



[http://newserver.stil.bas.bg/varsiti//Organization/VarSITI\\_gui2017databases.html](http://newserver.stil.bas.bg/varsiti//Organization/VarSITI_gui2017databases.html)

## **Report on the results from the IZMIRAN Team**

### **The name of the database:**

Database on the Forbush-effects and interplanetary disturbances to study Earth-affecting solar transients

### **The purpose and of database description:**

Our database refers to the project ISEST/MiniMax24 (International Study of Earth-affecting Solar Transients) in the VarSITI. Inclusion of data for the long-lived periods (several solar cycles) will allow the estimation of variations and interrelation of many parameters of the interplanetary environment (a solar wind, cosmic rays, indexes of solar and geomagnetic activity) within Solar Activity cycles

The purpose of this project is the development of open network database for research of disturbances and transient phenomena in the interplanetary medium and in cosmic rays. This database will allow us to study the coronal mass ejections (CMEs) and corotating interaction regions (CIRs) and their influence on the cosmic rays and parameters of the heliosphere.

During the period from January to March 2017 the IZMIRAN Team carried out the following work in the frame of International Study of Earth-Affecting Solar Transients (ISEST)/MiniMax24 (Creation of Database in the open Access):

1. The local database was verified and prepared for a transition in the Internet.
2. Web pages (one for each year) were created on the base of the site of Space Weather Prediction Center in IZMIRAN in two versions – in Russian and English <http://spaceweather.izmiran.ru/eng/dbs.html>. (see fig. 1)
3. On these pages were uploaded all the events (>7000) over the history of cosmic ray observations and more than 100 fields for each event.
4. There was prepared and loaded on this site the description of the all database fields in Russian and English.
5. The interface is created which allows us to get data for separate events, for all events during the year or data for all period over 1957-2015.
6. At present moment the first version of our database on the Forbush-effects in open access is ready for loading on NMDB (as reference) and VarSITI sites.
7. On the next step of our work the possibilities will be realized for a selection and sorting the events by different parameters of cosmic rays and of the Earth and space environment.
8. It is planned the permanent updating of this database.

All the preliminary results of this work were reported on the workshop "10 Years Neutron Monitor Database – NMDB Workshop" (19-23 March 2017, Athens, Greece) where the IZMIRAN team took an active participation:

1. Belov A., Abunin A., Abunina M., Eroshenko E., Yanke V., Oleneva V. "Data Base on the Forbush effects and Interplanetary Disturbances in an open access" – oral.
2. Abunina M., Belov A., Abunin A., Eroshenko E., Oleneva V., Yanke V. "Vector anisotropy of the cosmic rays in the beginning of the Forbush decreases" – oral.
3. Eroshenko E., Belov A., Yanke V., Abunin A., Abunina M. "Contribution of IZMIRAN for using data from the NMDB" – oral.
4. Belov A., Kryakunova O., Abunin A., Abunina M., Gaidash S., Tsepakina I., Nikolaevsky N. "The behavior of high-energy magnetospheric electrons during solar cycles 22 and 23" – oral.

5. Papaioannou A., Anastasiadis A., Mavromichalaki H., Belov A., Eroshenko E., Abunin A., Abunina M. "Dependence of Groundlevel Enhancement (GLE) Events on their associated solar flare and CME characteristics" – oral.

All these reports were made on the basis and with using the IZMIRAN database on the Forbush effects and interplanetary disturbances. The possibilities of this database in the open access were discussed during the Workshop in Athens. A training course on the use this database in open access was performed after the Workshop among students and young specialists of the cosmic ray group from Athens University. Some new users appeared after discussion this database during the Workshop.

The screenshot shows the website for the IZMIRAN database. The main content area is titled "Catalogue of the Forbush-effects". It provides the following information:

- Number of the Forbush-effects in the catalog: 7019
- Coverage period: 1957 - 2016
- List of all events (full file): [link](#)
- Number of parameters in the full file: 108
- Description of the parameters in the full file: [link](#)

Below this information is a table showing the years covered by the database:

1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
2010	2011	2012	2013	2014	2015	2016	2017	2018	2019

Below the table, there is a list of publications:

- Belov A., Abunin A., Abunina M., Eroshenko E., Oleneva V., Yanke V., Papaioannou A., Mavromichalaki H. Galactic cosmic ray density variations in magnetic clouds // *Solar Physics*: V. 290. – I. 5. – P. 1429–1444. – 2015.
- Belov A., Abunin A., Abunina M., Eroshenko E., Oleneva V., Yanke V., Papaioannou A., Mavromichalaki H., Gopalswamy N., Yashiro S. Coronal mass ejections and non-recurrent Forbush decreases // *Solar Physics*: V. 289. – I. 10. – P. 3949–3960. – 2014.
- Belov A.V. Forbush effects and their connection with solar, interplanetary and geomagnetic phenomena // *Proc. IAU Symposium*: N. 257. – P. 119–130. – 2009
- Abunin A.A., Abunina M.A., Belov A.V., Eroshenko E.A., Oleneva V.A., Yanke V.G. Forbush effects with a sudden and gradual onset // *Geomagnetism and Aeronomy*: V. 52. – N. 3. – P. 313–320. – 2012.
- Abunina M.A., Abunin A.A., Belov A.V., Eroshenko E.A., Oleneva V.A., Yanke V.G. Long term variations of the amplitude-phase interrelation of the cosmic ray anisotropy first harmonic // *Journal of Physics: Conference Series*: V.409. – A. 012163. – 2013.
- Abunina M.A., Abunin A.A., Belov A.V., Eroshenko E.A., Asipenka A.S., Oleneva V.A., Yanke V.G. Relationship between Forbush Effect parameters and the heliolongitude of solar sources // *Geomagnetism and Aeronomy*: V. 53. – N. 1. – P. 10–18. – 2013.

Fig. 1. Screenshot of the page for Database on the Forbush effects and interplanetary disturbances in open access.

<http://spaceweather.izmiran.ru/eng/dbs.html>