Space Monitoring Data Center
Skobeltsyn Institute of Nuclear Physics MSU

10TH EUROPEAN SPACE WEATHER WEEK
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
NOVEMBER 18-22 2013, ANTWERP, BELGIUM

Space Weather Monitoring and Analysis System Developed at Moscow State University

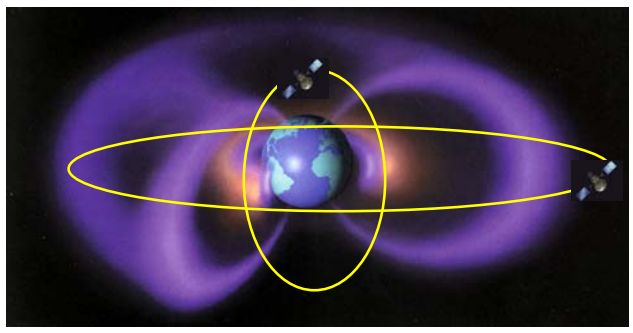
V. V. Kalegaev, M.I. Panasyuk, I.N.Myagkova, W. O. Barinova,
O. G. Barinov, S.Yu. Bobrovnikov, S.A.Dolenko, E.A.Muravyeva, L.R.Mukhametdinova, V.R.Shiroky, Yu.S.Shugay

Lomonosov Moscow State University Skobeltsyn Institute of Nuclear Physics (MSU/SINP), Leninskie gory, GSP-1, Moscow 119991, Russian Federation

http://swx.sinp.msu.ru
http://smdc.sinp.msu.ru

Abstract

Space monitoring data center of Moscow State University provides operational information on radiation state of the near-Earth space. Complex, fully automated information system gives access to the actual data characterizing the level of solar activity, geomagnetic and radiation conditions of the magnetosphere and heliosphere via the Internet portal http://swx.sinp.msu.ru/ in the real time mode. The main components of the system are real-time data and the models of space environment. Operational data are coming from space experiments, both, Russian and foreign, on charged particle fluxes in energy channels from hundreds keV to hundreds MeV. The UV images of the Sun and solar wind parameters are also used in forecasting and now-casting. The models of the space environment working in an autonomous mode are used to generalize the information obtained from observations on the whole magnetosphere. Interactive applications and operational forecasting services are created on the base of these models. Velocities of high speed streams in solar wind on the Earth orbit are reconstructing with advance time of 3-4 days on the basis of automatic estimation of parameters of the coronal holes detected on the images of the Sun received from the SDO satellite. By means of neural network approach Dst-index online forecasting at 0.5-1.5 hours forward depending on solar wind and the interplanetary magnetic field, measured by ACE satellite is carrying out.



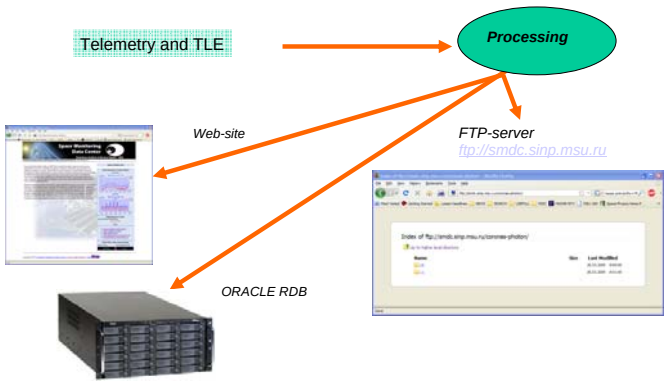
Radiation monitoring

Data:
- Data from own sources, from worldwide
- Data availability, real-time processing, *Free access*
- Data postprocessing
- Software: *standard (DB, graphics) and unique*

