

PLANETOLOGY GROUP'S EDUCATIONAL OUTREACH RESULTS AT EÖTVÖS UNIVERSITY, HUNGARY. H. Hargitai¹, A. Kereszturi¹, A. Sik¹, T. Varga², L. Szabó Soki³, G. Maros Sz³, Bérczi⁴. ¹Eötvös University, Faculty of Science, Department of Physical Geography, Planetology Group, H-1117 Budapest, Pázmány P. sétány. 1/a. Hungary, ²Aries Plus Kft. H-1111 Budapest, Bertalan L. u. 20. Hungary, ³Eötvös University, Faculty of Science, Dept. Educational Technology, H-1117 Budapest, Pázmány Péter sétány. 1/a. Hungary, ⁴Eötvös University, Faculty of Science, Dept. G. Physics, Cosmic Materials Space Research Group, H-1117 Budapest, Pázmány Péter sétány. 1/a. Hungary. (hargitai@emc.elte.hu, krub@freemail.hu, sikandras@ludens.elte.hu)

Introduction: We formed a Planetology Group on Eötvös University to study planetary surface geomorphology and cartography. We prepared and distributed various educational outreach units: 1) Online hypermedia package, 2) Atlas of Planetary Bodies in our "Little Atlas of the Solar System" series [1], and 3) Lecture note series video film and CD on Petrologic Studies of Solar System Materials which are related to surface rocks. We report these packages and a planetary cartographic work we began.

A web-based hypermedia package: We have prepared an online hypermedia environment for the distant education of planetology in Hungary. Our educational outreach project on our website includes a daily cosmic calendar, a monthly star map, and planetary topographic or photomosaic maps with

nomenclature. On the site we present Hungarian space activity and presence (astronauts, space devices, Hungarian names in the planetary nomenclature). Our new project is based on the idea of American radio programs, but is more planetology oriented than those. It contains short interviews with planetologists about actual events, news or a general planetology topic. The "Audio Atlas of the Solar System" is available on our website <http://planetologia.elte.hu>. We are preparing a daily planetary calendar for local radio stations, since in the last years Astronomy is getting less and less attention by the electronic media. We compiled a monthly cosmic calendar with star map in which we also describe planetary features and processes. Every Astronomy Circle and Secondary School can subscribe this publication for free of charge. Our final goal is to make printed, audio and online, quality (and scientifically correct) materials that reach the Hungarian public - especially the younger generation - on a daily basis.

Planetology lectures: We organized an autumn semester course in 2001 named *General Planetology* at the Eötvös Loránd University of Sciences. In this course we kept lectures from a general point of view dealing with certain processes and spheres of planetary bodies. The lessons went through from the internal structures and heat sources, volcanism and tectonism toward the external factors (atmosphere, hydrosphere, winds, weathering, ice, water etc.) influencing the evolution of planetary bodies. The aim was to combine the most basic elementary knowledge with the up-to-date scientific results. In the 2002 spring semester we organize a *Regional Planetology* course which is the next

step for the students. In these lectures we take the planetary bodies one by one from a comparative point of view. The bodies organized into two evolutionary sequences, one for the icy bodies (from primitive cometary nuclei to Europa) and another for rocky bodies (from primitive asteroids to Earth). Beside the theme of the certain lessons the framework of the two courses is important too because it draws a global evolutionary picture on the planetary bodies in the Solar System.

Small Atlas of the Solar System: The Atlas of Planetary Bodies: In this - free - printed educational material we collected the most important and typical features of our planetary neighbours - one feature for every body. For example the volcanism on Io, the boulders and grooves on Eros and Phobos, or the greenhouse-effect on Planet Venus, etc. We call it Atlas, because the pages are packed with a lot of maps and figures (not only images) so it is a kind of workbook or an "interactive publication". The main parts are: Rocky Planets, Galilean moons and Small Bodies. Certainly the chapters are connected to the lectures of our special collegium at the university.

