

Three order global endogenic cyclicity and its probable deep roots

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In the last years the concept of supercontinental cycles received a wide recognition. In the author's opinion these cycles are equivalent to the well known Wilson's cycles. Taking into account that in the post-Archean Earth's history four or five such cycles manifested, their duration could be determined as 500-600 mln years. But beside such megacycles, other cycles of minor importance are known, e.g. the cycles, long ago established by M. Bertrand: Caledonian, Hercynian, Alpine, later complemented by Baikalian and Cimmerian ones. Their duration is of the order of 150-200 Ma and they correspond to a partial closure of oceanic basins, generated by the breakup of supercontinents and are provoked by the collision of the microcontinents, opening or large island arcs with each other and with the borders of large continents. Third order cycles, with mean duration of 30 mln years, are separated by H. Stille's orogenic phases. They are manifested in mobile belts by collision of island arcs with continents or microcontinents, opening or closure of back arc basins, large scale jumping of spreading axes and subduction zones.

It is reasonable to think that all these phenomena are produced by deep-seated processes of convection or advection in the mantle, but at different level. Wilson's cycles must have the deepest origin and the formation and breakup of supercontinents could be the effect of change in the style of convection, or the replacement of layered convection by whole-mantle one. Bertrand's cycles are probably determined by convection in the transition zone between lower and upper mantle, and upper mantle, and Stille's cycles-convection in the uppermost mantle, in the asthenosphere. So the periodicity in the endogenic evolution of the tectosphere reflects probably the periodicity in the development of convection and advection (plume activity) in the Earth's mantle.