FULL TERM REPORT OF THE ICA COMMISSON ON PLANETARY CARTOGRAPHY

Our place in the community: Planetary Cartography has several professional organizations worldwide: NASA's Planetary Data Archiving, Restoration, and Tools program, and NASA's planet-specific Data Analysis Programs provides funding and implementation - through USGS - of new geological and thematic planetary mapping of results derived from US space missions. Planetary mapping of results from European missions are implemented by DLR. Aside ICA, another professional organization dealing with planetary cartography is ISPRS WG IV/8 Planetary Mapping and Spatial Databases which provides definition and development of planetary cartography resources for professional cartographers. In this environment, ICA's Commission on Planetary Cartography is focusing on involvement of classical cartographic products that involve no new base research, but are the cartographic representations of planetary surfaces utilizing already published data. Nevertheless, these are higher order products or products of historic importance. The commission also aims at opening the so-called planetary geological and other thematic mapping to non-US citizens.

We would like to note in this report that one of the co-founders of the Commission, also a co-chair at that time, Kira Shingareva passed away in 2013. This is a great loss for the planetary cartographic community. Our achievements are summarized below, following the original items in our terms of reference.

2011-2015

Co-chairs in 2015: Henrik Hargitai Irina P. Karachevtseva

Commission email: planetarymap@gmail.com

Commission website: https://planetcarto.wordpress.com



We have created and published online a brand new series of six planetary bodies in 11 languages, specifically targeting children. https://childrensmaps.wordpress.com/



Papers related to this project:

- Hargitai H and 11 others (2015) Multilingual Narrative Planetary Maps for Children. Lect. Notes Geoinf., Cartography, Claudia Robbi Sluter et al. (Eds): Cartography -Maps Connecting the World.
- Hargitai H and 10 others (2015) Planetary Map Series For Children. 46th Lunar and Planetary Science Conference #2257



Foundation of a new, bi-annual international children's and student's drawing competition, with special focus on planetary cartography This project was not implemented. Instead, we have focused on creating a series of children's maps that can serve as a basemap for future drawing competitions.

Development of a curriculum for geography or physics teachers at high school level, in which they can use planetary cartographic products This project is saved fo the future.



Instead of a textbook, an encyclopedia was developed with thematic entries on planetary landforms, and features.

Book: Hargitai H, Kereszturi A (2015) Encyclopedia of Planetary Landforms. Springer-Verlag New York





naterial underlying Olympia Undae is itself transport on the avalanche slope of the dunes a frozen paleoerg; Byrne and Murray 2002) (Bourke et al. 2010 and references therein).

Most sand dunes are dark, interpreted to be cover 12-18 million km2 (15-20 % of the sur

Participation in Specialized Planetary Cartography GIS projects One of this project is the development of **Phobos GIS** at MIIGAiK's MexLab. http://cartsrv.mexlab.ru/geoportal/

An important addition deals with the **ontology and symbology** of planetary cartography. This project is carried out in Germany. Paper: Stephan van Gasselt, Andrea Naß (2013) Planetary Geologic Mapping: Initial Thoughts on an Ontology Framework. 26th International Cartographic Conference, Dresden.

We have developed a **planetary geovisual application** (Figure) that helps in estimating distances and areas on planetary surfaces by comparing them to terrestrial country and state outlines;

Paper: Country Movers – an Extraterrestrial Geographical Application. Cartography Beyond the Ordinary World Symposium, Niteroi, 21-22 August 2015.

http://mercator.elte.hu/~saman/planetary/mycountryonmoon/

On another pathway, we have started to explore the opportunities of *ArcGIS* planetary mapping projects, but no project was completed. The GIS projects underway are extracting spatial data from professional publications and make them publicly available through our website, in ArcGIS-ready format.



Dune System, Fig. 3 The Meshkenet dune field with wind streaks, at 67°N, 90°E on Venus. Wind streaks are largest sand sea is the North (circum-) Polar sand riented perpendicular to the danes. Magellan left-look geologic unit. The type locality is the Olympia Undae erg in Olympia Planum (where the



bottom of the image are covered by frost and have brigh 78"N, 210"E, CTX D01_027461_2579; (b) wind frost on their slip face. Dark dates are defrosted. Scale treaks and fields of barchan and linear dunes at 75*N bars 2 km, CTX: B21_017961_2548 (NASA/JPL/MSS

free of a dust coating, which is bright (Thomas face) (Lorenz et al. 2009). The dunes on Titan are 1984), (Note: TARs are bright.) Outside the cir- 1-2 km wide, up to hundreds of kilometers long cumpolar regions, much of the sand is concen- and are proposed to be longitudinal dune trated in topographic lows (Laity and Bridges, (Lorenz et al. 2006) (straight > linear dune) 2009); in troughs, valleys, and - about 70 % of Dunes are only observed at equatorial latitude: the non-circumpolar dune fields – on impact cra- $(\pm 30^{\circ})$ (Fig. 6). ter floors. Only ~4 % of the dune fields are located between 40°S and 70°N (Haywar et al. 2013). On the southern hemisphere of Mars, dunes are stabilized poleward of 60° latitude, which corresponds to the region where the near-surface ground ice makes sediment supply polar ergs contain most northern dune fields onmobile (Fenton and Hayward 2010). Polar (Cutts et al. 1976), while most dune fields in the dunes on Mars are covered by a seasonal frost south are located in topographic depressions; cr layer for up to 2/3 of the Martian year (Fig. 4b), ters, troughs, and valleys. Greeley and Iverse during which time sand cannot be transported. (1985) characterized the discovery of the north Polar dunes are typically the first surfaces to be circumpolar sand sea "one of the most impressicovered by frost in the autumn (Malin and Edgett discoveries of the Mariner 9 and Viking mis-2000), Water ice from frost/snow stabilizes the sions." (See also " > aeolian sand deposits." polar dunes, resulting from permafrost conditions within tens of centimeters of the surface (Bristov et al. 2010b) (> Niveo-Aeolian Deposits) Defrosting processes, however, enhance sand



Online resources - Creation of a new, updated website for the commission with various resources for the planetary cartographer community worldwide, including the International Planetary Cartography Database which is a documentation, bibliography and analysis of the international planetary cartography products

We created and maintain and update the following websites:

The International Planetary Cartography Database - http://planetologia.elte.hu/ipcd/ Commission website: https://planetcarto.wordpress.com/

Commission Facebook page:

https://www.facebook.com/pages/ICA-Commission-on-Planetary-Cartography/1434 98362419996?ref=hl



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Planetary Nomenclature / Gazetteer supplements

We have co-authored a paper on **Chinese and Russian planetary gazetteer** development that can serve as type examples for future gazetteers.

Paper: Henrik Hargitai, Chunlai Li, Zhoubin Zhang, Wei Zuo, Lingli Mu, Han Li, Kira B. Shingareva and Vladislav Vladimirovich Shevchenko (2014) Chinese and Russian Language Equivalents of the IAU Gazetteer of Planetary Nomenclature: an Overview of Planetary Toponym Localization Methods.The Cartographic Journal. DOI: 10.1179/1743277413Y.000000051 Historic toponym research and database-building is conducted by Thomas Gangale and Marilyn Dudley-Flores. Paper: Thomas Gangale and Marilyn Dudley-Flores (2013) Proposed Additions to the Cartographic Database of Mars. 26th International Cartographic Conference, Dresden. We have developed a **nomenclature database frame** for future use http://emc.elte.hu/~hargitai/planetary_gazetteer/database/





Only informal contacts have been made as the commission moved to different pathways as these organizations.

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