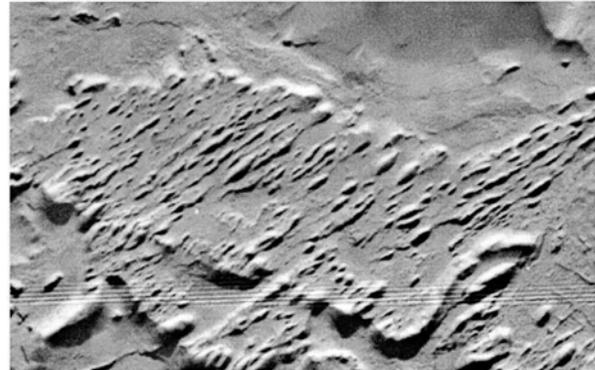


**ELONGATED DEPOSITS IN SOUTHERN ELYSIUM PLANITIA, MARS.** J. Nußbaumer<sup>1</sup>, <sup>1</sup> Johannes Gutenberg University, Mainz, Germany.

**Introduction:** In the Elysium Planitia region, deposits have elongated elevations which resemble terrestrial drumlins or yardangs. Drumlins and drumlin clusters are glacial landforms which have been extensively studied. Geologists have proposed several theories about their origin. They are formed a short distance within the receding glacier ice and record the final direction of ice movement. Drumlins occur in symmetric, spindle, parabolic, and transverse asymmetrical forms. Drumlins are commonly found with other major glacially-formed features and are related on a regional scale to these landforms. The large-scale patterns of these features exhibit spatial organization of the drumlin-forming flows with related tunnel valleys, eskers, scours, and exposed bedrock erosion. Drumlins form under ice sheets. They are streamlined, elongated sedimentary bodies pressed on material from the moraine at former glacial fields, and usually occur in groups. A drumlin's long axis is parallel with the movement of the ice, and it is roughly symmetrical around the long axis. Drumlins are typically 1–2 km long, less than 50 m high and between 300 to 600 metres wide. The deposits in Figure 1 may be related to the glacial landforms described in southern Elysium planitia [1]. The floe-like mesas, a few degrees of longitude away from the highland lowland boundary, may originate by mud flows or moving ice. The existence of Drumlin fields would support the hypothesis of glacial reshaping in the area.

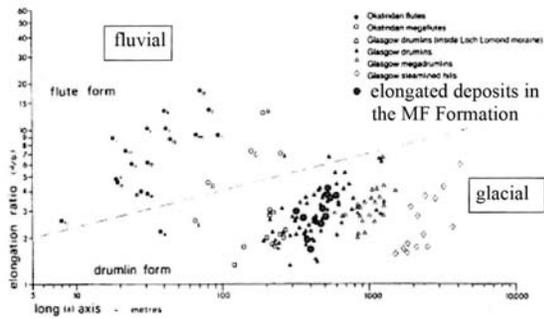
In contrast, Yardangs are formed by wind. A yardang is a streamlined hill carved from bedrock or any consolidated or semiconsolidated material by the dual action of wind abrasion by dust and sand, and deflation. Yardangs become elongated features typically three or more times longer than wide, and when viewed from above, resemble the hull of a boat. Facing the wind is a steep, blunt face that gradually gets lower and narrower toward the lee end. Yardangs are formed by wind erosion, typically of an originally flat surface formed from areas of harder and softer material. The soft material is eroded and removed by the wind, and the harder material remains. The resulting pattern of yardangs is therefore a combination of the original rock distribution, and the fluid mechanics of the air flow and resulting pattern of erosion.



**Fig. 1:** Mesa-like elevations with parallel-oriented drumlins or yardangs. Width of the image is about 10 km. The hills are oriented to NE-SW. Image resolution is 14m/pixel. An enlarged area from a Viking mosaic, orbit F762A (see Fig. 4).

length in image (mm)	width (mm)	true length (m)	true width (m)
12	4	720	180
6	3	360	120
4	2	240	120
9	3	540	180
5	3	300	100
6	2,5	360	144
8	2,5	480	192
7	2,5	420	168
6	2	360	180
7	2,5	420	168
10	3,5	600	240
4	2	240	120

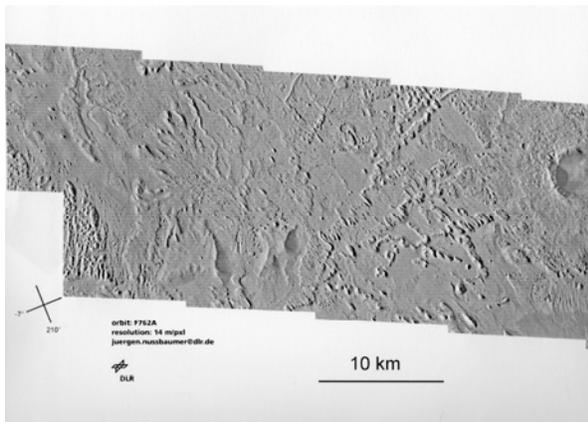
**Fig. 2:** Measured length and width of the elongated deposits.



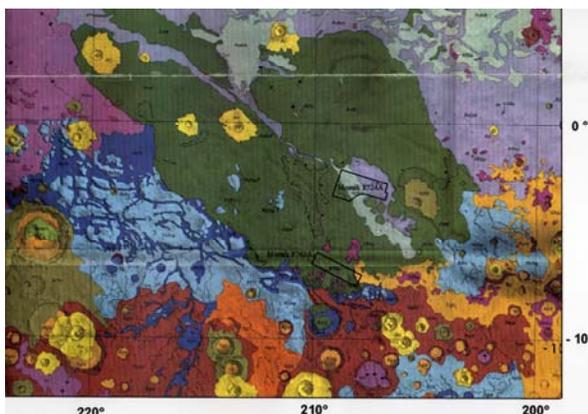
**Fig. 3:** Measured ratio of the values in a chart. The difference between drumlins and streamlined hills (flutings) in Glasgow. Their ratio is set in relation to its longitudinal axis. On the vertical axis the ratio is plotted (length divided by width), on the longitudinal axis is plotted the length of the drumlins. The dashed line is a possible quantitative limit between the two forms. [image modified from 2]



**Fig. 6.** HIRISE Image PSP\_002002\_1735\_RED, Image resolution is 25 cm/pixel.



**Fig. 4:** Viking orbit F762A, 14 m/pixel resolution.



**Fig 5:** Geologic map of the Elysium area [3], Viking orbit F762A is marked by a rectangle and is part of the Medusae Fossae Formation (green colour).

**References:** [1] Nußbaumer J. W. et al. (2003) 6<sup>th</sup> conference on Mars. [2] Rose (1987) Drumlin Symposium. Balkema, Rotterdam [3] Scott, D.H. and Chapman, M. G. (1995) Geologic and topographic maps of the Elysium paleolake basin, Mars. USGS. Misc.. Invest. Ser. Map -2397.I.