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Geophysical paradoxes of the Mid-Atlantic Ridge structure: some issues concerning the generally accepted paradigm.

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Mid-Atlantic Ridge (MAR) takes special place in range of oceanic ridges because of a number of reasons. The first reason is that it has been studied most thoroughly. We can add that it is the investigations of relief and deep structure of the MAR that led to formulation of essential dogmata of Plate Tectonics in 1960-1970-s. These tenets have not changed for the last 40 years. Only minor corrections related to the details of structure and genesis of MAR were made. It is especially surprising first of all because great amount of new geological and geophysical data have appeared in the latest decades. Moreover, this new data seems to have given possibility to argue with these tenets, and at least to question them. These very tenets are so commonplace that there is no sense speaking about them in detail. But two main tenets should be identified.

The first one was formulated in 1962 (Hess,1962) and the essence of this tenet is that along the axis of MAR there appears new oceanic crust which moves symmetrically from the axis to opposite sides of it (spreading mechanism). The second important tenet of Plate Tectonics is the assumption that according to D.Wilson (1965), there is a special class of transverse faults crossing the axis of the ridge, so called the new transform class. According to the canon, new oceanic crust doesn't appears in these gigantic structures and transform faults work like rails along which the crust blocks

move away from the axis of the ridge. Besides, the essential part of Plate Tectonics is the assumption that the oceanic crust is young age and thin. This statement is valid for both the axis part of MAR and its flanks.The three mentioned parts of Plate Tectonics hypothesis have been first thoroughly checked by us and finally put under question.

*The first paradox.*The results allowed us to make the main conclusion on the significant density asymmetry of the crust segments on opposite flanks of the MAR: the upper parts (up to 6-10 km) of oceanic plates adjacent to the ridge axis differ considerably in their density – Eastern slope –2,7g/cm3, Western slope – 2,3 g/cm3. Now, as an example let us take a rather simplified velocity (seismic) model of the central part of the MAR near the 10˚ S (Starostenko et al.,1994) together with corrected density computations by σ-blocks program. Fig.1 shows that velocities in the upper part of the crust decrease from 6,15 km/s (Eastern flank of MAR) to 5,0 km/s as we move from the East to the West above MAR axis. It is necessary to emphasize that the same can be observed for the lower (mantle) layer. Specifically, velocity values of 8,1-8,3 km/s which are characteristic of the Eastern flank lower crust change to 7,3-7,5 km/s as we move to the Western flank. So the density (velocity) asymmetry of the MAR crust observed using gravimetric studies has been proved by the results obtained at another research vessel with the use of another technique – seismic.

The second paradox. The research of the majority of transverse FZ (for example, Kane and Vema – Doldrams - Vernadsky) showed that they exhibit clear distinctions in their deep structure and even more in the mineral composition, geochemistry and age of dredged samples despite the fact that they have similarity in their bottom relief. Moreover, only few surveyed FZ can be classified as transform faults with their thin crust, specific seismicity

Besides, it was shown that in Romanche, Vernadsky and 15-20 FZ tectonic processes with proven spreading in N-S directions are prevail (Kogan et al.,1985; Pussharovsky et al.,1995).

The analysis of the first arrivals of seismic waves for last two decades shows that fragments of MAR axis rift restricting FZ Vernadsky, Doldrams, Arhangelsky, Vema, Marathon (7˚-13˚N) are practically aseismic if compare to above-mentioned FZ. Moreover, nearly a half of first arrivals are oriented in direction 0˚- 180˚, in other words perpendicular to general directions of FZ. These facts confirm geological (meridional spreading from axis of FZ with fresh basalt effusion) and gravimetrical (inversions of density) evidences that above-mentioned FZ, particularly Vernadsky fault, close resemble typical rift zone and in which case transform mechanism is obvious abstraction.

The third paradox. that can be formulated is that the studied FZ in vast area of MAR

from the tropic of Cancer to equator exhibit distinct ancient geological features such as thick (up to 40 km), mostly low density crust, density inversions, numerous dredged samples of ancient (up to 2 billions years) rocks.