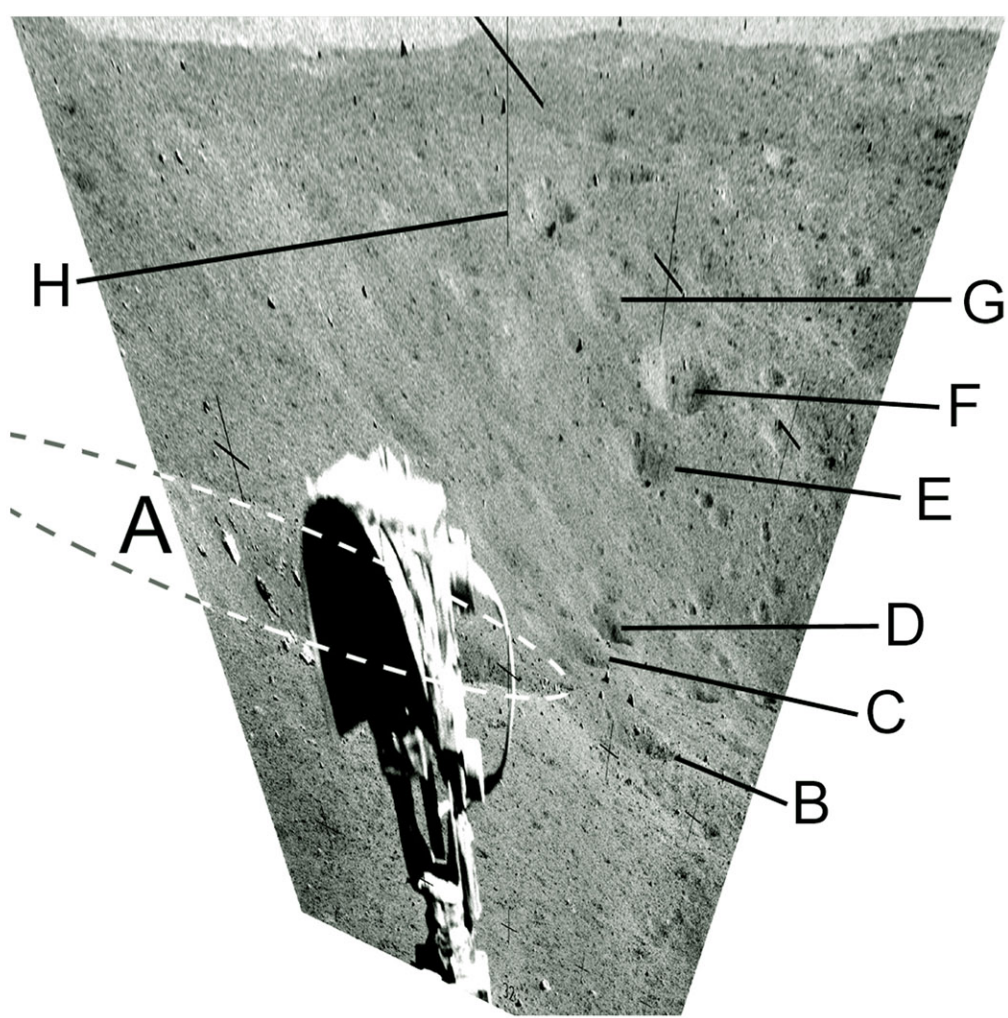


Figure 3. Top: frame AS17-141-21544, contrast-stretched and reprojected for perspective (topographic distortions remain). Bottom: part of LROC NAC orthoimage NAC\_DTM\_APOLLO17\_9\_M1190504960\_120CM.



## 4. Results

Figure 4 includes two processed images taken inbound near Hole in the Wall, showing outbound tracks to confirm the new mapping.

Typical map sections are shown in Figures 5-8. Some traverse segments are still mapped intermittently but the rover route is more accurate here than in any previous work. Figure 6 shows the area around Hole in the Wall which has never been shown properly in post-mission maps but is here fully consistent with the voice transcript and all image data.

## References

- [1] Stooke P. J. (2018) LPSC 49, abstract #1007.
- [2] Stooke, P. J., 2007. The International Atlas of Lunar Exploration, Cambridge University Press.

