

COMPARISON OF ICE BLOCKS ON EARTH, MARS, EUROPA AND GANYMEDE. R. Volent¹, A. Kereszturi^{2,3} (¹Eötvös Loránd University, Dept. of Astronomy, volren@freemail.hu, ²Eötvös Loránd University Dept. of Physical Geography, ³Collegium Budapest, Mars Astrobiology Group).

Introduction: We have analysed resembling areas on planets: breakup of B-15 iceberg in the Ross Sea on Antarctica (Earth), blocks at the southern Elysium basin (5N 150E, Mars[1]), ice rafts at Conamara Chaos [2, 3] (Europa) and a region with dark polygons around 10N -25W on Ganymede [4].

Methods: We used USGS global image maps of Europa, Mars, Ganymede from Planetary Data System, and images of Aqua satellite for Earth. We selected an icy area on Antarctica where ice-floe were found, and searched for resembling structures on the surface of other planetary bodies. These areas were 70×100 km for Earth, Mars, Europa (fig. 1.), and 500×650 km for Earth and Ganymede (because of 4 km/pixel resolution for Ganymede). We measured the smallest and the largest diameters of blocks and determined its surface area and the ratio of axes.

Summary: The size distribution of blocks shows similarity between Earth, Mars and Europa. The average diameter of 90 % of the blocks is less than 6 km, but larger than 160 km for Ganymede. We couldn't find such large blocks on Earth, Mars or Europa, as on Ganymede The Earth's size distribution graph shows two maximums about at 2,5 km and 3,75 km possible because of the changing environmental conditions, but at the other three planets there is one maximum value: 2 km for Mars, 2,25 km for Europa and 55 km for Ganymede.

We investigated the shape of blocks and ratio of their axes. We got nearly similar values for Earth (1.65), Mars (2.01) and Europa (1.71), but substantially different for Ganymede (3.49). The ice blocks are rounded, their shape is roughly close to circular. The ratio of elongation of blocks on Mars and Europa is somewhat larger, between 1-3.5 for Mars and Europa. This ratio is even larger for Ganymede, around twice of the upper mentioned.

We measured the area of the blocks from their average diameter. Their distribution is visible in Fig. 3. The drifted ice blocks on Earth show the same distribution as on Mars, suggesting they seem to be ice blocks too, from the point of view of this analysis. As a next step we are analyzing lavaflow-related blocks on Mars to find possible differences.

References: [1] Murray, J. B. and Muller, J. (2005) *Nature* 434, 352-356. [2] Greenberg, R. V. Hoppa, G. (1998) *Icarus* 141, [3] Belton, M. J. Chapman, C. R. (1998) *Nature* 391, [4] Pappalardo, R. T. Head, J.W. (1998) *Icarus* 135.

Exampe images of the analysis:

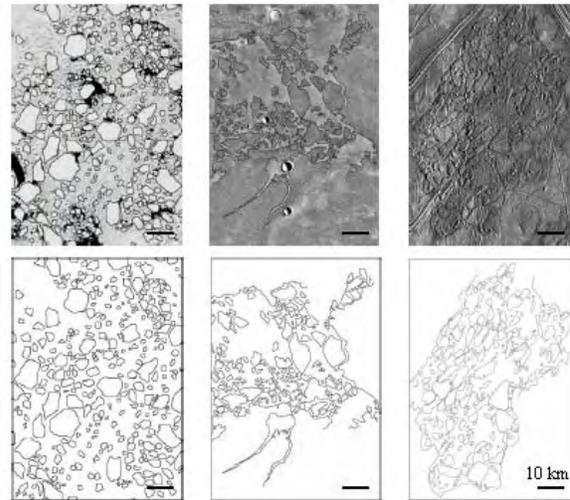


Fig. 1. Images (top) and graphical interpretation (bottom) of areas on Earth (left), Mars (center) Europa (right)

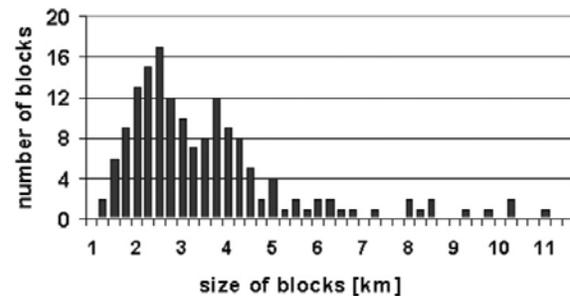


Fig. 2. Size distribution of blocks for the Earth

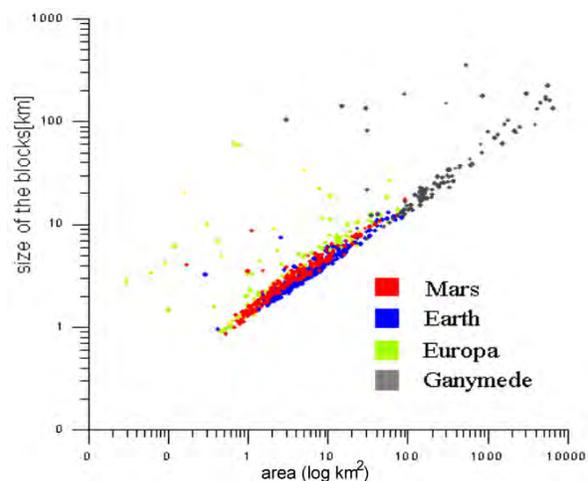


Fig. 3. Area of blocks on the planetary bodies