NEW PLANETARY SCIENCE COURSE AT THE UNIVERSITY OF WESTERN HUNGARY. A. Kereszturi[1,2] K. Pentek[3] ([1]Polaris Observatory of the Hungarian Astronical Assocation, [2]Nagy Karoly Astronomical Foundation, [3]University of Western Hungary, E-mail: kereszturiakos@gmail.com).

Introduction: In the first semester of 2010/2011 a planetary science course was started as part of the general astronomical geography education for first and second year university students at Earth science. Below we give some examples on the methods and visualization materials used in the course.

Methods: During the course using the earlier results from the past years in the education of planetary science [1-5´], we developed further the visualization methods and tools to present various topics in an understandeable way. Below examples are visible for the internal heat sources (Fig. 1.), normal faulting (Fig. 2.), compression formed mountain-belt like structures (Fig. 3.), volcanic cone sizes (Fig. 4.), explosive volcanic activities and their sediments (Fig. 5), plus comparison of volcanic cloud sizes (Fig. 6.).

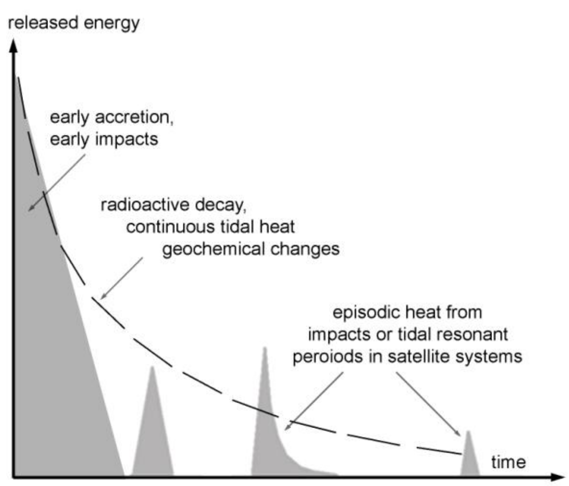

Figure 1. Comparision of temporal charactersitcs of various energy source types of a planetary body

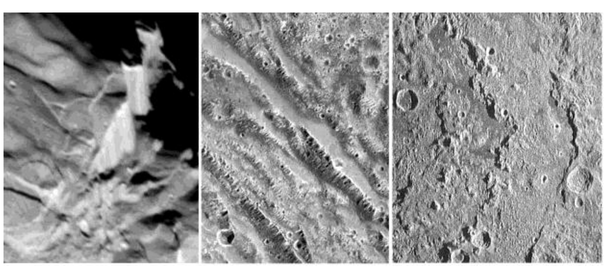

Figure 2. Comparison of normal faults on Miranda (left), on Ganymedes (middle) and on the Moon at the ring of Mare Orientale (right)

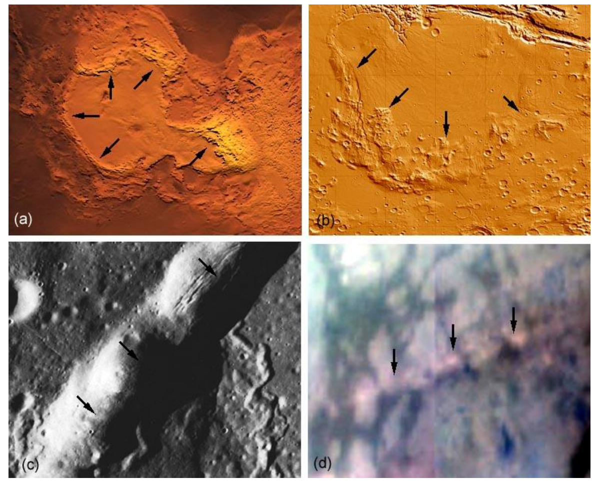

Figure 3. Possible surface manifestations of compression produced thickened and elevated crustal zones on a) Venus, b) Mars, c) Moon, d) Titan.

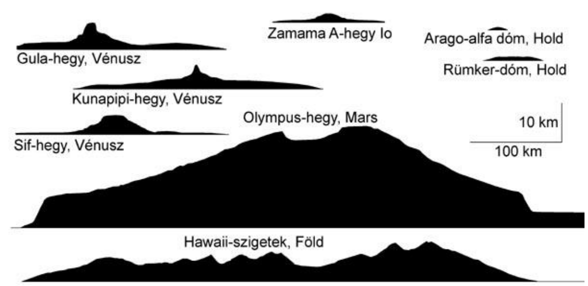

Figure 4. Volcanic cones on Venus, Io, Moon, Mars and Earth to scale with 5x vertical exaggearation