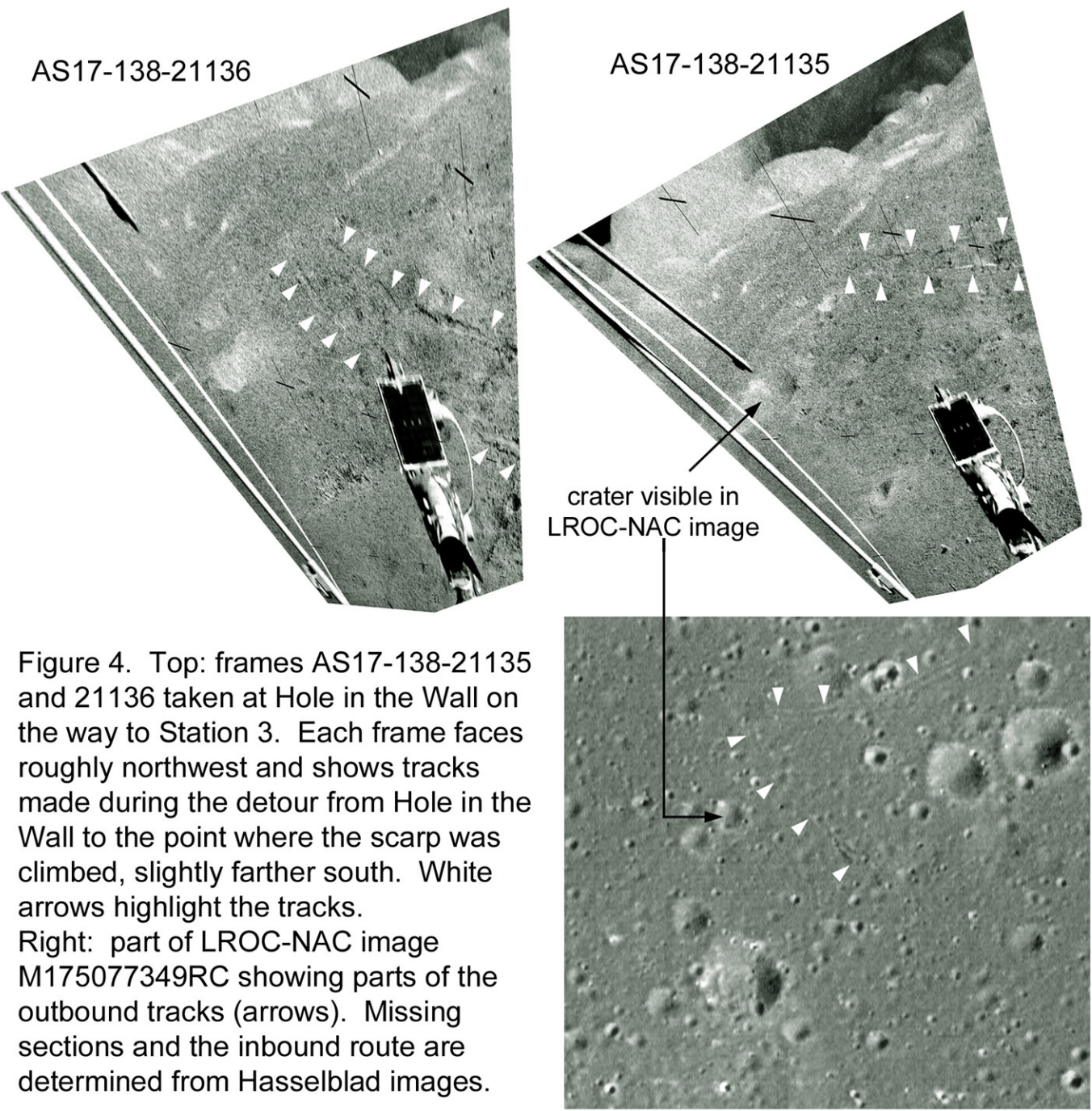


Figure 4. Top: frames AS17-138-21135 and 21136 taken at Hole in the Wall on the way to Station 3. Each frame faces roughly northwest and shows tracks made during the detour from Hole in the Wall to the point where the scarp was climbed, slightly farther south. White arrows highlight the tracks. Right: part of LROC-NAC image M175077349RC showing parts of the outbound tracks (arrows). Missing sections and the inbound route are determined from Hasselblad images.

