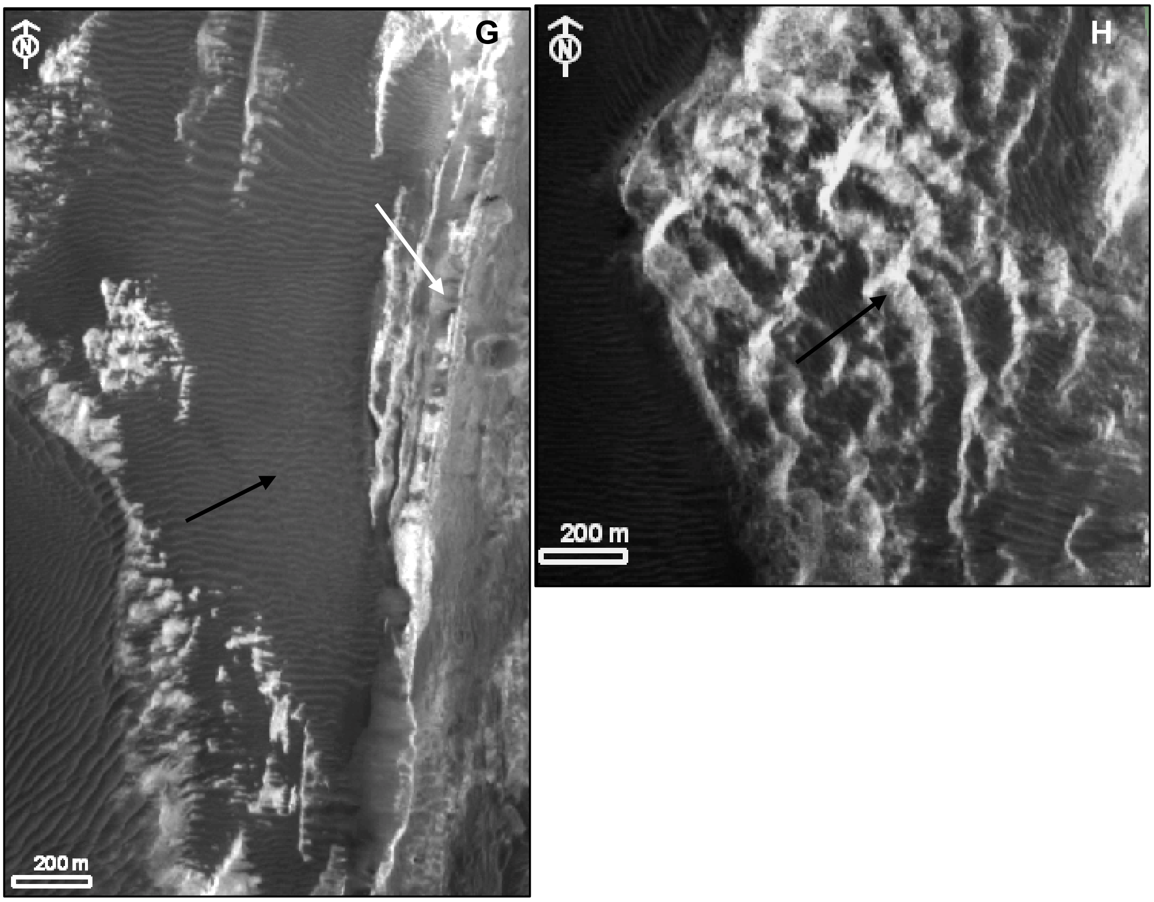



(G) Undulated, eroded ILD showing a thickness of ~270 m (MOC orbit E0401963; 2.1°S/342.4°E). For context, see Fig. 43C. Dark aeolian material accumulated in ripples is deposited on bedding planes (black arrow). Talus can be observed at steep scarps (white arrow, cf. Fig. 43C). (H) Detail of the undulated-like strata (arrow). Contrast is enhanced by high-albedo ILD material and low-albedo ripples that are located on bedding planes (MOC orbit E0401963).

