Space science + information technologies

- Department of Space Monitoring
- FP-7 related activity in space science

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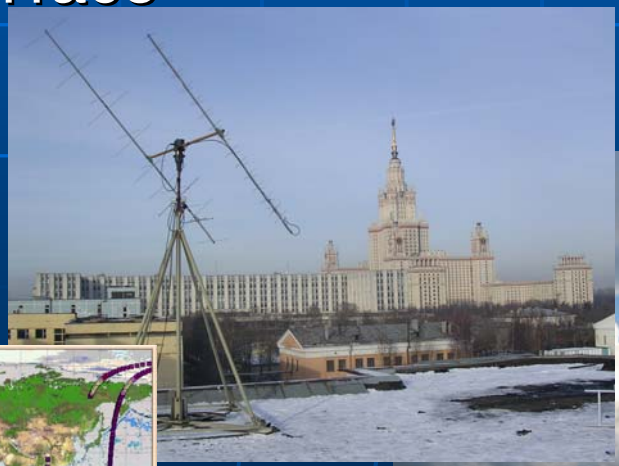
Department of Space Monitoring

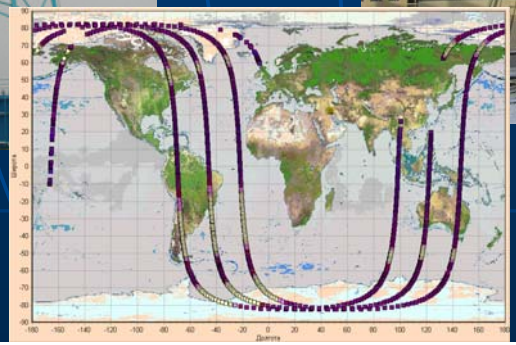
Analysis of conditions in space on the basis of space experiments data and intensive computations

- Established in 2006
- Consists from 4 labs
  - Space Missions Control Center
  - Space Data Analysis
  - Space Detectors Modelling
  - Space Science Practical Training

Space Missions Control Center

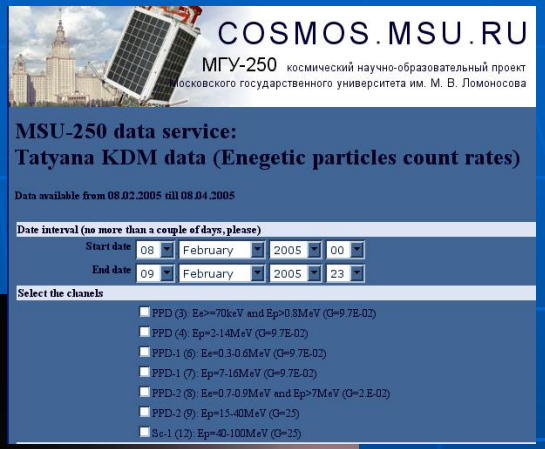
- Manages remote space objects (Tatyana Satellite - launched on 21 January 2005)
- Receives scientific data in special format (telemetry)
- Remote Sensing of the Earth's surface





