LIQUIDS IN THE SOLAR SYSTEM: NEW CONCISE ATLAS IN THE SOLAR SYSTEM SERIES OF TEXTBOOKS AT EÖTVÖS UNIVERSITY, HUNGARY. Bérczi, Sz.[1], Hargitai H.[1], Homolya E. [2], Illés E.[3], Kereszturi Á.[4], Mörtl M.[5], Sik A.[6], Tasnádi P.[2], Weidinger T.[2]. [1]Eötvös University, Institute of Physics, Cosmic Materials Space Research Group, H-1117 Budapest, Pázmány P. s. 1/a. Hungary (bercziszani@ludens.elte.hu). [2]Eötvös University, Faculty of Science, Department of Meteorology, H-1117 Budapest, Pázmány P. s. 1/a. Hungary, [3]Konkoly Observatory, H-1525 Budapest, Pf. 67. Hungary, [4]Collegium Budapest (Institute for Advanced Study), H-1014 Budapest, Szentháromság tér 2. Hungary, [5]Eötvös University, Dept. G. Chemistry, H-1117 Budapest, Pázmány 1/a, Hungary, [6]Eötvös University, Dept. Phys. Geography, Budapest, Pázmány P. 1/c, Hungary.

Introduction: To intensify student's research activities in planetary science we have developed an educational tool, the *Concise Atlas Series of the Solar System* [1-7]. In this abstract we report on the completion of this educational material on comparative planetology. The booklets in the series overview some important subsystems or research methods of the Solar System. The new booklet we have compiled in the Solar System atlas series deals with the liquids of planets and moons. The main chapters are 1) clouds, cloud formationn processes in planetary atmospheres; 2) liquids on the planetary surfaces and below the surface; 3) liquids deep inside planetary bodies and their eruption onto their surfaces.

Discussion: First we give a general overview why liquids are interesting in planetary science, than the list of contens can be red, and finally we present examples of some chapters from the booklet.

It is important that the students have an overview of various phenomena and processes that are related to liquids. Liquids play an essential role in life – a subject of astrobiology – and in the surface shaping processes on solid surface planetary bodies – a subject of planetary geomorphology. Liquids inside planetary bodies are a sign of a geological activity, therefore it may be claimed that liquids are shaping the planetary surfaces from both above the surface (by external forces like evaporation, precipitation and runoff) and below the surface (by internal forces, such as magmatism and volcanism; either in an "asthenosphere" or a "subsurface ocean").

Liquids in the outer core contibute to the support of life on Earth by maintaining the magnetosphere. Geologic life of planets start with their melting, thus creating a spherical shape, and continues by subsequent differentiation and resurfacing; all made possible by liquids.

Liquids may be made of various components depending on local temperature currently and at the formation of the particular body, and may play interchangeable roles from planet to planet (or moon). In some places water (including various brines) plays the same role as silicate elsewhere (cryomagma vs. magma), while on Titan, a water ice / methane-ethane system plays the same role as silicate rock/water system on the Earth.

Several "snowlines" exist in the Solar System (lines of precipitation of metals, silicates, water and other volatiles from the original protoplanetary disk). The p/T maps of individual planetary atmospheric liquid droplets, (in the synthesis part) and "snowflakes" are superimposed in a unified p/T map of the Solar System. This map compares the various precipitaitions occurring in planetary atmospheres and compares all of them with condensations in the early Solar System [8-13]. In other Solar Systems precipitation lines may have different effects on planetary formation. Such precipitation lines are also present from the atmosphere to the very inside of planetary bodies, containing various liquids.

Our Solar System has too few examples for a complete comparative planetologic overview, but including the already discovered exoplanets, a much wider range of liquids and types of "snowings" may be found from ocean planets with steam atmospheres to hot jupiters with silicate clouds and iron rains.

Geologic evolution of planetary bodies may be considered to reach an end when all liquids disappear (solidify) both in the interior and the surface of the planet. In such a geological state life as we know it may not be able to exist any more.

Detailed contents: The detailed content of the atlas is the following:

Clouds, cloud-formationn processes in planetary atmospheres:

1.1. Precipitations in the Solar Nebula.

1.2. Fluids appearing in the planetary atmospheres.

1.3. Summary of cloud processes: "Snowings" in the Solar System.

1.4 Precipitations from clouds outside our Solar System.

Fluids on and below planetary surfaces:

2.1. Continuous fluid bodies on planets

2.2. The liquid systems of Mars

2.3. Other solvent liquids on planets

2.4. The liquid systems of Titan

Liquids inside planetary bodies and their eruption onto the surface:

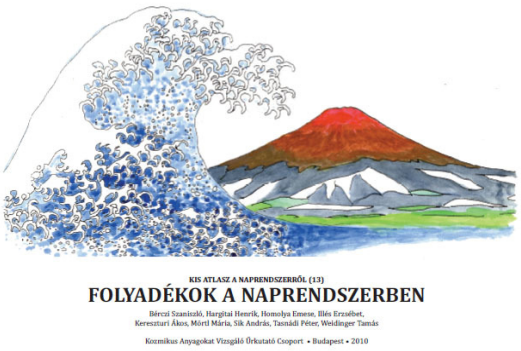
3.0. Fluids inside the Earth

3.1. Comparisons of the silicate lavas and cryolavas

3.2. Sulphur lava, sulphur volcanism

3.3. Cryolavas on the satellites of the giant planets

3.4. Fluids coming out from planetary bodies



The front cover refers to the two main liquid sources on the Earth: water and silicate lava. The main idea is shown in a style of Hokusai, who painted the Great Wave of Kanagawa.

Summary: The 13th booklet in the series Solar System concise atlas series helps to overview the liquids of planets and moons. In the series a synthesis of the new planetary measurements are also emphasized. Direct observation of fluids just began with Phoenix droplets on the leg of the spacecraft [15].

The new member of the series will be useful in constructing new experiments for the Hunveyor-Husar-Hunballon educational robots, too, which are developed in Hungarian Universities and high schools.

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