## Iani 3:

The ILD (4.4°S/341.5°E) displays a ~NS-strike (Fig. 39). Its extent measures 19 by 33 km at an elevation of -4300 m up to -3000 m (Fig. 44A-C, 46B). The ILD appears as a cliff-forming mound (Fig. 45A) showing distinct layering and a dome-like cross-section (Fig. 44A-C). Chaotic terrain is surrounded and in parts overlapped by light-toned material comparable to other regions. To the south-west, there is a small light-toned exposure and in nearby knobs there is light-toned material as well indicating a larger extent in former times and therefore erosion (Fig. 45D).
The ILD is characterised by the parameters shown in Table 14. Overall, the ILD features an intermediate albedo (Table 14). Talus can also be observed, especially on the eastern side, which looks more eroded while the westward side is more friable (Fig. 45D). There is indication for wind activity resulting in ILD erosion possibly by wind (SW-NE-lineation) indicated by yardangs (Fig. 45A, 46A) especially in the southern part along the layers. Furthermore, loose dark aeolian material has settled down in surface depressions (Fig. 46C). The ILD features a steep southwestern and a flat northeastern slope (Fig. 45C). Its western part, being more light-toned (Fig. 45D), eroded and elevated (Fig. 44A, 45A), while the eastern part, being more frayed and located at a lower elevation, exhibits loose dark windblown material causing a lower albedo. One unit only has been identified. On

MOC and HiRISE-images, the surface morphology of the western and eastern part appears comparable. Some parts show higher albedo due to steep regions and/or coverage by dark aeolian material and dust (Fig. 45A, 45D). This unit features undulating strata showing surface vales and monadnocks (Fig. 46C). A stair-stepped morphology indicates material differences. Laminated layers are visible (Fig. 46D). HiRISE- images do not confirm texture differences between layers. There are hardly any spectral differences between the layers except for those caused by material coverage, which prevails especially in the smooth-looking, flat eastern part.

This region is not covered by CRISM (Sect. 3.1.8), which might have shown whether the mineralogy of layers is different. OMEGA found PHS[1] corresponding to layered parts of the ILD [*NoeDobrea et al.*, 2008]. A higher spatial resolution – future CRISM data - and a lower signal-to-noise ratio are supposed to resolve these differences in interpretation. The haematite-rich unit coincides with the sulphate-bearing unit. Since layering is easily observable and distinct, the strike and dip was measured (Fig. 46A).

Layering sequences were counted to obtain an impression of their thickness which, however is mere approximation because layers are laminated and undulated. About 15 sequences are identified (10 are shown in Fig. 45D) with an average thickness of 70 m per sequences. All sequences show the same morphology but within competent strata that is measured, incompetent strata is assumed revealing stair-stepped morphology. Going from bottom to top, there is one layer with a rough surface and similar spectral properties similar to the upper 7-8 sequences. In between there are 7-8 sequences of lower thickness and rather smooth surfaces. Regions of higher albedo (rough parts; Fig. 45A) show higher surface temperatures (Fig. 45B).

The dipping direction occurs in the darker eastern region (Fig. 45A, 46A) indicating an antiform (Fig. 44A, 44C). This would explain the presence of altered fine rock fragments (dust coverage) in the eastern part. The lower parts may have plane surfaces. They show distinct layering, which may also result from a dust cover. The surface is clearly is etched and pitted and looks rough and massive in parts (Fig. 46C, 46D).

**Table 14:** Parameters of Iani 3.

| Morphology | Relative Albedo | Elevation[2] [m] | Thickness[1] [m] | Consolidation of Materials | Mineralogy | Layer Geometry [°] |
|---|---|---|---|---|---|---|
| Terrace-like, dome-like profile | Intermediate[3] | -4300±12.5 to -3000±12.5 | 1300±12.5 | High TI[4] TI Ø: 428 SI±41 (surrounding: Ø 308 SI±80) BT: 191-201 K (surrounding: 180-201 K) talus and boulders present | PHS + haematite within | 240±22/4±2 120±13/5±3 |

[1] Previous mineral detections pointed to gypsum [*Gendrin et al.*, 2005].
[2] HRSC-DTM: spatial resolution 50 m/px (Sect. 3.2.3)
[3] section 3.2.1
[4] section 3.2.2

