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Mars: destructive and constructive processes in its crust reflecting tendencies of leveling angular momenta of tropics and extra-tropics

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A globular shape of rotating celestial bodies means that their tropical and extra-tropical belts have significantly different angular momenta. But such unevenness in a single body is disturbing because it increases level of tectonic stresses and energetic state what is against natural trends for minimizing these characteristics. To level partly this inequality bodies tend to diminish radius and mass in tropics and increase them in extra-tropics. Traces of these destructive and constructive actions are fixed in planetary geospheres of different classes of celestial bodies: Sun, planets, satellites, and asteroids. The remote geologic mapping of Mars reveals these traces rather obviously. “Mysterious” contact zone of the martian lowlands and highlands with obvious traces of destruction expressed in widespread development of chaotic and fretted terrains is a good evidence that could be considered in comparison with the equatorial and tropical belts of some other planetary bodies [1]. At Earth the wide planetary long tropical zone is marked by its destruction. It is demonstrated by development of numerous islands of the Archipelago between the South-East Asia and Australia. In Africa and South America huge depressions of the Congo and Amazon Rivers develops where the Archean crust is subsided to depths of more than 2 km. In the Pacific along the equator numerous islands of Micronesia occur. Subsidence of the basaltic oceanic crust is followed by an intensive folding and faulting of basalt and sedimentary layers as a larger mass must be held by a smaller space (a planetary radius is diminished). Seismicity of the tropical zone is significantly higher than outside of it that means more intensive destruction in the crust and the upper mantle of tropics. Mantle derived diamonds are more nitrogen rich (thus, heavier) in extra-tropical zones than in Africa where even unique diamonds with boron (it makes the carbon crystal less dense). Changes in the atmosphere follow the same trend. Its heavier components like carbon dioxide, methane, and ozone are less abundant in tropics and enrich the higher and lower latitudes. The oceanic level at the higher latitudes is 2 to 2.5 meters higher than at the equator that is usually explained by varying water temperature and salinity. In the anthroposphere the observed geospheric trend is visible very clearly. People with small mass and stature develop in the equatorial (in a wide sense) region of Earth. Not depending on a main morphological type (great race or geographical branch) people of this belt is significantly smaller in mass and stature than their counterparts of more northern and southern latitudes). This observation is supported by the dendrosphere where the mean timber density in the equatorial regions is somewhat less than in the extra-equatorial regions of tropics: for folia trees 693 kg/m3 against 757 kg/m3 [2].
On Iapetus the wide equatorial zone of the bright trailing hemisphere is distinguished by relatively numerous craters with darkened floors.
The Sun’s photosphere is “perforated” by darker colder spots deep up to 300 (maybe more?) km – famous solar spots long to 200000 km and smaller pores. In the chromosphere there is a remarkable loss of “heavy” Ca ion from this region (compare with a loss of methane from the equatorial region of Saturn)[3].
Though Mars’ geospheres are studied not so fully as the Earth’s ones, its surface mapping allowed to show that a special kind of craters – so called pedestal craters – are broadly developed polarward of 40° N and S latitudes [4,

5]. Usually they are considered as impact craters but more correctly they should be assigned to normal volcanic features expulsing volatile-rich silicate material (a kind of mud, thus “mud volcanoes’). Usually they are less than 10 km in diameter, morphologically fresh and surrounded by wide pedestals several times wider than crater bowls (what is one of indicators against an impact origin). Normally they occur on Amazonian and Hesperian formations. An intensive volcanism through pedestal craters in extra-tropic belts should be compared with intensive plume-driven basaltic terrestrial volcanism also in extra-tropics – both are constructive events. References: [1] Kochemasov G.G. Destruction of the martian tropical belt as means of the angular momentum equilibration between the tropical and extra-tropical regions // Geophys. Res. Abstr., V. 10, 2008, EGU2008-A-01270; [2] Timbers of the world, v.1,TRADA/The construction press Ltd.,1979; Timbers of the world, v.2,TRADA/The construction press Ltd, 1980; [3] Kochemasov G.G. Tectonics of rotating celestial globes // Vernadsky-Brown microsymposium 48, 20-22 Oct. 2008, Moscow, Abstr. m48_20; [4] Kadish S.J., Head J.W., Barlow N.G. Pedestal craters on Mars: distribution, characteristics, and implications for Amazonian climate change // LPS XXXIX, 2008, Abstract 1766.pdf.; [5] Kadish S.J., Head J.W., and Barlow N.G. Determining the ages of mid-latitude pedestal craters // Vernadsky-Brown microsymposium 48, 20-22 Oct. 2008, Moscow, Abstr. m48_17.