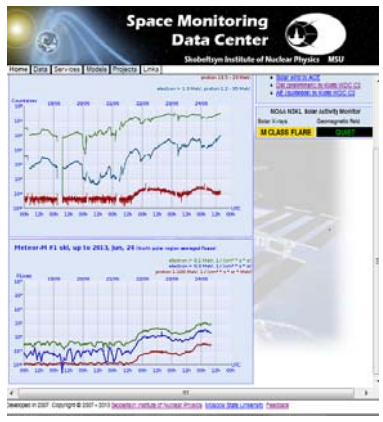
Models
- Interactive
- Real-time, *DB connection*

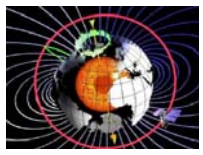
Visualization
- Fast app (Ajax), DB connection, 3D

Real-time data processing



Radiation conditions monitoring by low-altitude spacecrafts

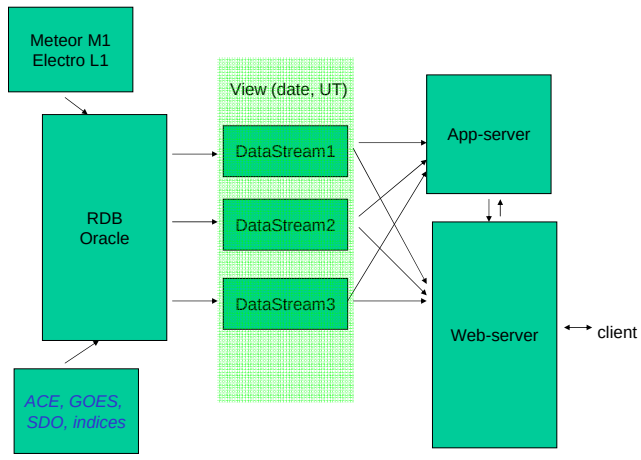




Meteor-M-N1
Coronas-Photon
Tatyana-1 and 2

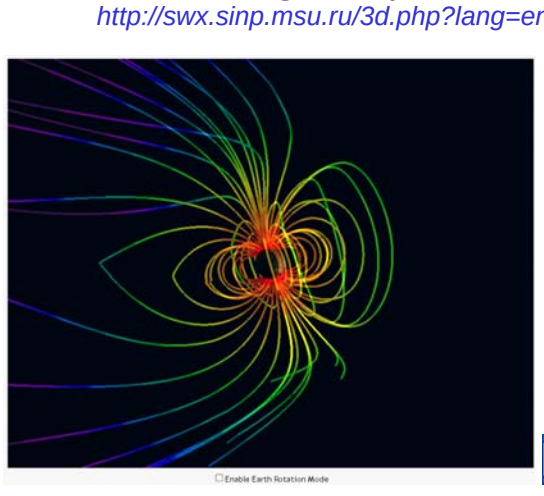
http://smdc.sinp.msu.ru

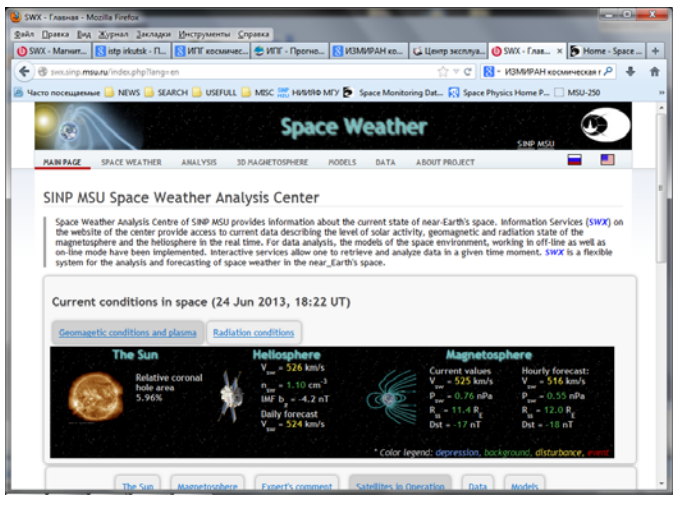
Postprocessing



