

**Eolian features on Mars and Titan: resemblance and difference;** G.G. Kochemasov, IGEM of the Russian Academy of Sciences, 35 Staromonety, 119017 Moscow, Russia, ([kochem.36@mail.ru](mailto:kochem.36@mail.ru)).

Two large planetary bodies – a planet (Mars) and a satellite (Titan) – both keep significant atmospheres and show traces of eolian action on their surfaces. In the martian case widespread classical dunes can be discovered in many areas at various latitudes. Fig. 1 demonstrates as the younger dunes “eats” the older ones that is normal for winds changing directions. On Titan ripples prefer dark methane lowlands at the equatorial belt (tropics) (Fig. 2) and bear some peculiar characteristics.

A persistent ripple pattern covers mostly dark smooth plains. This pattern consists of very regular often cross-cutting (Fig. 3) wavy forms hundred and thousand kilometers long with spacing between ridges or grooves about 1-2 km (PIA03555, PIA03566, PIA03567, PIA03568) or 10-20 km (PIA08454) -so called “cat scratches”. Some important characteristics of this pattern usually considered as a result of eolian action still have to be explained. **1)** The pattern consists of intersecting (cross-cutting) ridge-groove structures not destroying each other under intersection; radar can fix at least two structure directions (Fig. 3); normal eolian forms tied to winds of changing directions show earlier dunes wiped out by the later ones (Fig. 1). **2)** Ridges (dunes) are radar-brighter, grooves are darker normally at the equatorial belt (Fig. 3-4), but the opposite is observed (ridges are darker, grooves lighter) in the image PIA11802 at the southern edge (19.2 degrees south) of the wide equatorial dune field (Fig.5 to 7). **3)** Symmetric shape of tight and straight dunes (Fig. 5); a perfect symmetry is not typical for Earth and Mars (Fig. 1). **4)** Width of ridges and grooves is nearly equal with variations to both sides (Fig. 3-4); at the southern end of the equatorial “dune” belt spacing between dunes increases and can reach 10 km, the ripple pattern becomes less regular (PIA 11802, the southern part) (Fig. 7). **5)** Meeting an obstacle (high standing light icy blocks) dunes are abruptly cut keeping their shape and width (Fig. 5-6); one would expect some radical changes in dune appearance under an action of a wind turbulence caused by a barrier. **6)** Morphologically resembling dunes groove-ridge systems on sectors of a tectonic grain (Fig. 8) have different strikes. Uplifted sectors (radar-lighter) have nearly E-W strike, separating them subsided ones (especially the upper one) show N-S strike. Such pattern of the groove-ridge system can be better interpreted as a tectonic pattern.

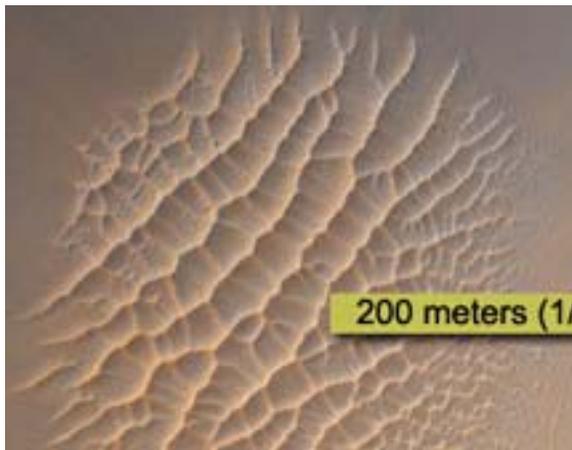


Fig. 1.

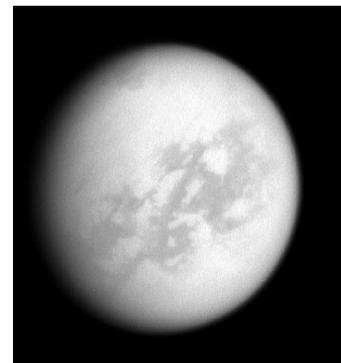


Fig. 2.