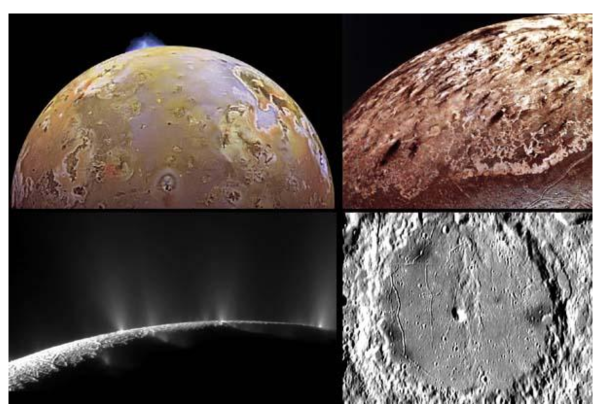

Figure 5.Explosive volcanic activity on Io (top left) on Enceladus (bottom left), pyro(cryo)clastic deposits on Triton (top right) and Moon (bottom roght)

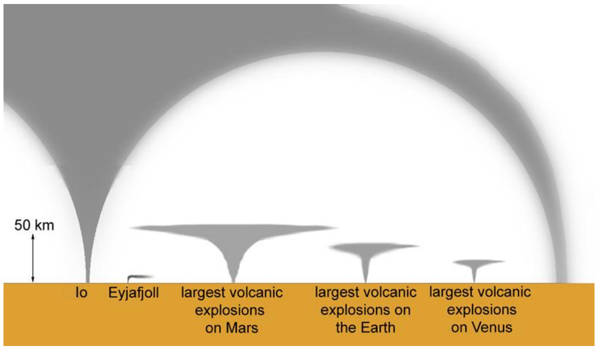

Figure 6. Comparison of hypothertic and observed volcanic cloud sizes on Io, Earth, Venus and Mars

Results: During the course we had the following experiences based on the feedbacks (personal and in written tests) from the students: 1. comparison of scales are useful tool to widen their knowledge, 2. comparison of processes is useful only if the content of the image was previously explained in details (for example the connection between normal faults in Fig. 2. and compression formed mountain-belt like structures in Fig. 3. required detailed explanation on what is visible on the images, 3. the students could easily change in their mind the composition of a liquid on a planetary surface (from water to methane-ethane) that is able to produce erosional valleys.

Future work: we are open to change educational material with foreign universities and other types of cooperations are strongly welcomed.

References: [1] Berczi et al. (1999) *30th LPSC* #1332. [2] Kereszturi, chapter in *Astrobio. Phys. Orig. Biol. Evol. Spatial Distrib.*, ed. Hegedűs and Csonka 2010. Nova Publishers, 131-141. [3] Hargitai, 2006 *Cartographica* 41. 149-167. [4] Hargitai et al. 2007, *Cartographica* 42. 179-187. [5] Berczi et al. *32th LPSC* #1332.

Figure 7. Planertary landform matrix to present the connections between landfrom types (1st row), formation processes (2nd row), parameters that could be inferred from their morphology and morphometry (3rd row) and the planetarry bodies where such landforms are present (4th row)

Landform type	**Formation mechnaism**	**Inferred parameters from morpholmetry**	**Planetary bodies**
central volcanoes	long term one central magmatic source	spatial and temporal stability of magma supply	Venus, Moon, Mars, Io
fissure volcanoes	lava release along fault lines	crust with the necessary hardness and thickness for faulting, and sufficient source of magma	Venus, Mars, Europa, (Ganymedes ?)
lava plains	low viscosity lavas, covering large area	composition and viscosity of lava	Mercury, Venus, Moon, Mars, Io, Europa, Triton
lava channels	lava flow formed narrow elongated depression produced by thermal and mechanical erosion	composition and viscosity of lava	Venus, Moon, Mars, Io
debris from mass movements	changed consistency, stability, overburden mass	change in stability of material and/or mass	Venus, Moon, Mars, Io, Europa, Callisto, Titan
collapse pits	collapse by consistency change, sublimation of subsurface material	subsurface material migration away	Mars, Mercury
dunes	suitable grain sized material, winds	weathering processes, wind directions	Mevus, Mars, Titan
yardangs, erosional scours	wind blown streamlined erosional structures	stability of wind direction, erodibility of bedrock	Mars
flow features and their network	precipitation and surface movement of liquid material, surface runoff	climate, liquid stability	Mars, Titan
banks of staniding liquids	bank erosion and sedimentation (waves, tides, sediment deposition)	mass and stability of liquids, characteristics of sediments	Mars, Titan
glacier valleys	erosion form moving ice masses	mass of water ice, temperature	Mars
poligonal and petterned ground	temperature and volume changes	temperature conditions, available H_2O	Mars (Triton?)
debris slopes	debris accummulation on slopes by various transport processes	effectivity of rock weathering, transport processes	Mars, Titan