Space Weather Research and Activities at USTC, China

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Key Laboratory of Geospace Environment (KLGE)
Objective
Organization

Lab

- Fundamental Physical Processes in Geospace
- Geospace Responses to Solar Activities
- Laboratory Experiments for Space Plasma Processes
- Technology of Ground-based Instruments
- Technology of Spacecraft Payloads
1. CMEs from the corona to IP space

- Automatically recognize a CME from coronagraphs
1. CMEs from the corona to IP space

- CME Autodetection
- Ice-Cream Cone Model
- Deflection Model
- HAFv2.w Model

- Obtain 3D kinematic parameters

Xue et al., JGR, 2005
1. CMEs from the corona to IP space

- in the corona
- in IP space

- Magnetic field dominant
- Solar wind dominant
- Deflection angle up to tens degrees
- See poster: P-3
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1. CMEs from the corona to IP space

CME Autodetection → Ice-Cream Cone Model → Deflection Model → HAFv2.w Model

The propagation of the dynamic pressure of the solar wind in the ecliptic

Akasofu & Fry, 1986; Wang et al., CJG, 2002

The interplanetary disturbances at 1 AU

Akasofu & Fry, 1986; Wang et al., CJG, 2002
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Online Models
- **Fitting Magnetic Clouds**
  Velocity-modified cylindrical force-free flux rope model for magnetic clouds observed in-situ. (Launched on Aug. 5, 2014)

Data Products
- **Events**
  Events of interest. (Launched on Mar. 22, 2013)
- **Solar Limb Prominence CAther & Tracker (SLIPCAT)**
  Movies and catalogs of auto-detected solar limb prominences based on EUV observations at the wavelength of 30.4 nm. (Launched on Mar. 1, 2010)
- **CME Source Locations (CMELOC)**
  CME’s source locations on the visible solar disk manually identified based on SOHO/EIT and LASCO images. (Launched on Apr. 6, 2011)
- **Quasi-Homologous CMEs (QHCMEs)**
  A list of quasi-homologous CMEs originating from the same super active regions during solar cycle 23. (Launched on Nov. 6, 2012)
- **Full Halo CMEs (FHCMEs)**
  A list of full halo CMEs viewed by SOHO/LASCO since 2007 March 1. (Launched on Mar. 13, 2013)
- **Interplanetary Causes of Geomagnetic Storms Since 2007 (GeoStorms)**
  Interplanetary causes of moderate to intense geomagnetic storms since 2007 are identified. (Launched on May 4, 2014)

Data Mirrored
- **Solar & Heliospheric Monitor (SHM)**

http://space.ustc.edu.cn/dreams/
2. Kinetic Model for Radiation Belt (STEERB)

Su et al., 2010; 2011
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3. Thermospheric density model at 400 km

Our EOF model

Lei et al., JGR, 2012

MSIS model

mass spectrometer and incoherent scatter model (Hedin, JGR, 1991)
1. Wind Lidar System
Quasi-seamlessly from 5 to 110 km

- Narrowband sodium W/T lidar (80 - 110 km)
- Doppler wind lidar (15 - 60 km)
- Doppler wind lidar (5 - 40 km)
2. Low-energy Ion Detector (under development)
Development of Instruments at KLGE

3. Laboratory Devices

For basic space plasma physics studies

**KMAX**: Keda Mirror with AXisymmetricity

**LMP**: Linear Magnetized Plasma Device
Summary

Space weather research

- CME propagation and arrival ---- Geomagnetic disturbances
- Radiation belt model ---- Storms & substorms
- Thermospheric density model at 400 km

Instruments

- Wind lidar system ---- middle to high atmosphere
- Low-energy ion detector ---- MIT, IP space
- Laboratory devices ---- fundamental studies
Thank you for your attention!