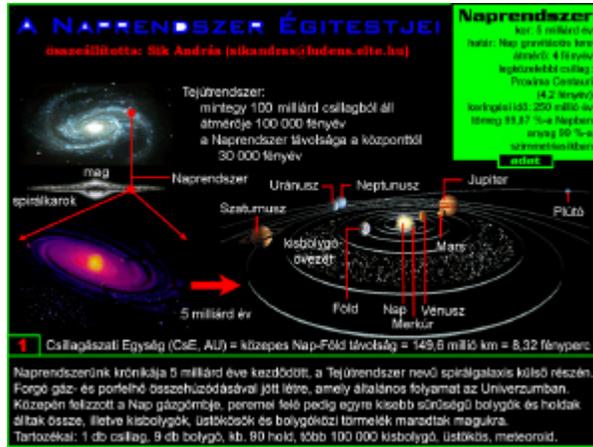


Bodies of the Solar System - Slide Series: Like an assistant or a teaching material we compiled a series of photo slides. (It is an analog way of presentation, but in the schools of Hungary the computer-projector unfortunately not too common yet, so a compact disk is not too practical for this purpose.) The series consist of 20 slides - in a thematic and logical order. First of all our place in the Galaxy and the structure of the Solar System. Then the Sun, the Mercury, Venus, Earth, Moon, two slides for Planet Mars, then the Asteroids, Jupiter, Io, Europa, Ganymedes/Callisto, Saturn, Titan, Uranus, Neptune, Comets/Meteorites and finally one slide about the exoplanets. The layout and style of the slides are "cyber-like" and the screens are divided into different

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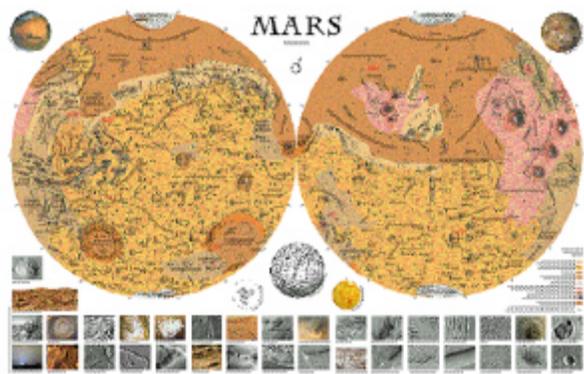
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parts: title, images, data, text and serial number. This way it is easy to "navigate" between them - like in the frames of a web-page (but is not interactive). On the basis of this series a normal geography lesson can be held in a secondary school - 2 minutes for every slide. We hope that lesson will be



exciting and interesting for the students - and some of them will choose this topic for university studies.

Interactive study of Lunar Samples: The first step was to prepare the lecture note series booklet we reported [2] Last year we recorded the videofilm of lectures related to studying NASA Lunar Set. Ten minutes blocks lectures enlighten problems to study, such like a) general lunar stratigraphy, b) lunar terra rocks and formation of anorthosites, c) layers of basalts by their textures. Mirror units in the booklet correspond to one 10 minutes video (or CD) unit of the film, so that students could note the observations in petrologic microscopy into the booklet prepared with textural types drawn. Further units of the film and note booklet explain industrial material science relations parallel to lunar textures. This way materials structures in planetary science and technology products in factories can be learned parallel. This material science activity is also connected to the spin of material products of other fields of space science technologies [complex concepts].



Planetary Cartography: Under support of the Commission on Planetary Cartography of the International

Cartographic Association we have prepared a multilingual map of Mars [3] for use in Central European universities, in Coatian, Czech, Hungarian and Polish languages. The map was prepared in cooperation with the following institutions: Observatory and Planetarium Prague, Zagreb Astronomical Observatory, Jagiellonian University Observatory, Krakow, the Department of Geology of Zagreb University and the Tectonics and Geological Cartography Section of Faculty of Geology of Warsaw University. The Shade relief base map [4] was supported by the Moscow State University for Geodesy and Cartography.

We are also preparing a planetary atlas booklet for university and high school students. This Atlas follows common structure of common School Atlases therefore it can be used more easily by students who are not familiar in planetary sciences.

Language problems. Since our domestic activity is in Hungarian, we need to prepare a Hungarian nomenclature (and scientific dictionary) that is accepted by the scientific community and find the appropriate words for terms like Sulcus or Chasma - or even ejecta - which are often used in planetology but not in geology. Since we make educational materials for elementary and secondary schools, these should not include Latin or English terms, only Hungarians so that the students understand it.

References: [1] Bérczi Sz. Hargitai H., Kereszturi Á., Sik A. (2001): *Kis Atlasz a Naprendszerről (3): Bolygótestek atlasza.* (Little Atlas of the Solar System Series (3): *Atlas of Planetary Bodies*). (In Hungarian) UNICONS-TANT, Püspökladány; [2] Bérczi Sz. (2001): *Kis Atlasz a Naprendszerről (1): Planetáris és anyagtérképek holdközvetekről, meteoritekről.* (Planetary and Material Maps of Lunar Samples and Meteorites.) (In Hungarian) UNICONS-TANT, Püspökladány; [3] Multilingual map of Mars, *in print*. Editors of language sections: Hungarian: H. Hargitai, Czech: A. Růkl, Croatian: D. Roša, Polish: T. Kundera [4] Map of Mars. Cartographers: L. S. Oreshina, L. Yu. Baeva. Editors: B. V. Krasnopevtseva, K. B. Shingareva, Moscow State University for Geodesy and Cartography (MIIGAIK).