

Spacial-temporal structure of the magnetic field in territory of Ukraine

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The Earth's magnetic field (EMF) is one of the principal geophysical factors concerning the processes in a different planet covers and the planet in whole. Numerous phenomena in magnetosphere, ionosphere, atmosphere and biosphere are due to the magnetic field state as well as to the geomagnetic activity. Space-temporal structure of the Earth's magnetic field B is defined by field total from different sources:

$$B = B_n + B_a + B_e + \delta B_v$$

where B_n is the Earth's normal main field that is generated by the processes in the liquid core and at the border with the mantle and that is defining global space and temporal structure of the planet field; B_a is the anomalous magnetic field (one of the lithosphere) that is due generally to the rocks mag-

netization; B_e is the external field that is due to the influence of solar and cosmic radiation as well as to the Sun magnetic fields and circumterrestrial space; δB_v is the variations field.

Geomagnetic anomaly of the total scalar ΔB of the territory of the Ukraine has a very complex character after the data of surface and airborne survey. Anomalies sizes and intensities are depending on the geological structure of the Earth crust and on the magnetic sources.

Continuous registration of the EMF induction as well as of the induction of northern B_x , eastern B_y and vertical B_z components is carrying out by geomagnetic observatories (GO). On the territory of the Ukraine during long period of time there three GO: "Kyiv", "Lviv" and "Odesa". After the survey data it is shown that the principal changes have place in the main EMF, especially for the territory of the Ukraine the value is upon the average $B_n=1200$ nT for the last 50 years. This field were used by us to evaluate the magnetizing effect in the magnetic field secular variations (B_{SV}).

Magnetic field secular variations B_{SV} is defined as a difference between successive average annual values of three orthogonal components and total intensity of the geomagnetic field that is observed uninterruptedly by GO. Calculating those differences it is assumed that the variations with the periods less that one year and that are generated by external sources are excluded automatically. However the variations of the geomagnetic field generated by the ring magnetic current that are reflected in the horizontal (δB_H) and vertical (δB_z) field components are of the same sign. Therefore during magnetically active years δB_H -component is always smaller and δB_z -component is bigger than in the quiet years. The same effect is produced by the solar-day variation δB_s . Under the influence of the external sources the secular variations δB_{SV} obtained by average annual values will have the components connected with solar activity and, correspondingly, with magnetic one.

Changing magnetic field is inducing from the external sources in the main Earth's layers the currents whose magnetic field is overlapping the dipole field. So the average annual intensity values of the geomagnetic field and its components have besides a dipole field) a contributions from external sources as well as from the magnetizing effect and induction currents in the main layers of the Earth. A very actual goal is to disjoint field by components from every source.

Geomagnetic observatories of the Ukraine "Kyiv", "Lviv", "Odesa" are placed in the regions with different geological structure that is reflected by the magnetic field intensity. GO "Kyiv" is located in the region of weakly intensive Kiev regional magnetic anomaly $\Delta B=85$ nT, GO "Lviv" on the periphery of

the intensive Lvov anomaly $\Delta B=250$ nT, and GO "Odesa" — in the gradient zone of Odesa anomaly $\Delta B=-20$ nT. Thereby it should wait a different values of observatories cushion courses.

To separate a components connected with external and internal sources it needs to subtract from average annual field value for this observatory its dipole part generated by currents at the core-mantle border. Dipole field value B_{IGRF} as well as the values of all EMF components were calculated from IGRF 1945—2010 Model Coefficients 2010.

It is necessary to divide the obtained difference into two parts: one from external magnetospheric and ionospheric currents, another from magnetization of the magnetic sources and currents in the cushion courses. External sources influence on the average annual values of the geomagnetic field is reflected best of all in the horizontal B_H -component, internal sources influence — in the vertical B_z and total field component B .

Contribution of the external sources for all the observatories are evaluated by the difference of average annual values for all the days and by the quiet days ($B_H - B_{sq}$).

At present for GO "Kyiv", "Lviv" and "Odesa" using a new criterion to estimate EMF disturbance the anomalies that occurred due to the magnetizing effect in the anomalies B_{sv} are calculated. They originated from the change of the rocks magnetizing field value. It follows from the supposition that in case the inductive component $I_f = \chi H$ is conditioning the total rocks magnetization the proportion $\Delta D = \Delta B / 2Bn$ must be constant for any time interval. The calculations shown that this field component during last 50 years make: -0.75 nT for GO "Odesa", 2.25 nT for GO "Kyiv" and 6.3 nT for GO "Lviv".

Thus the report evaluated the space-temporal structure of the EMF on the territory of the Ukraine during last 50 years, it proposed the technique to evaluate the contribution of external and internal sources in the secular variation anomaly as well as it obtained first numerous evaluations after the data of the Ukrainian observatories.