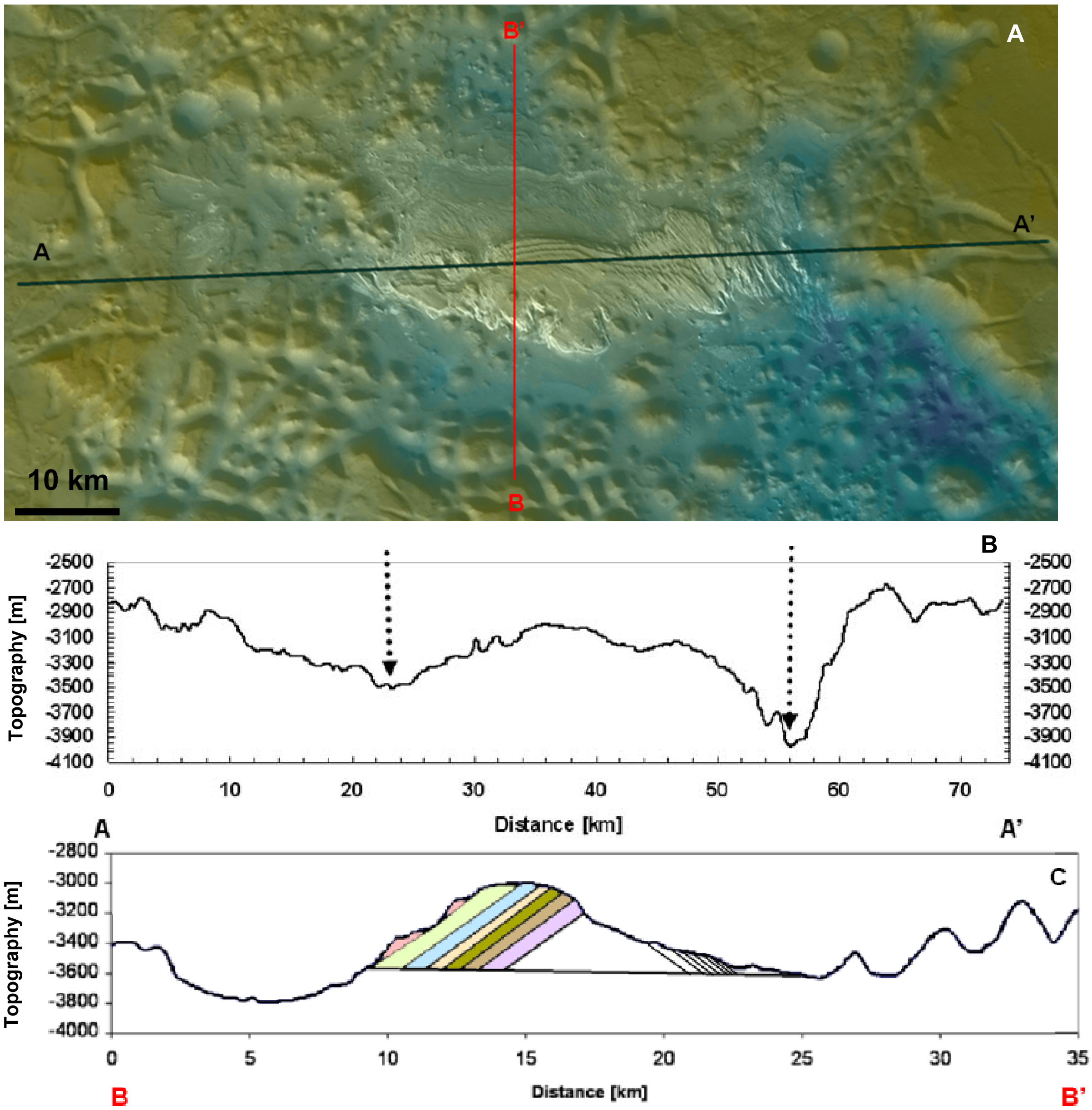



**Figure 44:** Profiles covering Iani 3. (A) N-S and W-E trending profiles on an HRSC DTM (orbit h0934_0000; 4.2°S/341.5°E) underlain by nadir image. The ILD is located in a depression and surrounded by chaotic terrain and plateau remnants. For context, see Fig. 39, 28. (B) NS trending profile A-A'. Dotted arrows mark the area of exposure within Fig. 44A. (C) W-E trending profile B-B' (shown in Fig. 44A) showing the dip of mapped layers. Above the dashed line, the ILD has been exhumed. The extent to the ground is not known. Accuracy: Distance ±0.050 km, topography ±12.5 m (HRSC DTM orbit h0934_0000).

