

SINP MSU FEASIBILITIES FOR IMCP

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D.V. Skobel'syn Institute of Nuclear Physics of M.V. Lomonosov Moscow State University (SINP MSU) can contribute various items to the International Meridian Circle Program (IMCP) in the frame of Solar-Terrestrial Physics.

In the scope of Space Weather (SW) Space Monitoring Data Center (SMDC) of SINP MSU (<https://swx.sinp.msu.ru/index.php>) provides experimental data on energetic particles of the solar and magnetospheric origin. Monitoring of the energetic particles is conducted by a number of Russian meteorological satellites equipped by particle detectors manufactured by SINP MSU. At GEO orbit, geosynchronous relativistic electrons (GRE) and high-energy solar protons are observed by Russian geosynchronous satellites Electro-L1, L2 and L4 during the recent decades. NOAA GOES data are also collected and analyzed. At HEO orbit, high-apogee satellites Arctica M1(160/340E) & M2(160/340E) observe Earth Radiation Belts (ERBs) in the Southern Hemisphere. At LEO orbit, a fleet of Russian sun-synchronous satellites Meteor-M1(3/15 MLT), M2(4/16 MLT), M2-4(9/21MLT) observed near-Earth radiation environment, including solar energetic particles (SEP), inner and outer ERBs and auroral precipitations from the plasma sheet. Experimental data from POES/METOP fleet are also analyzed. SINP MSU SMDC supports various SW models. Forecasting models have been developed for the solar wind velocity, geomagnetic indices Kp & Dst as well as for GRE fluences. This allows providing Alerts & Warnings for the enhancements in X-rays, SEP fluxes, GRE fluxes and geomagnetic storms. The now-casting includes SEP probabilistic model (peak fluxes & fluences), model of the magnetopause, 3D model of the magnetic field in the Earth's magnetosphere, high-latitude boundary of the outer ERB, elliptical model of SEP cutoff boundary and polar cap absorption.

In the scope of Global Electric Circuit (GE), SINP MSU provides experimental data on atmospheric transient luminosity events (TLE) in UV range acquired from Russian LEO satellite Vernov and International Space Station. TLEs are also observed by ground-based instrument located at high-latitude station in Apatity. The high spatial and temporal resolution of the data allows accurate analysis of the TLE power, location and propagation.

In the scope of Geomagnetic Field Variations (GM), SINP MSU develops models of decadal dynamic of the electrons in the inner and outer ERBs for the time interval from 1998 to 2024. The models show diminishing of the inner ERB and significant equatorward shifting of the outer ERB above Siberia within the last decade.