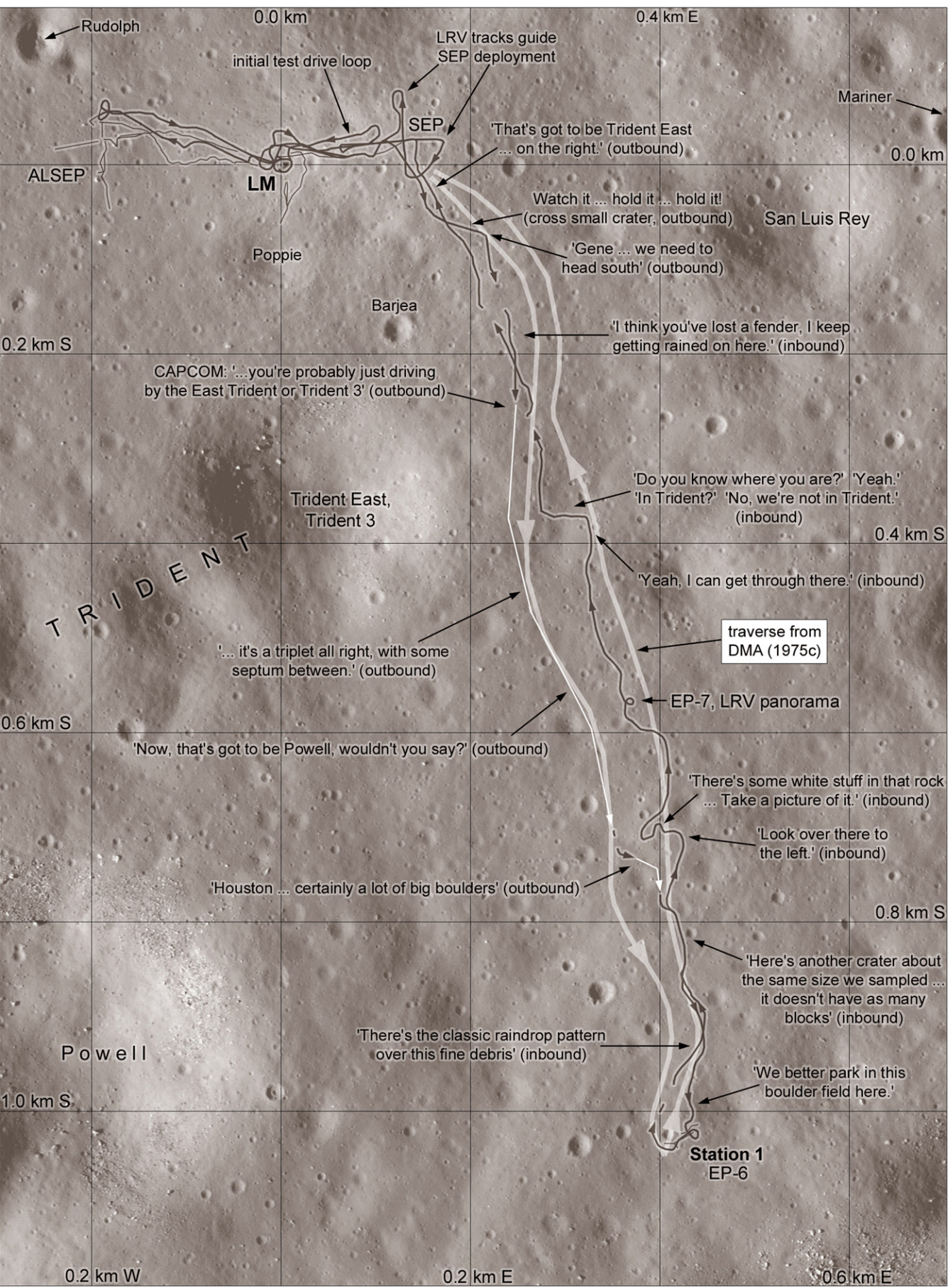


Figure 5. EVA 1 map. The pale white line shows the route as mapped by the Defense Mapping Agency in 1975.