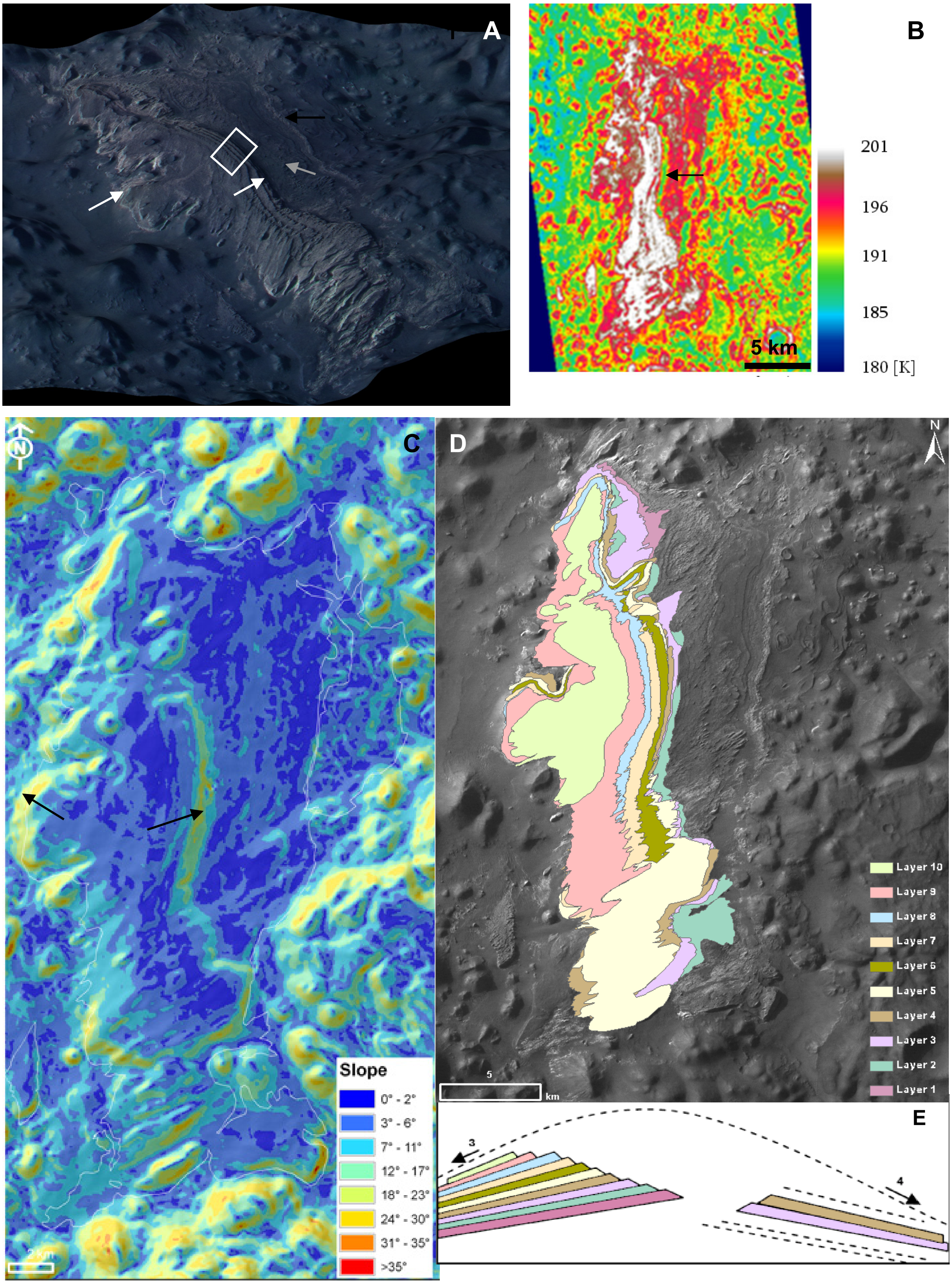



**Figure 45:** Properties of Iani 3. (A) HRSC false colour image perspective view (orbit h0934_0000; 4.3°S/341.5°E) confirming the terrace-like appearance with its distinct layering. White arrows mark steep parts. A change in the dipping direction (cf. Fig. 46A) is indicated by the grey arrow. Much of the eastern part is covered by windblown material as it is more flat and exposed at a lower elevation (Fig. 44A, 45C) than other flat regions on the ILD, but a more freshly eroded light-toned layer crops up in the easternmost part (black arrow). Box shows the location of Fig. 46C. (B) THEMIS-BT map (orbit I18205017; $L_S = 359.8$ →summer; 4.3°S/341.5°E). Highest surface temperature of 201 K (white) corresponds mainly to flat regions,

