



Study of Geometric Parameters of Slope Streaks on Mars.

Eugene Brusnikin (1), Mikhail Kreslavsky (1,2), Irina Karachevtseva (1), Anatoliy Zubarev (1), and Vyacheslav Patratiy (1)

(1) Moscow State University of Geodesy and Cartography (MIIGAiK), MIIGAiK Extraterrestrial Laboratory (MExLab), Russian Federation (brusnikin@yahoo.com) , (2) University of California - Santa Cruz, Santa Cruz, CA, USA (mkreslav@ucsc.edu)

Slope streaks are a unique active phenomenon observed in low-latitude dusty regions on Mars. They are dark markings formed by an unknown type of run-away downslope propagation of surface disturbance. There are two kinds of hypotheses of their formation mechanism: "dry", involving granular flow, in particular, dust avalanche, and "wet", involving liquid flow, in particular, percolation of concentrated brines in shallow subsurface (1). Study of geometric characteristics of the slope streaks, especially their slopes, is a way to decipher their origin. We are carrying out an extensive set of measurements of geometric parameters of the slope streaks. We use stereo pairs of images obtained by High Resolution Imaging Science Experiment (HiRISE) onboard MRO orbital mission to Mars. These stereo pairs potentially allow geometric measurements (both horizontal and vertical) with accuracy on an order of a meter. Unfortunately, the digital terrain model is currently released for only one stereo pair in the regions of slope streak occurrence, and we have to work with raw, unprocessed stereo pairs. We perform direct photogrammetric measurements using PHOTOMOD software complex (<http://www.racurs.ru/>). We use our custom software to import "raw" HiRISE images (EDRs) and supplementary geometric information from SPICE into PHOTOMOD (2). We select tens to a hundred meters long segments in the beginning and the end of selected streaks and register length, azimuth, and slope of each segment. We also search for anomalously gentle parts of streaks. We analyze the obtained results by means of ESRI ArcGIS software. Our survey is in progress. So far we registered over a hundred of streaks. We found that the extent of the streaks varies from several meters to hundreds of meters. The streaks are formed in locales with a slope from 17 to 37 degrees. The lower boundary indicates that the streaks can propagate on slopes that are significantly gentler than the static angle of repose. Distal (downslope) termini of the streaks often are in rather flat sites. So far we have not found any convincing example of a streak propagating uphill. This is consistent with earlier conclusions that the streaks do not have appreciable inertia. We will continue our survey. With more data we will correlate streak formation and their slopes with slope orientation, latitude, etc. This work was carried out in MIIGAiK and supported by Russian Science Foundation, project 14-22-00197.

References:

1. Kreslavsky A.M. and J. W. Head, Slope streaks on Mars: A new "wet" mechanism, *Icarus* 201, 517-527 (2009).
2. Zubarev A., Nadezhkina I. Alignment-Calibration and Processing of HiRISE CCD Data // ISPRS Meeting of the Working Group IV/8 "Advances in Planetary Mapping and Spatial Databases", Moscow, Russia, October 09-12, 2013