EPSC Abstracts,
Vol. 4, EPSC2009-7-1, 2009
European Planetary Science Congress,

Europa and Iapetus: two satellites with comparable dichotomy patterns

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Abstract

The theorem 1 of the comparative wave planetology states: “Celestial bodies are dichotomous” [1-4 & others]. This is an inevitable result of an interference of orthogonal and diagonal standing fundamental waves warping any celestial body. This warping affects all bodies as a result of their movement in non-circular keplerian orbits with changing accelerations. Two satellites – Europa and Iapetus are suitable objects for a demonstration of this universal regular structurization. Both are large satellites of two prominent satellites systems, both have rich in ice surfaces and show “enigmatic” hemispheric color and compositional dichotomy. If for Iapetus it is well known and widely discussed, for Europa this not so often draws attention. Nevertheless, a simple comparison of Figures 1 and 2 shows that there is a comparable patterns of distribution of two different terrains.

The tectonic dichotomy means that two antipodean segments – hemispheres are blocks of different elevations (two phases of the fundamental wave, up + and down -). An existence in one rotating body of two segments – one uplifted and the antipodean subsided – requires building them of materials of different densities for leveling their angular momentum. Thus, on Earth the subsided Pacific basin is filled with dense basaltic rocks and continents of the uplifting continental eastern hemisphere are built of less dense granitic rocks (on average andesitic). On Mars the subsided northern lowlands are filled with dense ferruginous basalts and the uplifted southern highlands are built of less dense lighter rocks (according to “Spirit” rover findings probably with alkaline affinities) and less dense basalts with higher feldspar content and relatively magnesium rich.

The same tendency is observed in tectonics of satellites. The best long known example is the Moon. The visible nearside is a domain of basaltic basins. The bulging farside is built mainly of feldspar-rich lighter rocks and lighter KREEP basalts. Symptomatically, the farside South Pole-Aitken (SPA) basin contains rocks of basaltic affinities but not rich in iron according to remote spectral data. This means that the deepest SPA basin belonging to the uplifted farside was built with mantle derived basic rocks not enriched with iron, thus, less dense than basic rocks of the pressed in nearside.

The best -known two-face satellite from the outer solar system is Iapetus (Fig. 2). A bright icy hemisphere is opposed by a very dark (black) hemisphere (more precisely not ½ but 1/3 of the surface what follows from a wave interference picture [4]) (Fig. 3). The bright water ice crust (2/3 of the surface) is on relatively uplifted segment and the black covered with some organic matter crust (1/3 of the

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surface) is in the Cassini basin. Again, uplifted planetary block – lighter building material, subsided block – denser material that is a necessary demand of the angular momentum regulation rule. It is interesting that the long and high equatorial ridge in the Cassini basin is a natural result (squeezing out) of strong pressing in of the basin floor.

Less impressive but still remarkable is color (and material) differentiation on the Europa surface. On the whole very bright icy it presents however two varieties disposed very likely to the Iapetus' case (Fig. 1). Here two dense varieties are pure water ice and the ice with sulphur (probably sulphuric acid). Only future laser altimeter measurements will show how correspond surface elevations and ice types.

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Fig.1. Europa, PIA00502

Fig.2. Iaputus, PIA07766

Fig. 1 and 2 show dichotomy of Europa and Iapetus: darker and presumably denser halves (more precisely 1/3 what follows from the wave interference theory) are comparable to planetary lowlands of Earth & Mars (Fig. 3).

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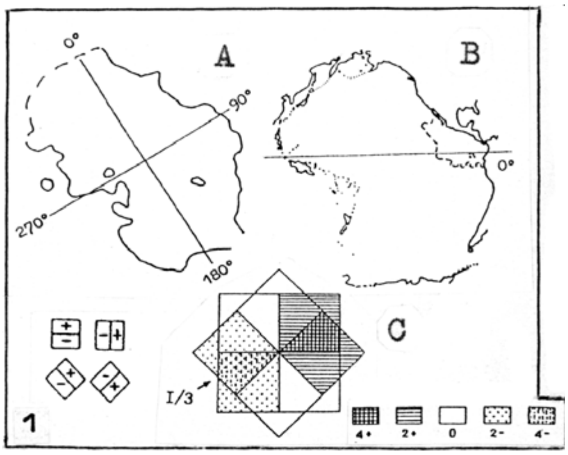

Fig. 3. Tectonic dichotomy formation. Identical formation of Mars' and Earth's tectonic dichotomy: a model of wave interference. **A**-Vastitas Borealis of Mars. Crustal thickness inside the contour is less than 50 km [5] (as viewed from inside the globe what makes the contour mirrored). **B**- Pacific basin. **C**- Flat geometric model of wave interference (4 wave directions). One needs mentally to wrap up it around the globe.