LUNAR SINUOUS RILLE ELEVATION PROFILES, G. Schubert, R. E. Lingenfelter, W.M. Kaula, Dept. Planetary and Space Science, Univ. of Calif., Los Angeles, 90024

Transverse and longitudinal elevation profiles of a number of lunar sinuous rilles, based on photogrammetric analysis of Apollo metric photography, have been prepared by the Defense Mapping Agency Topographic Center. In general, apparent sources (craters, etc.) are higher than apparent terminii and the downward slopes are continuous, decreasing towards the ends. Typical slopes are about 10m/km and smaller. Sinuous rille profiles exhibit a typical roughness of ± 20m which may be partially attributed to uncertainties in the measurements or to inability to track exactly along the rille bottom (rille cross sections are often V-shaped). Alternatively, rille floors may indeed be this rough as a result of cratering and slumping of the walls. There are interesting exceptions to the above generalizations which are discussed below for particular sinuous rilles whose profiles are shown in Figure 1.

The northward trending rille Rima Aristarchus VI and the sinuous rille trending northwest from the crater Krieger (Rima Krieger) are noteworthy in that a portion of Rima Aristarchus VI may have been covered by material deposition from Rima Krieger (see Lunar Topo Orthophotomap 39A1).

Rima Aristarchus VI - Note the trough or crater-like depression at upper end. The roughness is about ± 20m. The rille slope near the source is ≈ 25m/km. The extremely smooth profile between about 50km and 65km downstream may be evidence for deposition by Rima Krieger. The rille appears to run uphill near its terminus. A possible explanation for this is local uplift subsequent to rille formation associated with the nearby fresh crater Wollaston (~ 10km diameter). Coordinates of the most upstream point of the profile are ≈ 28° 0.7′N, 47° 36′W. The intersection with the Rima Krieger profile is marked by an arrow.

Rima Krieger - The depression at the upper end is the floor of the crater Krieger. The slope at the upper end is ≈ 10m/km. In the apparent depositional region between about 25km and 35km the profile is extremely smooth as was that on Rima Aristarchus VI. The rille is not discernable beyond ≈ 25km. The remainder of the profile is the topography of a straight track extended to intersect Rima Aristarchus VI. The coordinates of the most upstream point are ≈ 29° 02′N, 45° 59′W. The intersection with the Rima Aristarchus VI profile is marked by an arrow.

The rilles Rima Prinz I and II merit special attention because of the intersection of Rima Prinz II with a NE-SW trending ridge and the close proximity of Rima Prinz I (see Lunar Topo

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Orthophotomap 39A3) to both the ridge and Rima Prinz II.

Rima Prinz II - The rille generally trends downhill with a slope ≈ 5m/km which contrasts with the mean slope of the terrain parallel to the rille course of about 20m/km. The roughness is about ± 10m. Six cross-sections of the rille confirm that the depth generally decreases and the width increases with distance downstream. These cross-sections are relatively flat-bottomed. The rille cuts through the ridge between about 25km and 40km from the head. Along the intersection, the rille floor is apparently uplifted about 100m above the general slope of the rille profile. We believe that the uplift, associated with the ridge, most likely occurred subsequent to the rille formation. The ridge stands some 250-350m above the slope of the surrounding terrain. Coordinates of the most upstream point are ~ 26° 35'N 43° 10'W.

Rima Prinz I - This rille has a rather uniform slope of ~ 2.5 m/km and a roughness of ± 20m. There is no indication in the profile that the rille abruptly changes direction by 110° about 25km from its head. The elevated topography between about 5km and 10km may be an instance of poor tracking of rille floor. Cross sections of the rille show evidence of a smaller central channel within the rille which is also seen in the photographs. These and other rille cross-sections show no evidence of raised rims which would be expected if the rilles were lava drainage channels. The positions of the cross-sections are marked by arrows along the longitudinal profile. Coordinates of the most upstream point are ~ 26° 20'N, 43° 45'W.

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