

VENUS AND EARTH COMPARISON:STRUCTURAL HIERARCHICAL PATTERNS FROM COMPUTER ANALYSIS OF DIGITAL TOPOGRAPHY

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Objective computer symmetrical analysis of Venus and Earth using Global Digital Topographic Data sets (including Magellan) identifies similarities in regional and local quasi-circular structures comprising hierarchical patterns on both planets. A computer algorithm was designed specifically for our analysis to interpret the internal dynamics of Venus. The above approach identified quasi-circular hierarchical patterns in Alpha Regio, Artemis, and other regions of Venus. Observations of such regions on Venus include: (1) quasi-circular shapes of individual elements, (2) a hierarchy of distinctive sizes for those elements, and (3) a large-scale arrangement or pattern (morphostructure) that includes all of the smaller elements. Noteworthy, similar hierarchical patterns are observed on Earth. The procedures of this investigation consisted of producing: (1) histograms of altitudes with the highest frequencies of occurrence, (2) images that show slices of highest frequency occurrence, and (3) layered images of the highest frequency occurrences. The similarities of Earth and Venus include assemblages of smaller scale, quasi-circular structures inset symmetrically within larger ones. This pattern may result from deep thermal convective processes and interactions between lithosphere and crust. We infer that specific sizes and shapes of the hierarchical patterns correspond with Venus mantle convection. This technique may suggest a new class of objective quantitative surface observations used for modeling. Endogenetic-type structures can be identified, for example, from impact structures using this approach.