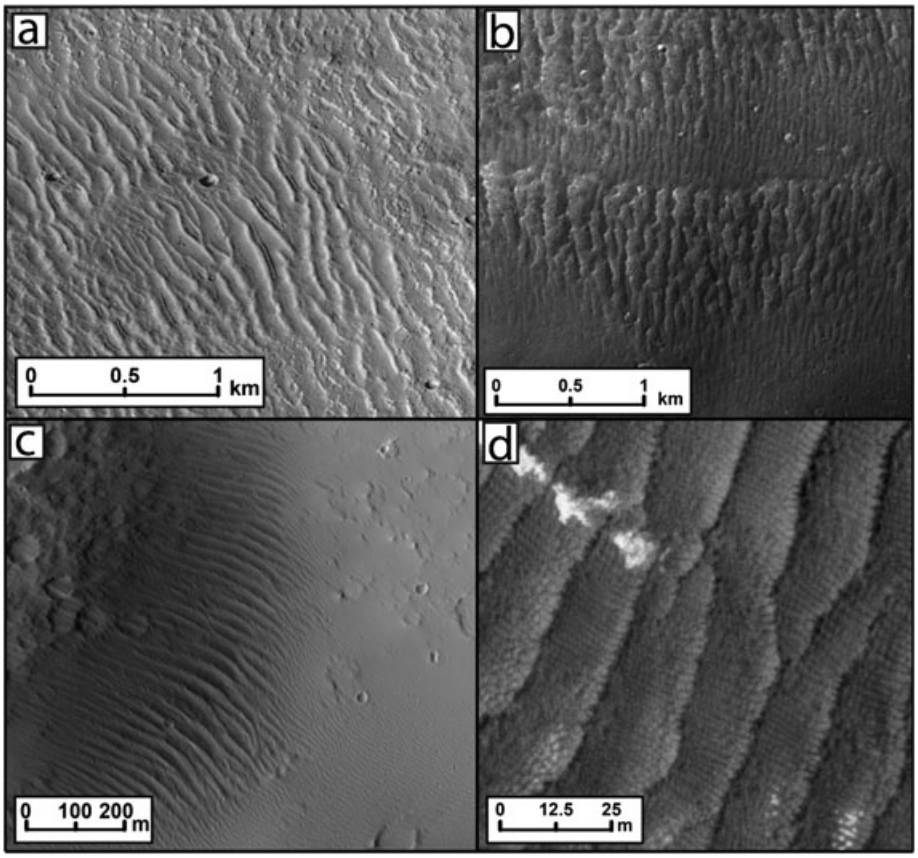

Figure 9. Heavily eroded, etched, and cratered TARs in Lucus Planum. (a) TARs north of Apollinaris Patera. Note rounded crests, subdued topography, etching, and superposed craters (portion of MOC image M1301069). (b) Eroded TARs with flattened crests. Smaller, secondary bedforms at the edges of the field are also eroded and cratered (portion of MOC image M1003186). (c) Indurated TARs sheltered by a nearby hill display rough, crenulated crests (portion of HiRISE image PSP_002634_1725). (d) Eroded dunes in eastern Lucus Planum are heavily eroded and modified, with rough and discontinuous crests (portion of HiRISE image PSP_006273_1715).

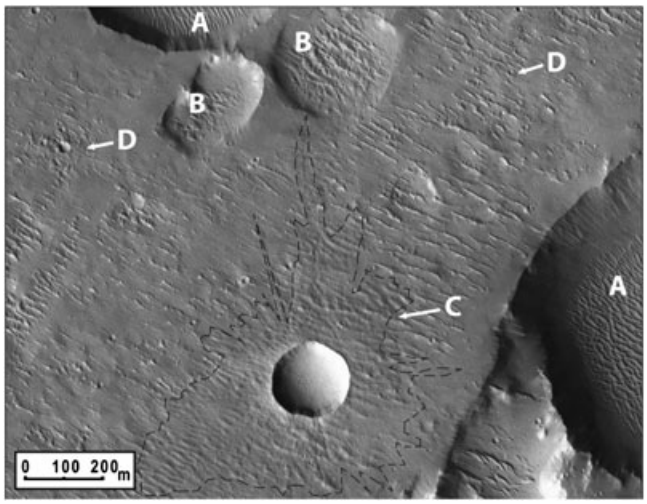

Figure 10. A region of the Medusae Fossae Formation northeast of Apollinaris Patera showing the progression of TARs from fresh to highly eroded in one image. A Relatively fresh-looking TARs with sharp crests are preserved in the deeper craters. B Slightly more degraded TARs fill the shallower craters. C The rays from a fresh primary crater (dashed line) have preserved the morphology of nearby TARs. TARs covered in ejecta have remained full and undulating, while elsewhere on the surface the TARs have been eroded into slightly sinuous remnant ridges. D Small impact craters are superposed on the remnant TARs. Portion of HiRISE image PSP_003966_1725.

Aeolianites made from layers of superposed TARs might lack fine-scale cross-bedding, but they would still develop complex and variably dipping bedding as a result of the layering of undulating, indurated forms. Erosion of an aeolianite could explain the swirling, discontinuous layers seen in yardangs in Apollinaris Sulci (Figure 14(b)). The yardangs in this area are heavily jointed, but their joint orientations do not seem to affect the orientation of the yardangs. Terrestrial aeolianites such as the Navajo Sandstone are also pervasively jointed (Hodgson, 1961). Figure 15 compares an outcrop of the Navajo Sandstone to a yardang of the MFF. Both faces have jointing on similar scales and subtle layering. While other processes can result in these kinds of layers (namely ignimbrite emplacement), this kind of morphology could also result from reworking.

Discussion

Fresh TARs exist in the MFF region, but their abundance and volume appears to be much less than the volume of material that seems to have been removed from the deposit by erosion (Zimbelman and Griffin, 2010). We have documented a wide variety of aeolian bedforms that appear to be indurated and undergoing erosion. On the basis of these observations, we propose that aeolian bedforms created as a result of erosion from the MFF can be rapidly indurated and degraded, and thus that a large number of the 'eroded' surfaces present in the formation may have previously been depositional surfaces. If this hypothesis is correct, then much of the 'missing' volume of the MFF may actually still be present in an extensively reworked form.

In order for dunes to be preserved in the eroded state seen in the MFF, they must have been subject to some kind of