GLOBAL PHOBOS GEODATABASE AND GIS ANALYSES. I. Karachevtseva[1], J. Oberst[1,2,3], K. Shingareva[1], A. Konopikhin[1], I. Nadejdina[1], A. Zubarev[1], K. Willner[2], N. Mut[2], M. Wählisch[3]. [1]Moscow State University of Geodesy and Cartography (MIIGAiK), Gorokhovskiy per., 4, 105064, Moscow, Russia; [2]Technical University of Berlin, Berlin, Germany; [3]German Aerospace Center (DLR), Berlin, Germany.

Introduction: We have developed a comprehensive geographic information system (GIS) for Phobos. Our GIS includes orthorectified images and a previously compiled DEM with spatial resolutions of 100 m/pxl [1, 2] as well as various thematic data sets.

Method: The underlying image data for our Phobos Geodatabase are orthoimages derived from Mars Expressed and Viking Orbiter with resolutions from 4-30m/pxl to 30-80 m/pxl. Using the instrument CraterTools for ArcGIS [3] we have carried out semi-automatic digitizing of craters for development of a global Phobos Crater Catalog.

GIS-analyses of Phobos surface: In total, about 5000 craters were digitized. The catalog contains their diameters and depths as well as the ratio of depth/diameter (for craters with diameter more than 300 m). Using these information we calculate size-frequency distribution and spatial density of craters [4]. The global distribution of craters shows (Fig. 1) that identified craters are concentrated in the Sub-Mars region, where highest-resolution images are available, while numbers of crater are small on the Trailing hemisphere and in the Polar regions. In addition to the orthoimages, DEM and craters, our Phobos Geodatabase consists of several more vector and raster layers, such as grooves, slopes, topographic roughness. These data had been planned for mapping of the landing sites of the Phobos-Grunt mission [5].

Conclusions and Future Work: Geostatistical analysis of Phobos' surface have been made using automatic GIS functions. Although the available data are varying in resolution and are not optimal to derive a consistent measurement across the all areas of Phobos, and the GIS reveals that some areas on Phobos remain poorly studied, we decided to globally assess the population of craters. In contrast to previous crater studies on Phobos [6] even small-scale features are clearly visible in the high-resolution image obtained by the HRSC on Mars Express. This allows for a more detailed mapping and analysis.

Our further activities are to include Phobos grooves and boulders in the GIS for various statistical analyses. Also, we anticipate to include color images, obtained by co-matching of the Mars Express images. Currently, a new Phobos control point network [7] is being developed, which may warrant updates of the current Phobos shape and map models.

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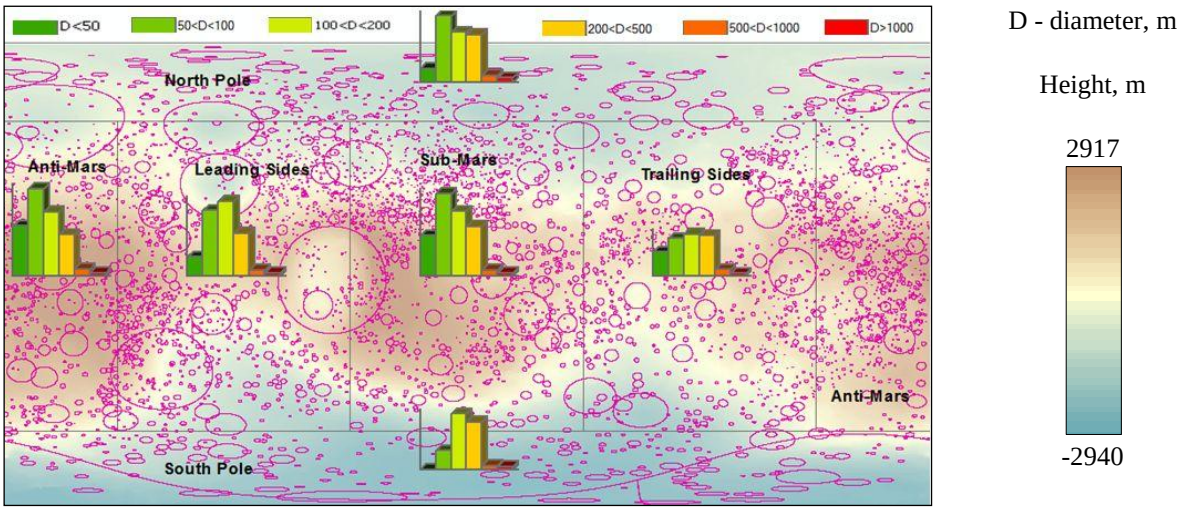

Fig. 1. Global crater population of Phobos (Simple Cylindrical projection, background – color coded DEM). Numbers in histograms are normalized to the corresponding area.