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Peculiarities of Appearance of Westward Drift on the Earth's Surface and Core Fluid Fluxes Causing Drift of the Geomagnetic Field

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Investigation of core originated variations of the recent geomagnetic field, provided by regular observation data on the worldwide net of magnetic observatories shows that decade variations might be envisaged as a result of superposition of jerks stochastically appearing in different regions of the Earth's surface at different time. Quantitative estimation of all the jerks observed on the globe throughout the 20th century, promotes construction of jerk based every-year spatial models of core originated geomagnetic field and its secular variations through time expansion of central spherical model IGRF1980, constructed by use of homogeneous vector data of magnetic satellite MAGSAT. Obtained JBM_SV and JBM_F allow study of year- by-year dynamics of the main structural specificities of core originated geomagnetic field. Both processes of slow diffusion and advection of the field by core fluid fluxes have been detected in result. It has been revealed also that diffusion is caused mainly by slow dissipation of dipole field. While in the non-dipole field dynamics the processes of regional feature swelling/decay and drifting are exposed. Drift strictly toward to the west is revealed only in the restricted region of the Earth's surface figuring the known Brazil geomagnetic anomaly. However global feature drift of geomagnetic morphological structures is observed in narrow band along the geomagnetic axis and is directed to north-west and south-east in the northern and southern hemispheres correspondingly. Reflection of the global drift was found in the slow variations of integral geomagnetic characteristic when geomagnetic center angular coordinates temporal series were investigated. Correlation between the global geomagnetic variations caused by drift of core field, and variations of orientation of the Earth's daily rotation axis is shown up. Despite of some specificities depicted in variations of these parameters, which evidently are caused by complicated character of interaction between geomagnetic field and axial rotation, variations correlation is quite distinct for being ignored. Steady north-west drift of geographical pole corresponds well to the drift of geomagnetic integral characteristic during the whole 100-year period under investigation. Such a correspondence evidently might be caused by influence of Coriolis forces on the orientation of geomagnetic dipole and drift caused variations with characteristic times over than 100-years. Hence it is reasonable to conclude that between the spatial structure of global geomagnetic disturbances reflected in drift of geomagnetic center, and the variations of orientation of the vector of daily rotation velocity there is cause-and-effect relation, the mechanism of which can be magnetostrophic balance of forces, functioning in conditions of the Earth's liquid core.

Study of the structure of quasi-stationary movement system on the liquid core surface through its decomposition into the rotational and divergent components, and its dynamics shows that leading role in motions system carry divergent character movements. Foci of rotational movements arise between the foci of divergent character motions evidently due to the Coriolis forces. Their permanent manifestation in the Atlantic region between African and Latin American plates could cause observed westward drift of geomagnetic field. Core surface motions structural-dynamic pattern at the whole resembles the scenario of rising from deeper layers plums, which reaching the surface stochastically at different regions, reorganize quasi-stationary system of surface motions, established from one kinematic jerk to another. Correspondingly jerks in the geomagnetic field appear due to advection of geomagnetic field by fluid fluxes.