Fig. 3.

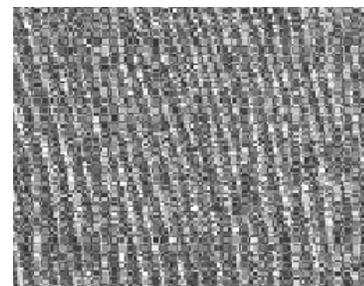


Fig. 4.

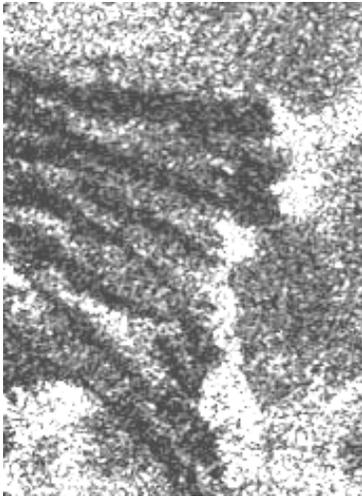


Fig. 5.



Fig. 6.

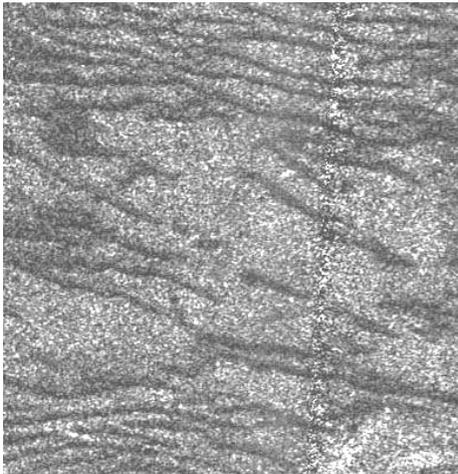


Fig. 7.

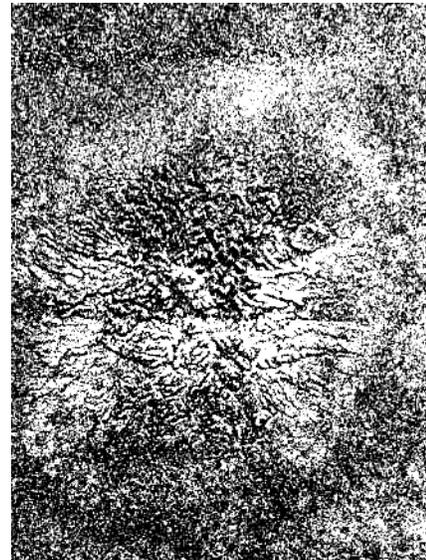


Fig. 8.

- Fig. 1. Dunes on the Victoria Crater bottom, Mars (TRA\_000873\_1780). Two dunes directions. The later direction (to the left) wipes the earlier one (to the right) what is a necessary characteristics of eolian (wind) formations.
- Fig. 2. Titan, PIA10594. Destruction of the light icy crust in the equatorial belt and appearance of cementing dark wavy methane plains (lowlands).
- Fig. 3. Titan's surface, radar image, a portion of PIA03567 (13° south lat., 300° west long.), grid spacing 1-2 km.
- Fig. 4. Titan, radar image, a portion of PIA08454, grid (ridge-to-ridge) spacing ~12 km.
- Fig. 5. Titan's dunes. A portion of PIA11802 (19.2° south lat., 257.4° west long.). the frame width is ~31 km.
- Fig. 6. Titan's dunes. A portion of PIA11802, the frame width is ~30 km.
- Fig. 7. Titan's dunes. A portion of PIA11802, the frame width is ~53 km.
- Fig. 8. Titan. A portion of PIA12496 (41° north latitude, 213° west longitude). Tectonic granule has characteristic size  $\pi R/91$  (~88 km) and sectored structure. Two uplifted sectors (radar-light) are separated by two subsided sectors (dark). Groove-ridge systems are roughly oriented W-E on the light sectors and N-S on the dark ones.