not scarps (~188 K; arrow) as they exhibit loose material at their base. (C) HRSC slope map (orbit h0934_0000; 4.3°S/341.5°E). Arrows mark the steepest regions. The change in the dipping direction is apparently not indicated by steepness (Fig. 46A) or by the distinct easternmost light-toned layer (Fig. 45D). (D) Mapped layers on HRSC orthoimage (orbit h0934_0000). Layering looks homogenous except for some layers that are more covered by dark sands than layers that look more resistant and have higher albedo due to less coverage. (E) Exaggerated sketch of the approximate dip of the layers shown in Fig. 45D. The change in the dipping indicates an antiform (cf. Fig. 44B, 44C). There is no clear indication that the layers continue in the eastern part but a more resistant light-toned layer is present there with dips of 6°+10°. Unfortunately, there is no HiRISE coverage of the easternmost part of this ILD.

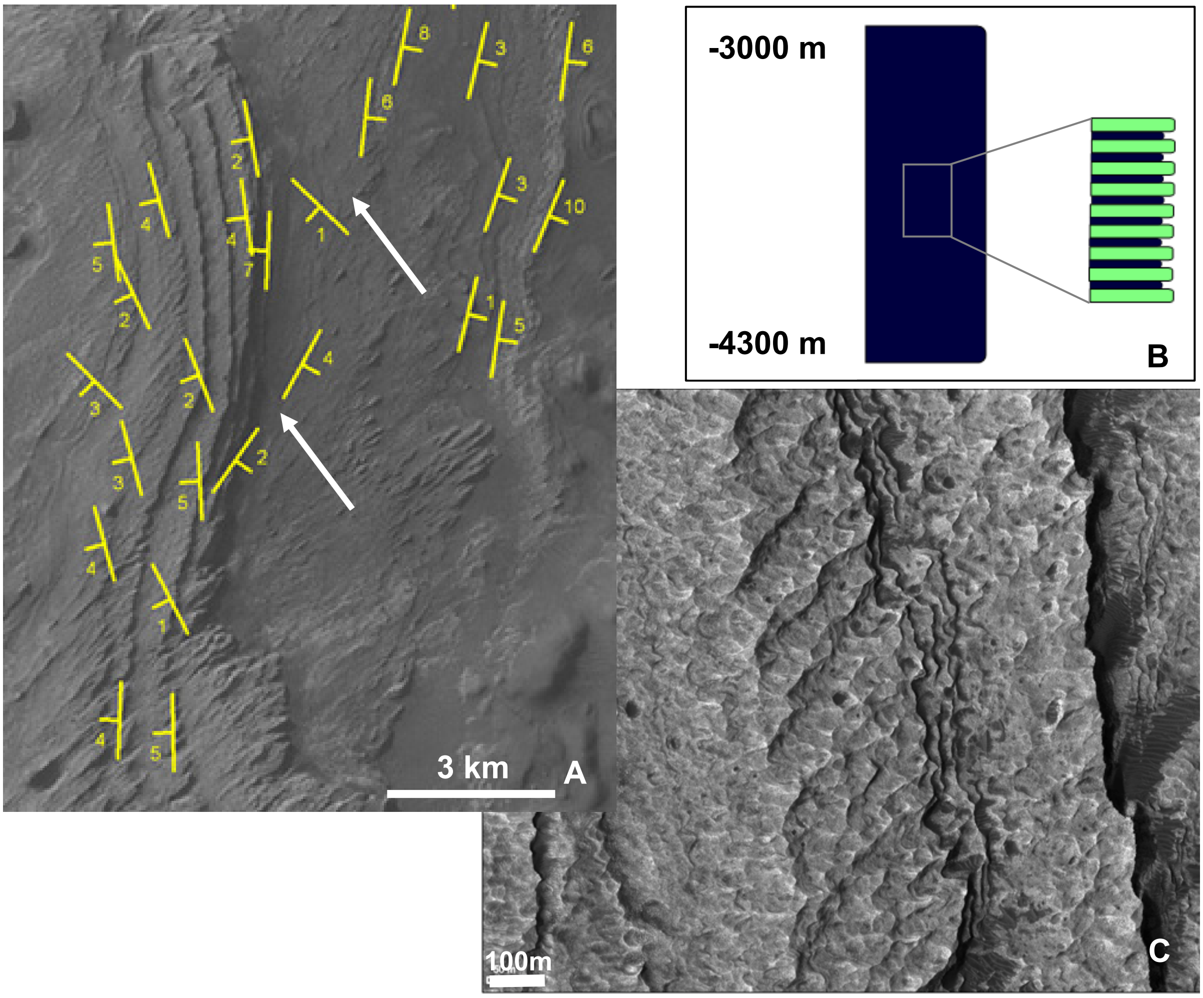
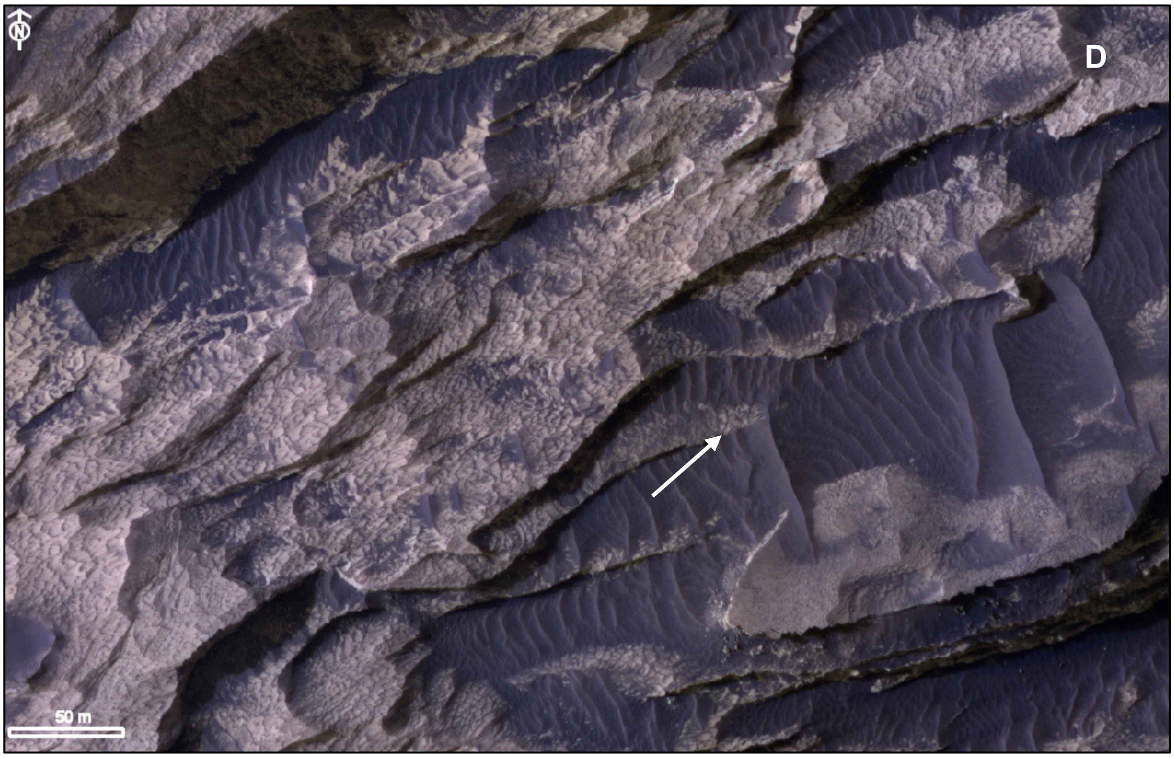