Space Data Analysis Lab

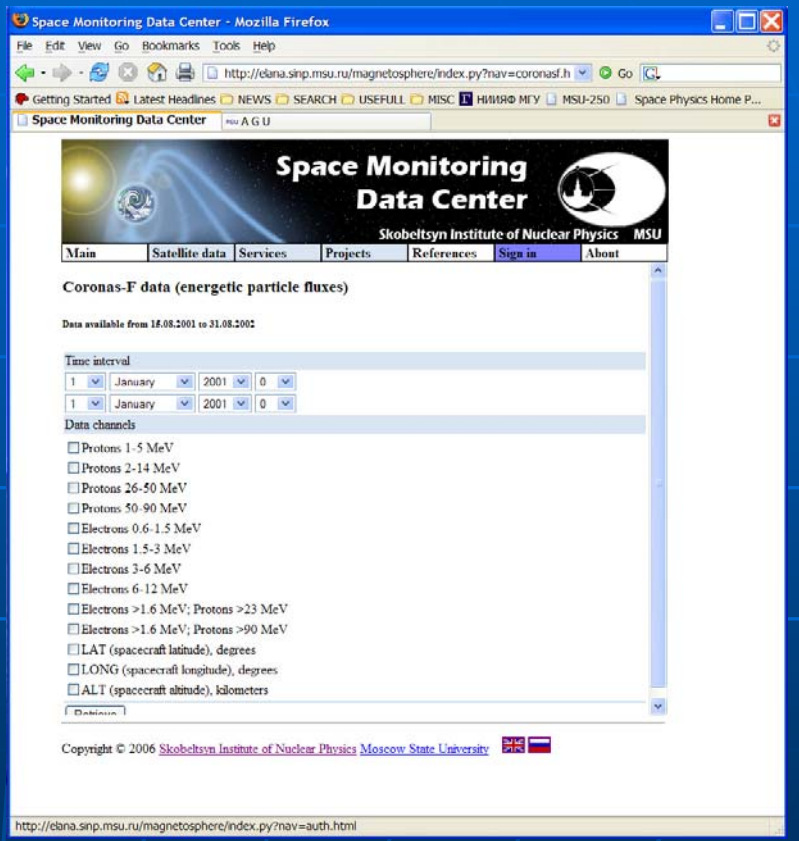
- Data Center
  - Collection the scientific data from space missions
  - Software development for data processing, storage and visualization

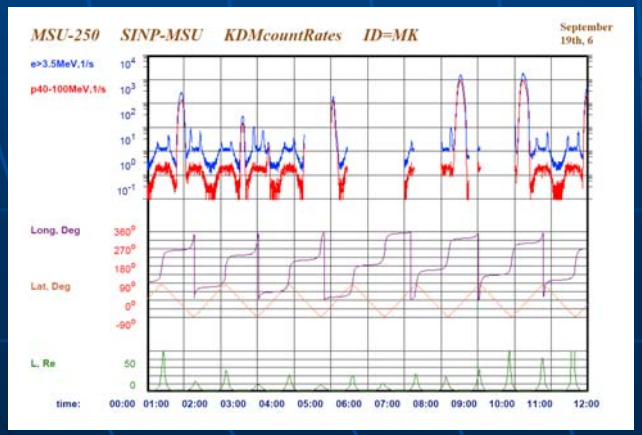


Data analysis and modeling

Space Monitoring Data Center

- Oracle RDB
- Internet services
- Space experiments
  - Coronas-F
  - International Space Station
  - Tatyana
  - Meteor 3M
  - Coronas-I, Cosmos-1686, Mir…





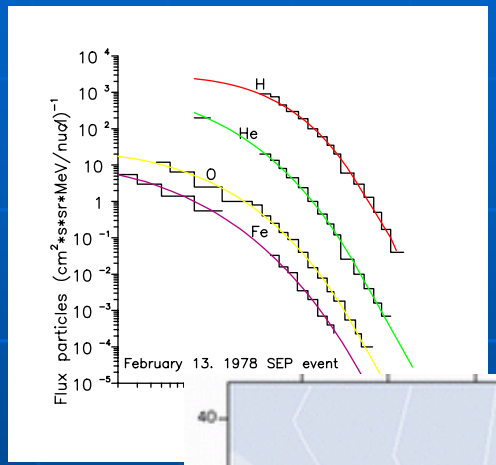
The main aim is to provide the data services and modern computing tools for space science and education

