TRIAXIAL ELLIPSOID AS A REFERENCE-SURFACE ON MARS MAPPING.

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At the development of a mathematical basis of cartographic products the problems of selection of a reference-surface system, system of coordinates, and also selection and elaboration of cartographic projections are decided. The selection of a reference-surface, as a rule, is connected to use of some idealized (model) surface. At large-scale mapping of the very small areas for these purposes the plane approaches. However at increase of territories and application of middle, and especially of small scales, in which the celestial body is mapped as a whole, until recently it was considered sufficient to use a sphere of a given radius. Thus supposed, that the center of a reference-surface coincides center of mass of a planet or satellite, and polar axis coincides with rotation axis. For a long time during pre-space and transient periods of celestial bodies mapping the sphere remained practically unique model surface. With appearance of the new data updating the form and the sizes of the Solar system bodies other regular reference-surfaces came to use. First of all, a rotation ellipsoid having small polar compression (parameters of this ellipsoid were R polar = 3 376.3 km, R equatorial = 3 393.4 km) have applied to Mars. Then for the first time a triaxial ellipsoid was tested for Phobos. Last time some elements of mathematical base for irregular surfaces maximum approximated to an actual physical surface of the celestial bodies are developed.

The strengthening of activity in researches of Mars gives the basis to suppose, that the flights to Mars will be regularly implement during nearest 10-15 years. In an outcome the large volume of information, both for researches generally, and for mapping of a planet, in particular, will be obtained. In this connection there is a problem on expediency for Mars at its mapping of transition from a rotation ellipsoid to a triaxial ellipsoid as a reference-surface. For the use of a triaxial ellipsoid, it is necessary to determine appropriate coordinate systems and to work out the theory and concrete formulae of projections for representation of a surface, to conduct calculation of their rectangular coordinates and characteristics, and also to analyze the calculated values, scales and distortions of an obtained projection. For the first time such development were made for the Moon (Bugaevsky, 1971). Then in full volume and at any polar and equatorial compression all these steps were made by development of an equiangular cylindrical and azimuthal projections of a triaxial ellipsoid for Phobos [1]. The creation of Phobos map and Phobos globe [2,3] was an outcome of this activity. Thus, some ways of determination of isometric coordinates of a surface of a triaxial ellipsoid are known, there are separate publications about separate projections of a triaxial ellipsoid and rules of the theory of distortions (disregarding of particular coordinate systems of considered surfaces). Recently it was offered the general theory of cartographic projections of regular surfaces including the generalized theory of cartographic projections of any regular surfaces, in which the projections of an ellipsoid of revolution and a sphere are determined as particular cases of the theory [4]. The special attention in the theory should be given to consideration of such problems as the determination of isometric coordinates of regular surfaces, representation of infinitesimal trapezium of a triaxial ellipsoid on a plane, determination of partial scales of lengths and areas for projection, basic rules of the theory of distortions and conditions of representation of a surface of a triaxial ellipsoid on a plane and on a sphere, and also the theory of classes of projections in which the main formulae are given. We think expedient to take into account existing development connected to direct application of the theory of cartographic projections of regular surfaces, at scheduling on mapping of Mars.

[1] Bugaevsky L.M. (1987), *Izv.Vuzov, series Geod.and Cart.* 4, 79-90. [2] Bugaevsky L.M. and Shingareva K.B. (1991), *Geod i Kart*. 5, 41-43. [3] Shingareva K.B. at all (1992), M., *MIIGAiK*, 280. [4] Bugaevsky L.M. (1999), M. *“Zlatoust”,* 144.