3D-magnetosphere

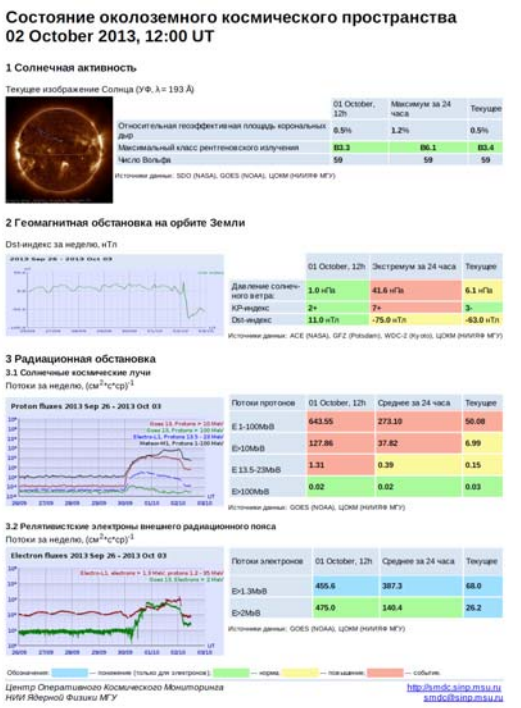
http://swx.sinp.msu.ru/3d.php?lang=en





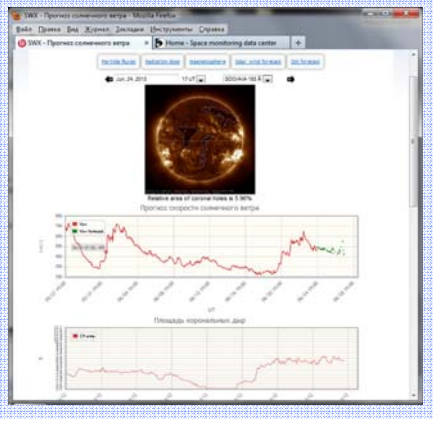
http://swx.sinp.msu.ru

Hourly data report

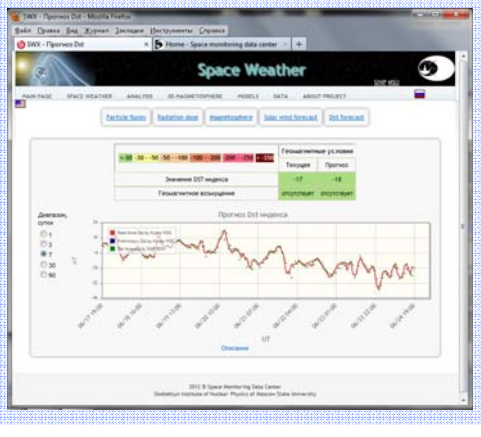


Operational Models

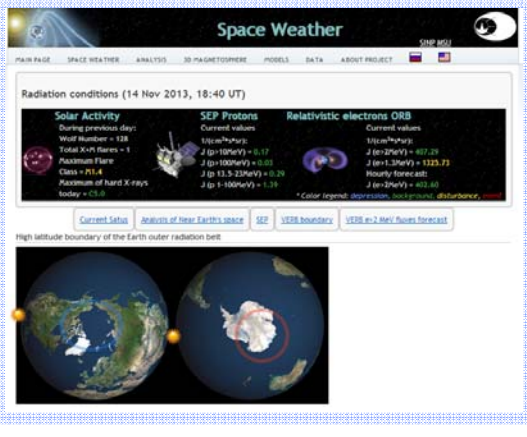
Solar Wind Forecast
http://swx.sinp.msu.ru/models/solar_wind.php?lang=en



Dst Forecast
http://swx.sinp.msu.ru/dst.php?lang=en



High-latitude Boundary of ORB Forecast



Magnetopause Stand-off Distance Forecast