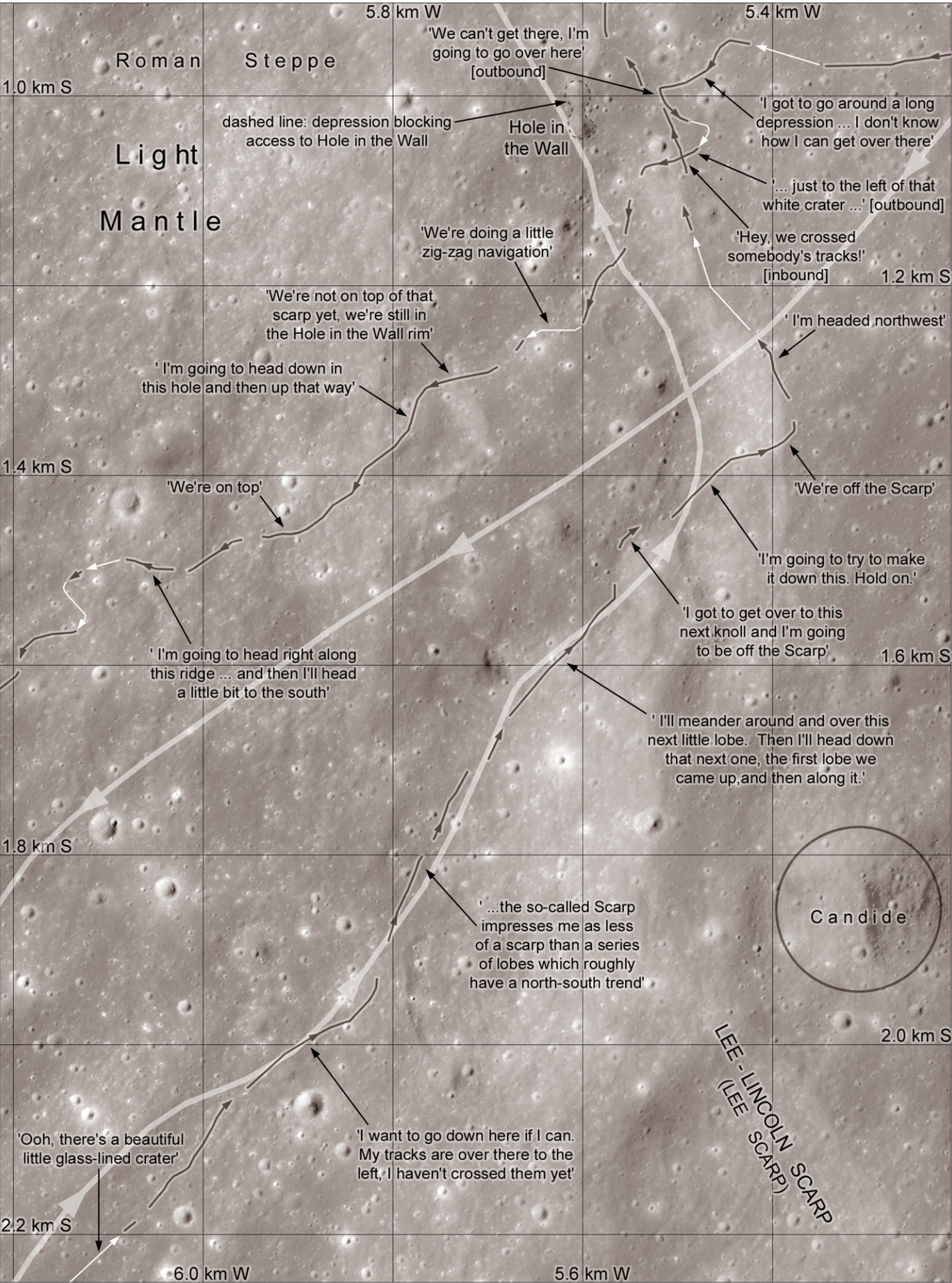


Figure 6. Part of EVA 2. Hole in the Wall is at upper right.

