

# INTERNATIONAL PLANETARY CARTOGRAPHY DATABASE

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## Abstract

Planetary maps and globes are made in several countries in several languages, but for the general public mostly American products are known. Our database has the goal to collect all kinds of planetary maps made outside the USA, or in languages other than English; or made by international institutions, like IAU or UN.

## Introduction

The International Planetary Cartography Database (IPCD) (Fig. 1.) is a collection of recent and historic planetary maps and globes, classified by celestial body and language / alphabet used. The IPCD is maintained by the Commission on Planetary Cartography of the International Cartographic Association and the Cosmic Materials Space Research Group of the Eötvös Loránd University, Budapest.

The database includes planetary maps published in a wide diversity of languages, alphabets, subjects and visual styles.

**Nomenclature.** American and European planetary maps follow the international forms of place names as approved by IAU: Latin language and Roman alphabet. Place names of the nomenclature are transcribed/transliterated in the cases when the language of origin uses an alphabet other than Latin. Romanization follows the rules designed for anglophones, which became an international standard but not always suitable for non anglophones. Planetary maps made in a language other than English may use its own rules for Romanization more suitable for the particular language than the international standard. Languages using an alphabet other than Roman, must use some form of transformation: it may be phonetic (transcription), based on letter to letter transformation (transliteration) or may be based on the meaning of the words (translation). IAU does not give any recommendation on how to use place names in languages other than English.

**Visualization.** Planetary maps have also a wide variety of visualization methods. Maps made by USGS or NASA have their own sets of standards: maps made by other institutions has other standards, cartographic traditions, thus may emphasize other phenomena than maps made by USGS. It is therefore useful for both the general public and cartographers to know other schools, techniques, traditions and ideas of planetary cartography than only the mainstream American one.

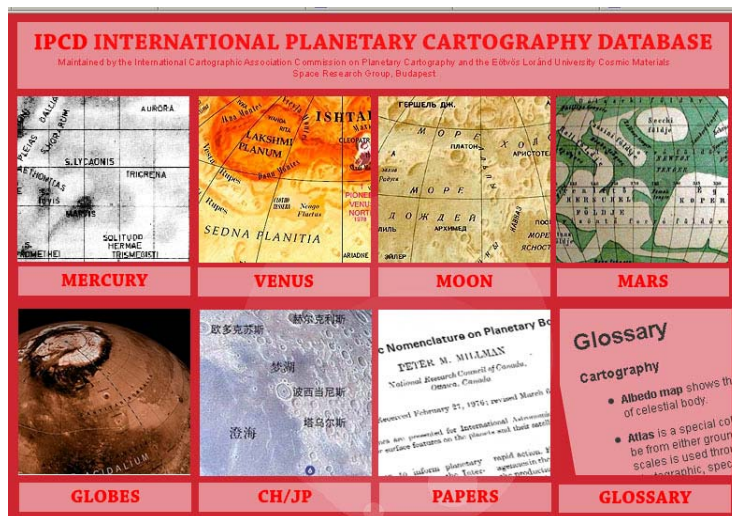


Figure 1. Home page of the IPCD (<http://planetologia.elte.hu/ipcd/>)

## Objectives

The database serves as a resource for planetary cartographers, where one can compare nomenclature, terminology, visualization techniques, and also a resource the general public, where they can find planetary maps made in their preferred language. One of the goals is to provide these maps as educational materials for university courses and projects (Kereszturi and Horvai 2009; Bérczi et al. 2006). Our goal is also to draw the attention (and made accessible) planetary maps that are not present in the mainstream (English) popular planetary science literature because they are unknown for the American public.

Since it is a general rule that in small countries popular planetary science literature is translated from English and their images are taken from American or British publication, an increasing level from online resources, instead of using locally made maps as illustrations, the authors use maps available in the aforementioned publications. This is not because of their quality but because of their accessibility.

Our objective is to make these non-mainstream US maps available, or, draw the attention to their existence. It is true, however, that most of the maps are made for the public and not for the professionals in astrogeology. American (USGS/NASA) made maps has an online database (USGS 2008). However, a large number of older maps - which are important for their historic value - are not available in digital format in this database.

Maps collected may also help the creation of new products by national cartographer institutions, private publishing companies, electronic or printed media, textbook publishers etc.

The Database functions as a virtual catalogue and library of planetary maps.

The database is made available through the internet, at <http://planetologia.elte.hu/ipcd> (Fig 2.).

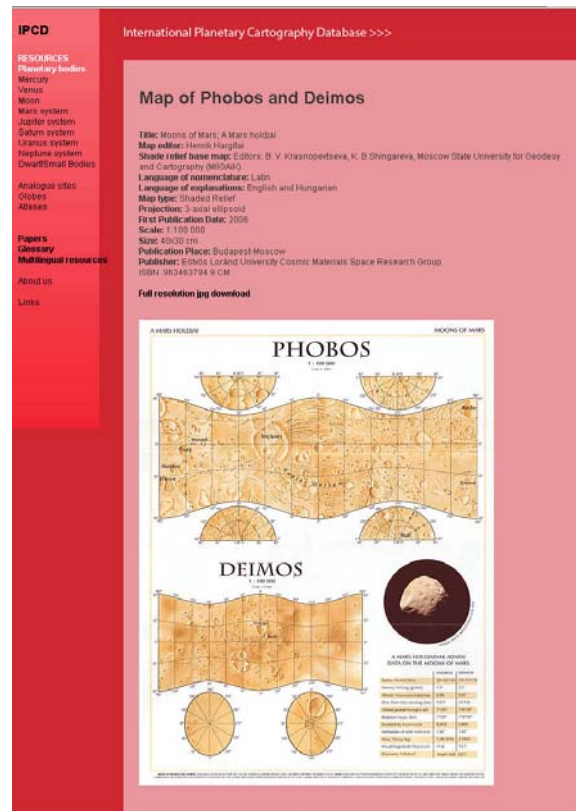


Figure 2. Sample page from the IPCD (<http://planetologia.elte.hu/ipcd/>)

## Methodology

Printed and electronic planetary maps and planetary globes are being collected from several sources: commercial resources, conference publications, professional papers and public outreach publications, including posters.