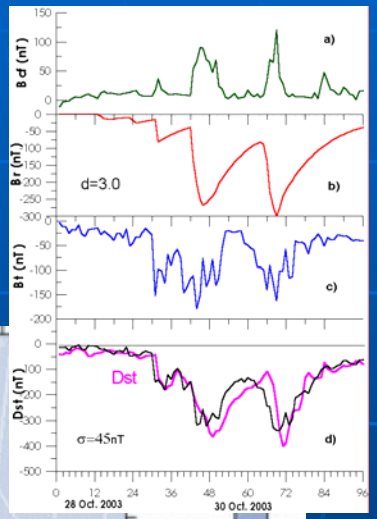
Data analysis: Models at SINP

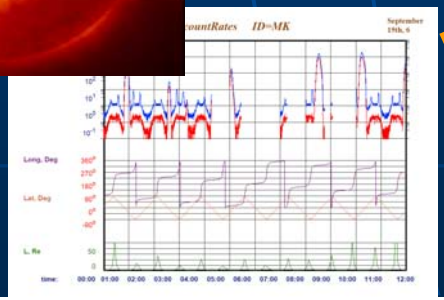
- The semi-empirical model of GCR fluxes
- Semi-empirical probabilistic model of SEP particle fluxes
- Radiation environment models
- Model of the magnetospheric magnetic field

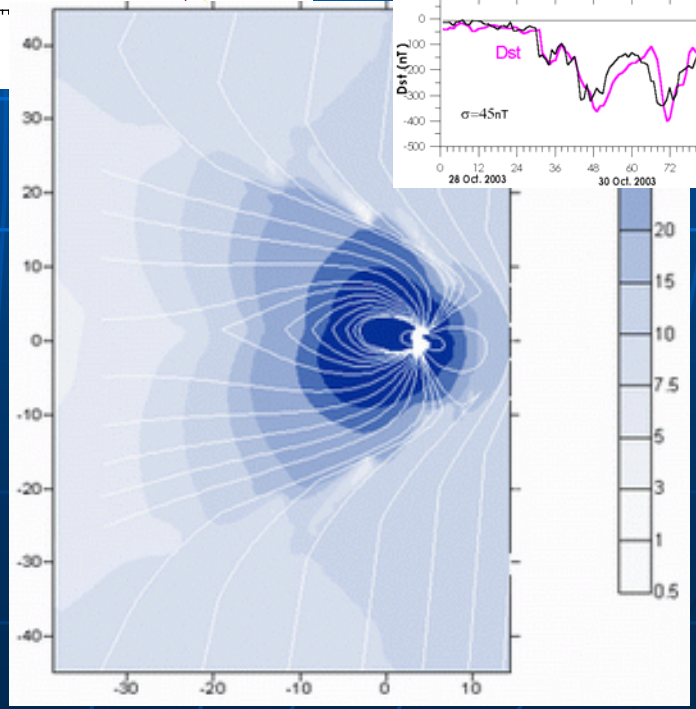
Space Weather monitoring

- Data from Space
- Modeling
- Scientific applications
- Space weather prediction





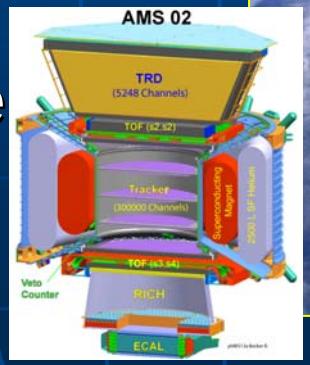




Space Detectors Modeling Lab

- The Alpha Magnetic Spectrometer Experiment: An experiment to search in space for dark matter, missing matter & antimatter on the International Space Station (2008)

