Magnetic field secular variations in Ukraine on the base of RS network observations

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Accordingly to results of geomagnetic observations on the Ukrainian RS the map of secular variations for 2005-2010 yrs. was plotted. Spatial structure is characterized by existence of anomalous zones, which are confined to active seismic areas of Ukraine.

Geomagnetic observations on the repeat stations (RS) network let us obtain information about absolute values of magnetic field components, which are the base for normal magnetic field maps plotting. At the same time repeat observations on the RS network allow us to obtain magnetic field secular variations (SV) data and information about their spatial structure. The area under study covers the entire territory of Ukraine that extends 18 degrees in EW direction and 8 degrees in NS direction, which cause a problem for normal geomagnetic field representation and its SV mapping is very actual for Ukraine.

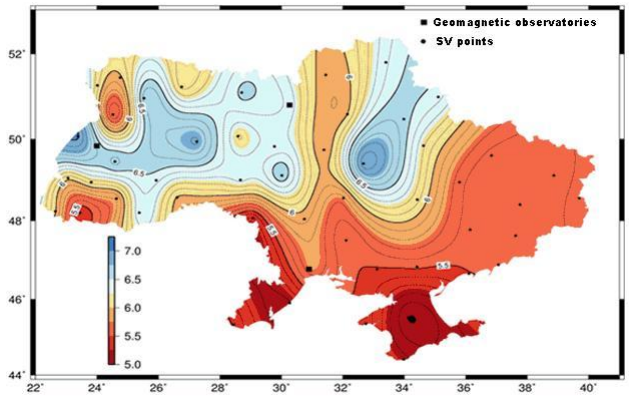

Figure 1: Map of secular variation of magnetic declination D (min/y) during 2005-2010 in Ukraine.

In 2018 SV network in Ukraine consists from 78 points (approximately 1 RS point in 8,000 sq.km). Additionally, three geomagnetic observatories (Kyiv, Lviv, Odesa) are located on the territory of Ukraine. Recent RS network was founded during 2003-2004 yrs. and the first cycle of observations was carried out. Repeat observations were done during 2010-2011 yrs. Those results were used as a base for maps of secular variations for X, Y, Z, F, D components for 2005-2011 years. Especially complex SV spatial structure in all magnetic field components was revealed.

Few anomalous zones of D (Fig.1) and F (Fig.2) SV morphology in Ukraine are defined. Minimum values of SV F field are obtained in Transcarpathians (28 nT/per year), Volyno-Podillya (30 nT/per year), Crimea Peninsula (30 nT/per year) (Fig.2). Central and Eastern parts of Ukraine are characterized by mosaic SV structure of F field with some isometric anomalies, supported only by one RS point.

Comparison of SV spatial structure, based on the RS points data and IGRF model shows essential differences. Deviation from IGRF model for F component was defined in active seismic regions of Carpathians and Crimea (-2-3 nT/per year), for Volyno-Podillya and Donbass (2-3 nT/per year). The same time close correlation of SV anomalies structure with anomalous magnetic field can be observed. It underlines that Earth's lithosphere sources have an impact into magnetic field SV.

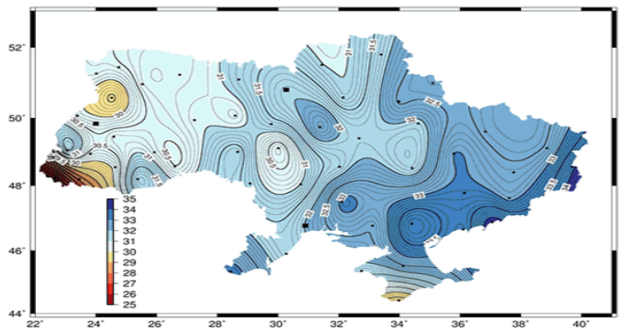

Figure 2: Map of secular variation of geomagnetic field F(nT/y) during за 2005-2010 in Ukraine

The next cycle of geomagnetic observations on the Ukrainian RS network is planned in 2019-2020 yrs.

References:

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