The collection includes maps

- published in any languages
- historic drawings, maps and globes
- recent maps and globes
- national variants, new editions of an international map

- sheet maps
- global maps, including sketch maps
- maps made in Roman, Cyrillic, Japanese, Chinese alphabets
- maps of planetary test sites (analogue stations)
- maps of human and automatic landing sites
- maps published by IAU
- but excludes maps made by USGS/NASA/ESA

The data for maps include

- image of the map (scanned or photographed)
- map editors / cartographers
- source (publication/Publisher)
- date of publication
- language of nomenclature
- language of other data on map
- size
- other data (description etc.)

Selected maps are scanned at high resolution (300 dpi), others are photographed. Where copyright permits, full resolution (preferably pdf) images are made available.

Associative search methods of visual electronic databases, like the one of Youtube let their users to find visual content regardless to their language or alphabet. One of the goals of this work is to create a planetary map database where search is easy regardless of the languages and alphabets used.

## **Results**

### **Maps in the database**

The database contains several maps that are not available in electronic format and are out of print. Several planetary maps and globes produced in the Soviet Union in the 1960s-1980s are now included in the database in high resolution format, scanned from originals in Moscow, from the collection of the Planetary Cartography Laboratory of MIIGAiK. One such example is the first complete map of the far side of the Moon made in 1967 that have used Luna-3 (1959) and Zond-3 (1965) images.

The database includes several maps which were never printed and are only available in digital format, like some of the maps in the Central and East European editions of the series "Multilingual Maps of Terrestrial Planets and the Moon" coordinated by the Commission on Planetary Cartography of the International Cartographic Association (ICA) (Shingareva et al 2005).

Some thematic maps have only been published as illustrations to scientific papers. The database also includes such maps. An example is the thematic map of the “hydrology” of Mars, using Hungarian nomenclature (Sik et al. 2005).

### **Globes in the database**

Globes in the database are photographed but where the original prints are available, they are scanned and the original globe is re-created as virtual globe in VRML virtual reality (Gede 2009a, 2009b). These globes are made in cooperation with the Virtual Globes Museum maintained by the Department of Cartography and Geoinformatics of Eötvös Loránd University.

One such globe is the 1:10 000 000 globe of the Moon made in the 1980s by GAISH Sternberg Institute, Moscow, Russia, using terrestrial, Luna-3 and Zond-3 imagery; colored shading was made by painter-cartographer V.V. Solokolov (Rodionova 1991). (Fig. 3a,3b)



Figure 3a and 3b. Russian Globe of the Moon with Cyrillic nomenclature as photographed (left) and recreated in the virtual space (VRML) (right) for the Database.

### **Content of the database**

As of July 2009, the database contains images and/or data of the followings:

- Mercury
  - 6 general maps 1934-2005
  - 1 thematic map 1981
- Venus

- 10 general maps 1789-2007
- 1 thematic map 1981
- The Moon
  - 37 general maps 1609-2008
  - 6 thematic maps 1969-2008
  - 5 globes 1967-2009
- Mars
  - 33 general maps 1659-2008
  - 5 thematic maps 1975-2005
  - 6 globes 1884-2009
- Phobos / Deimos
  - 4 general maps 1988-2006

### **Glossary of Terms and Multilingual Dictionary**

The database also includes important papers and documents on planetary mapping and nomenclature issues; a glossary of terms.

It is planned to list major names in various transcriptions and transliterations. Now it offers a multilingual dictionary of descriptor terms in English, Chinese, Japanese Russian and Hungarian.

An example for one entry:

- **Latin name (sing., plur.)** Fossa, fossae
- **English equivalent** Trough
- **Official IAU description** Long, narrow depression
- **Original meaning of the latin word** trough, moat
- **Possible geologic origins** tectonic, aeolic, tectonic-fluvial
- **Chinese term** 溝
- **Japanese term** 凹地
- **Russian term** борозда, борозды
- **Russian explanation** длинная, узкая, неглубокая линейная депрессия
- **Hungarian term** árok, árkok

### **Future plans**

It is planned to include in the IPCD the following datasets:

A multilingual dictionary of geologic terms used in planetology, especially in morphology of planetary surfaces

- Terms in chronostratigraphy (examples: Amazonian, Rusalkian etc)

- Adjectives of planets and moons (example: European)
- Terminology of morphology (examples: ejecta, cryovolcanism, ribbon tessera, runoff channel)
- Terminology of planetary bodies (examples: dwarf planet, asteroid groups, Jovian planets, TNOs, planetesimals)
- Ring terminology
- Phonetic notation of the main place names using the International Phonetic Alphabet
- Special section for informal names: Gazetteer of informal names of planetary surface features with explanation (excluding Landing Site names)
- Gazetteer of Historic Names (17th century Moon / 19th century Mars)
- Planetary nomenclature history section: explanations of selected names
- Descriptions of institutions creating Planetary Cartography products
- Analyses of the maps from a cartographer point of view
- Online planetary mapping course for university students in geosciences.

## Conclusions

Maps and globes made outside the USA, especially in Russia, and Central European countries (Shingareva et al 2005, Hargitai 2006) has been collected and published with their bibliographical data in the electronic database "International Planetary Cartography Database". The creators hope that this way maps otherwise forgotten or unknown will have a publicity and this way the general public will have the access to maps in their preferred language.

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