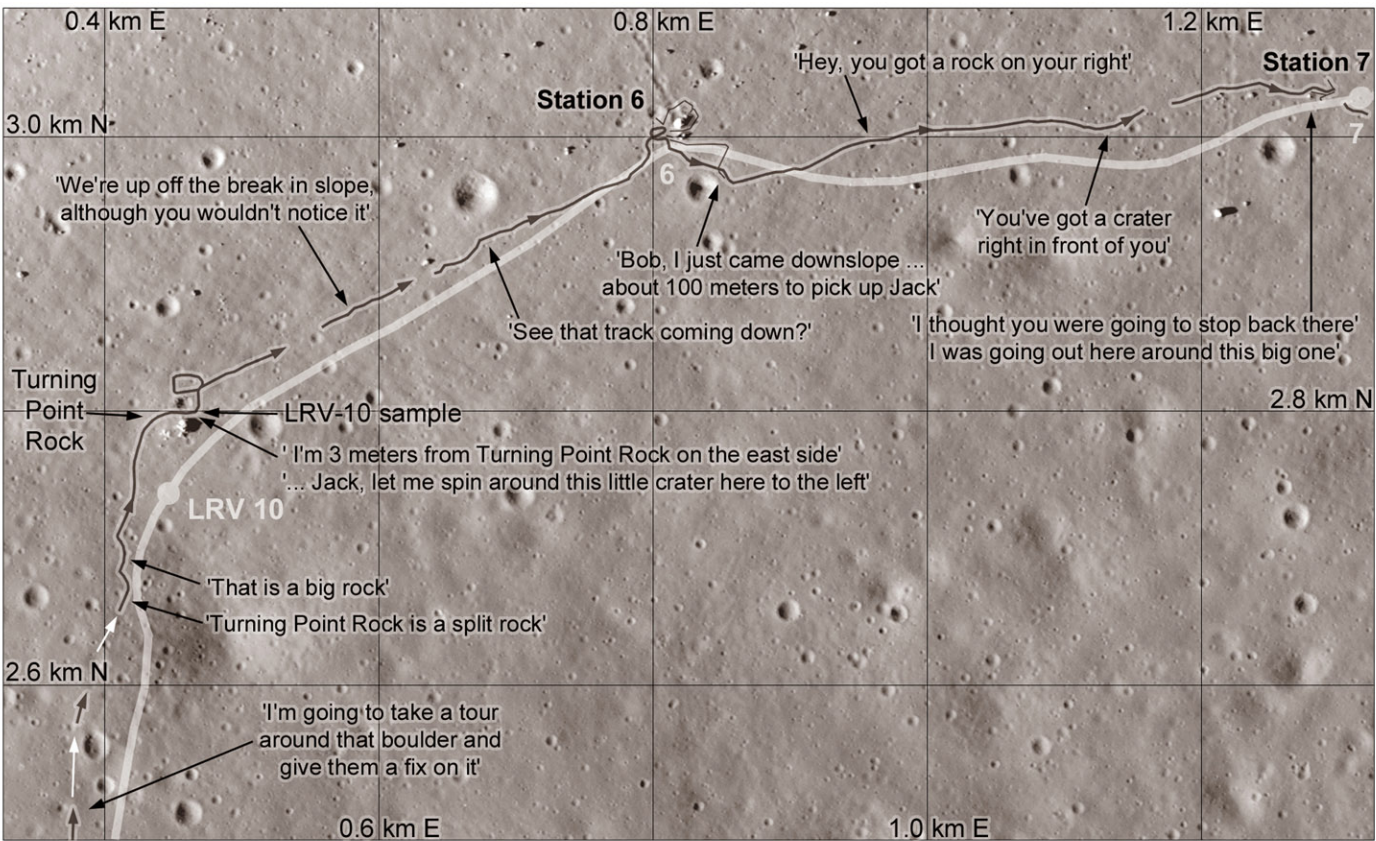


Figure 7. Part of EVA 3. These maps are sized for pages of a book but can be joined for continuous coverage.