**Figure 46:** Strike and dip of Iani 3. (A) Note the shallow dip values and the change in the dipping direction (white arrows) in the eastern part. The layers dip by around < 5°, which indicates sub-horizontal layering (Sect. 3.2.3). Layering seems homogenous in the western part (HRSC orbit h0934_0000). (B) Thickness profile showing the ILD is observed between -4300 m and -3000 m. Its stair-stepped morphology suggests less competent material in between the cliff-forming layers. The surface shows yardangs and pits indicating wind erosion and material discrepancies. Layering is undulated but distinct. Hydrated sulphates and haematite are present within the ILD. (C) Detail of layering in Iani 3 (4.3°S/341.5°E). For context, see Fig. 45A. No morphological differences between layers were observed. Note the pitted surface and the undulated strata. The surface exhibits dark material in several vales (HiRISE orbit PSP_002628_1760).




(D) Laminated strata can be observed (4.3°S/341.5°E). Boulders are visible at the base of scarps (arrow). Compared to other false colour images (Sect. 4.1.1, 4.1.2) dust may have settled there causing the beige colour. Blue corresponds to mafic sandy material accumulated in ripples which are superimposed on bedding planes (HiRISE false colour image orbit PSP_002206_1760). Note the pitted surface (Sect. 2.3.1).