- The main approach: distributed storage and distributed processing of data

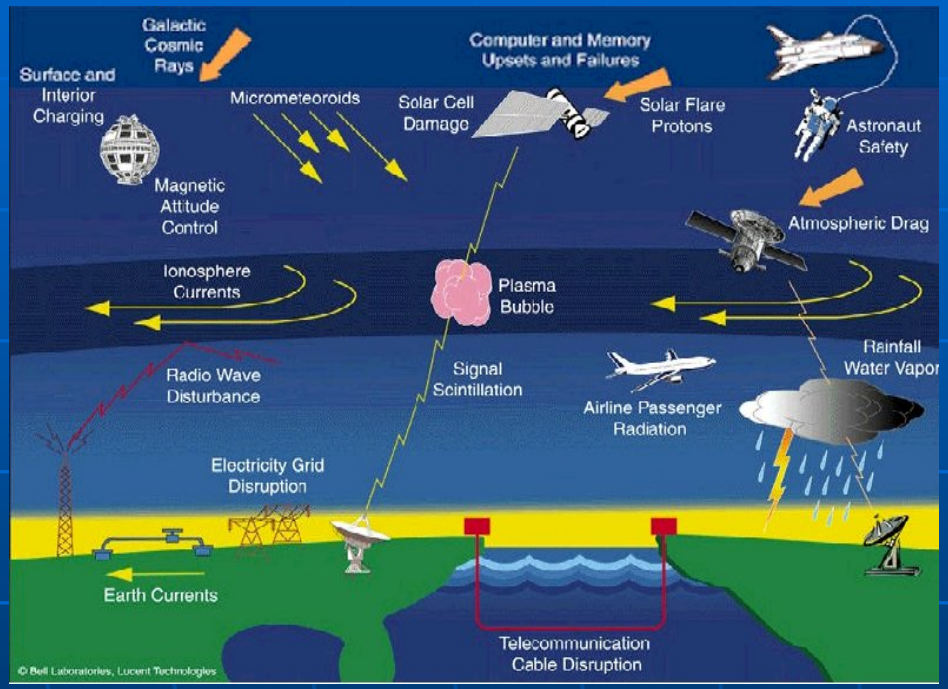


Education and Outreach

- Practical training courses with MSU students (from September 2005)

- New lecture courses
- Scientific work of students

FP7 related activity in the field of planetary space weather



- **Planetary radiation environments and effects**
- **Planetary space weather**
- **Sun-Earth Virtual observatory**

Why is this important?

Space weather gives us displays of the beautiful aurora or northern lights.

But, at its worst space weather, is a ***natural hazard*** that can catastrophically disrupt the operations of many technological systems, thus causing disruption to people's lives and jobs.

Significant European capability to develop mitigation services, spin-out to industry

Planetary radiation environments and effects

JRA inside the Europlanet I3

PI: Patricia Gonçalves (LIP Lisbon)

- University of Barcelona (E)
- University of Bern (CH)
- Bordeaux University, CENBG (F)
- Finnish Meteorological Insitute (FIN)
- University of Kiel, IEAP (D)
- KU Leuven (B)
- Lisbon Institute of Physics (P)
- SINP MSU (RUS)
- SpaceIT (CH)
- European Space Agency (ESA)

Planetary radiation environments and effects

Objectives:

Development of advanced planetary and lunar radiation environment models

Data analyses from onboard radiation instruments in planetary and interplanetary missions and database development based on these

Planetary space weather

(networking activity inside the Europlanet I3)

M. Hapgood, J. Lilensten, N. Crosby, A. Viljanen, R. Vainio, S. Vennerstrom, T. Dachev, V. Kalegaev, A.D. Aylward

Outputs

Generate/consolidate knowledge on planetary SpW

- Publication in appropriate scientific and engineering journals (develop new journals?)
- Focused summaries on the web
- Targeted advice for potential users within the European planetary community.
- Updates to databases & models of planetary environments.
- Review interfaces to make best use of the available e-infrastructures

Sun-Earth Virtual observatory

Aim is to mobilise European e-resources for space weather and underlying science (Sun-Earth connections)

Pooling the data resources existing in different observatories and data centers scattered across the world, so that complementary information from different sources can be rapidly located, recovered and used to further scientific research.

Presented at FP7 information event on Research Infrastructures in Brussels on 6 February

Mike Hapgood, Chair, European Space Weather Working Team (M.Hapgood@rl.ac.uk)