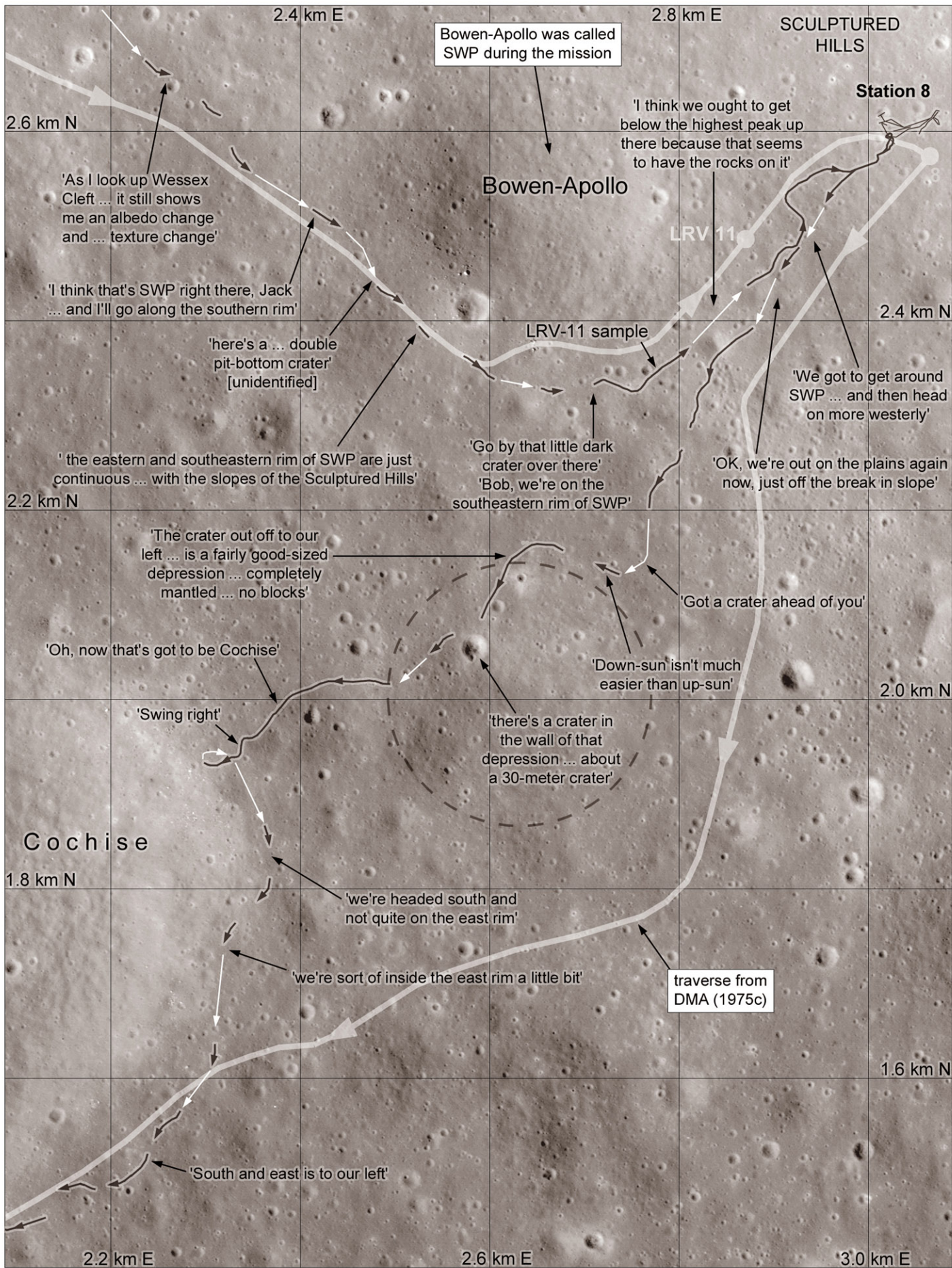


Figure 8. Part of EVA 3. The path deviates from the 1975 map by up to 400 m here and elsewhere (grid lines 200 m).