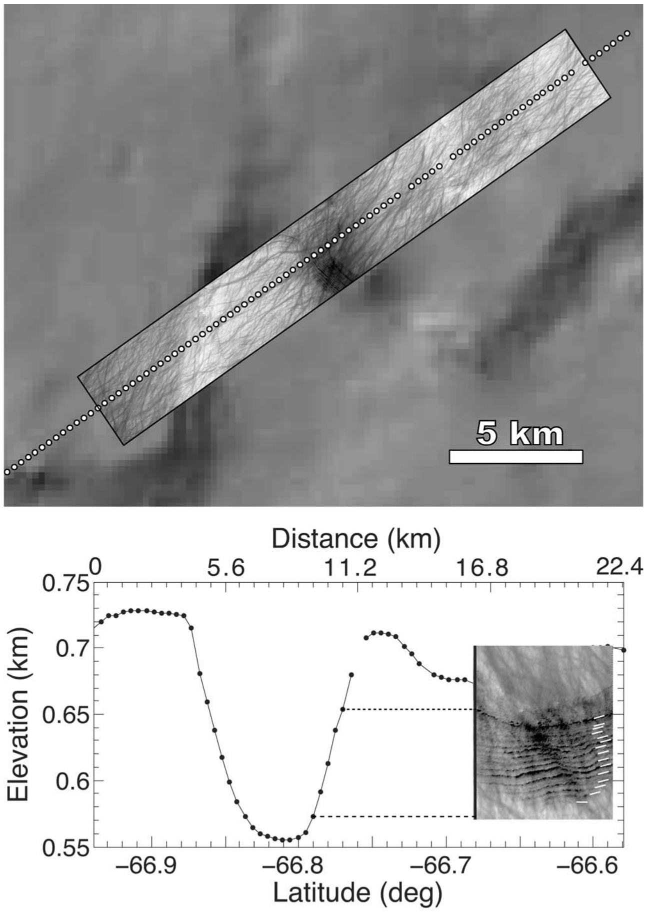

Figure 15. (top) Individual MOLA shots from PEDR ap12655 across the margin of the Malea Pedestal in Figure 2a, superposed on MOC frame R11/04399 and shaded relief depiction of the 128 pixel/degree MOLA gridded data. (bottom) Topographic profile from the MOLA ap12655 shots and the MOC. Height of the pedestal is about 150 m, and fine layering is exposed on both of the scarps sampled by the profile (at ~4 and 11 km). MOLA shot separation is too coarse to resolve the layers.

SHARAD radargrams at this location either because it is too thin to be resolved or it does not present a large enough contrast in permittivity to produce a reflection. Note also that the radar reflection from the surface of the pedestal is nearly specular, which indicates a dearth of surface scattering, implying a smooth surface at SHARAD wavelengths (15 m). This observation stands in great contrast with those of *Nunes et al.* [2010], which show the surface reflection from non-pedestal ejecta blankets to be very diffuse as a result of surface scattering. Hence, ejecta blankets are rougher than the surface of pedestals from MOLA scales (~400 m) down to SHARAD wavelengths (15 m).

[32] Based on the image data we believe that the mantle unit has been or currently is being removed to expose the layered material composing the pedestal. There is no evidence for overhangs and debris slumping, as might be expected from preferential removal of the pedestal material beneath an armoring surface. Based on the possibility that the mantle is being actively removed, or at least that the pedestal layering exposures are recent, we searched the data set from the CRISM (Compact Reconnaissance Instrument Imaging Spectrometer) [*Murchie et al.*, 2007] for another constraint to the compositional nature of the largest Pedestal in Malea Planum. Only one CRISM footprint is close enough to a relatively minor exposure, as seen in Figure 16, where a few pedestal layers are partly revealed. These layers are shown in the IR band as well as in the mafic band 1 (MAF1), but they are absent from the ices band (ICE1). *Pelkey et al.* [2007] offer a detailed description of these bands prepared by the CRISM team as browse summary products. In MAF1, the green and blue hues are indicative of low-Ca and high-Ca pyroxenes. Close investigation of the actual spectra corrected for the atmosphere reveals a gentle positive slope around 1 μm, which is indicative of mafic, iron-bearing mineralogy. Because the 1 μm slope is gentle, the layering visible in the frame is barely exposed through a mantle unit, and because this exposure is not well centered in the CRISM frame, we interpret the mafic composition as only tentative at this point. We note that low albedo material collecting in two neighboring volcanic calderas appear to have a basaltic composition according to HRSC (High Resolution Stereo Camera) [*Jaumann et al.*, 2007] and OMEGA (Observatoire pour la Minéralogie, l'Eau, les Glaces et l'Activité [*Bibring et al.*, 2004], so mobile mafic fines are regionally available. More targets were placed at the margins of the large Malea pedestals at the time of this writing, and we await better data to confirm this finding. Nonetheless, the fact we see a possible mafic signature associated with the layers supports the finding from the dielectric modeling of SHARAD data (ε = 4 to 5) that the material in pedestal deposits contain a significant fraction of silicates (Figure 13). Further, the absence of ice signatures in CRISM data does not invalidate the possibility raised by the dielectric models that a substantial fraction of ice may also exist in pedestal materials (Figure 13) because, if exposed, ice is unstable at Martian surface conditions and will rapidly sublimate.

[33] Both of the other large pedestals in Malea Planum have a mantling layer similar to the ones described, but their margins lack clear exposures of the underlying pedestal material. In the case of LMP3 (Figure 6), hints of layering are seen where the mantle overlapping the pedestal margins is apparently thin, similarly to what is seen on the left side of the LMP1 pedestal lobe in Figure 14. Oddly, none of the available SHARAD radargrams of this pedestal show any layering. A number of possible effects may explain this absence. Slope in the pedestal layers would reduce the power reflected back to the SHARAD antenna, and so would weaker dielectric contrasts across the layers. Another possibility is that the dielectric properties of the mantle at this location are different from the other layered pedestal and reduces the coupling of the signal into the subsurface. A combination of these or other factors could also be claimed, but a systematic study of each factor is necessary to better understand the problem. The point that should be kept in mind is that the internal reflections produced by layering within LMP1 are weak and can be more easily depressed below the noise level than the basal reflection at other pedestals (such as LMP3).

[34] The low permittivity value (2.3) for the northern section of LMP2 (Figure 5) is difficult to interpret. One possibility is that this portion of the deposit is dominated by porous ice, but this does not seem to be very likely because porosity