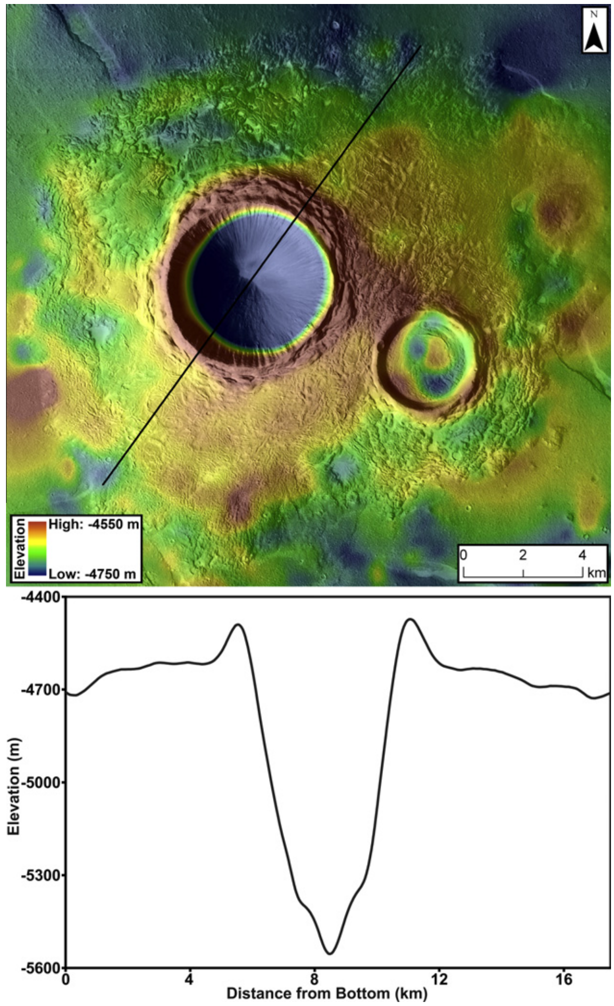

Fig. 2. An excess ejecta crater located at 32.8°N, 107.4°E, shown as a CTX mosaic with HRSC HiRes DTM data. The black SW–NE trending line across the crater shows the path of the topographic profile beneath the image, which has a vertical exaggeration of 10×. This EE, which has a V_{above}/V_{cavity} of 5.2, is 5.5 km in diameter and the crater interior is approximately 0.8 km deep. This fresh crater exhibits rough single-layer ejecta (SLE) that has a well-defined margin where it gently slopes down into the plains. The crater interior shows only minor evidence of infilling. The second crater in the image has similar ejecta morphology and, although the crater rim looks quite young, the crater interior has been almost completely infilled. This crater qualifies as a perched crater. The proximity of these examples suggests that the Pr may have been infilled by the ejecta of the EE.

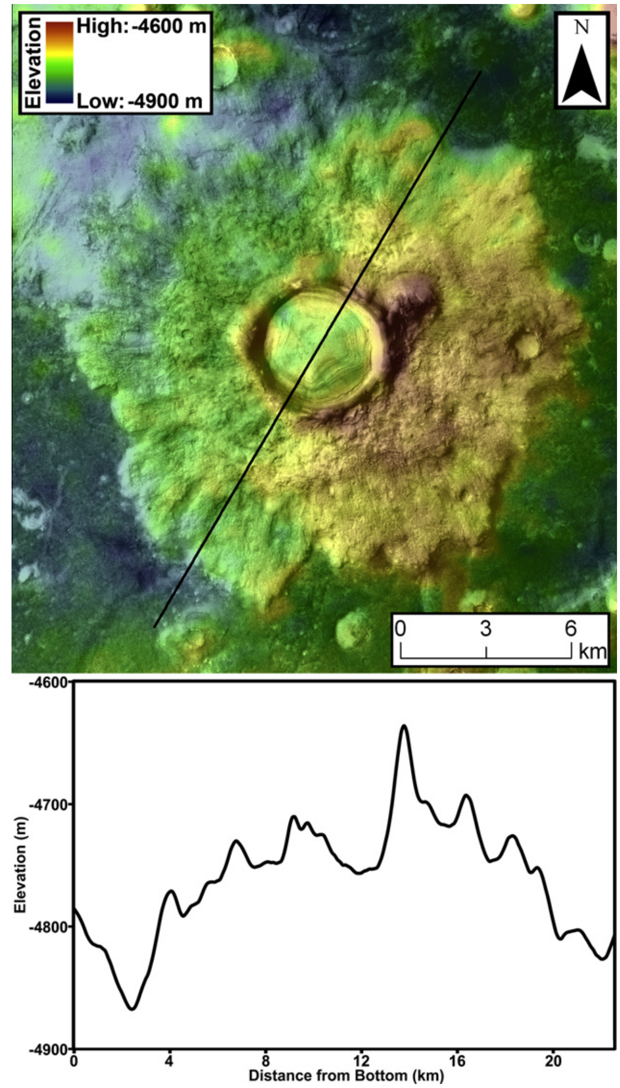

Fig. 3. A 4.3-km-diameter perched crater shown as a CTX mosaic with gridded MOLA topography. The black SW–NE trending line across the crater shows the path of the topographic profile, which has a vertical exaggeration of 51×. The crater interior exhibits clear concentric crater fill (CCF); due to the extensive infilling, the floor of the crater is now at the same elevation as the surface of the ejecta. The eastern half of the crater rim crest is still quite prominent, as can be seen in the image and the profile, but overall the rim appears to be considerably degraded. The ejecta, which itself contains small infilled craters, still has a distinguishable inner and outer layer. The radial striations are faintly visible, interrupted by the extremely rough surface texture. The margins of the ejecta are well-defined, creating a clear contrast with the relatively smooth surrounding plains.

2.2. Perched craters

The set of perched craters (Pr) includes all craters whose current cavity floors and ejecta deposits are at or above the elevation of the surrounding terrain (Boyce et al., 2005; Garvin et al., 2000; Meresse et al., 2006) (Figs. 3–5). These crater interiors have necessarily undergone significant infilling, decreasing the depths of the cavities; in extreme cases, the crater floor can be situated hundreds of meters above the intercrater plains. This process results in Pr having minimal variations in relief from the elevation of the surrounding plains to the lowest elevation of the crater floors (Boyce et al., 2005; Meresse et al., 2006). Through a survey of rectangular-shaped test areas (defined by the MOLA 1/128° DEM) in the northern lowlands, Boyce et al. (2005) found that Pr exist below an elevation of −2400 m. They tend to be located north of 40°N, although they are present as far south as 25°N, with the highest concentration in Utopia Planitia. Out of 2279 craters measured, Boyce et al. (2005) identified 414 examples of Pr with diameters ranging from ~6 to 23 km. However, their study did not include craters smaller than 6 km in diameter. A subsequent study by Meresse et al. (2006) found several examples that were 3–10 km in diameter.

The ejecta and crater rims of Pr often show evidence of degradation or erosion (Figs. 3–5). The ejecta can be SLE or DLE (Barlow et al., 2000), and always exhibits a low thermal inertia in THEMIS nighttime images (Meresse et al., 2006). The texture of the ejecta is highly variable; it may be smooth or rough, and can exhibit radial lineations and/or pits. Measurements of the ejecta of Pr and normal DLE craters in Utopia Planitia have been used to estimate the excess thickness of the Pr ejecta, which is typically 60–80 m for the outer ejecta layer and 150–200 m for the inner ejecta layer. These ranges suggest an excess thickness of 35–140 m of material (Meresse et al., 2006). Despite Pr having inflated ejecta, the