

DEVELOPMENT OF A GIS-ORIENTED INFORMATION SYSTEM FOR
GEOSCIENTIFIC ANALYSES AND PLANETARY MAPPING

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Conceptual approaches of Geographic Information Systems (GIS) and data model for mapping of Solar System bodies have been developed by researchers of the Laboratory for Planetary Cartography at the Moscow State University of Geodesy and Cartography (MIIGAiK), who have been involved in GIS-oriented planetary mapping since 2003. At the beginning, data structures were developed to build a GIS-version of the "Atlas of the Terrestrial Planets and their Moons". In this Atlas for the first time maps of celestial bodies were represented in the comparative-planetological aspect. All planet and their moons (small bodies) are represented by the same set of characteristics (geology features, geophysical properties, etc.) in small scales series maps. Digitizing and processing of the Atlas data were carried out within educational programs by University students. During this process students received experience of working with different GIS software packages.

Since 2010 this work is being continued within the MIIGAiK Complex Laboratory Investigation Of Extraterrestrial Territories, funded by the Ministry of Education of the Russian Federation. Planetary mapping is being carried out within the commercial ArcGIS software (ESRI), which provides opportunities both for geoscientific analyses and for a high level cartographic representation. Basic data for mapping are processed by all project participants and the ArcGIS Server will be used for data management.

The main goal of our work is to develop GIS-oriented information system for planetary mapping and easy integration of data from many sources including DLR,

USGS, PDS, and Russian Academy of Science. The mapping targets deal with small bodies of the Solar system, such as Phobos (landing sites, spectral and crater analyses) as well as large planetary satellites, the Moon (traverse of Lunokhod-1 and slope analyses) and Io (geomorphology analyses). These works are currently being conducted by students using data at various scales, such as the global ortomosaic image, digital terrain model (DTM), derivatives products (slopes, shaded relief) and high-resolution images (LRO NAC, Mars Express HRSC and SRC).

GIS-oriented information system will include a number of geodatabases (for example Phobos geodatabase or Lunokhod-1 geodatabase). Geodatabase is provided integration and management data within single system for performing spatial analyses making use of different types of data (orthoimages, DTM, vector shapefile, planetary nomenclature in English and Russian form).

In the future, our project will focus on new planetary missions and exploration tasks, such Phobos-Grunt, Luna-Glob and Luna-Resource:

- Data modeling and spatial database structure development;
- New mapping and updating of present data;
- GIS-based information system development;
- WEB-access and planetary data visualization.