Report of recent activity related to theme 2

K. Shibata
Kwasan and Hida Observatories
Kyoto University
Funding Approved!

- Grant-in-Aid for Creative Scientific Research (学術創成研究) of the Ministry of Education, Science, Sports, Technology, and Culture of Japan
- Title: "The Basic Study of Space Weather Prediction"
- PI: K. Shibata (Kyoto Univ.)
  - recommended by Prof. Kamide
- Term: 5 years (2005-2009)
- Number of Researchers: 11
- Budget: 450 M yen / 5 years ~ 800k dollars/year
Purpose of this project

• The purpose of this project is to develop a physical model of solar-terrestrial phenomena and space storms as a basis of space weather prediction under international program CAWSES

• To encourage close and effective collaboration between solar and geophysicists
Research Plan

1. Study of Energy Release on the Sun
   K. Shibata, S. K. Kato, S. Tsuneta, K. Kusano
   Kyoto/Hida obs and Solar B

2. Solar Wind Radio Observations and Modeling
   K. Fujiki
   Nagoya/STE Lab radio obs

3. Real Time Observations of Magnetosphere and Ionosphere and Space Weather Map Modeling
   T. Ogino, Y. Omura, T. Obara

4. Virtual Observatory (Numerical Modeling)
   M. Hoshino, M. Fujimoto, M. Ugai
Solar-B Mission

- Solar Optical Telescope (SOT)
- X-Ray Telescope (XRT)
- EUV Imaging Spectrometer (EIS)
- to be launched in 2006, August
  - Mission Lifetime: > 3 years
- Scientific objective
  - coronal heating mechanism
  - elementary MHD processes such as magnetic reconnection

Astro-E2 (Suzaku, X-ray astronomy mission) was successfully launched in July, 2005
SMART (Solar Magnetic Activity Research Telescope) at Hida Observatory of Kyoto University, 2003 – observing full Sun Halpha and vector magnetic fields every 1 minute

To observe energy storage and triggering Mechanism of flares and coronal mass ejections

SMART (solar magnetic activity research telescope)  H alpha image  Vector magnetic field
H α Observations

Flare Monitoring Telescope (FMT) (Hida Obs., Kyoto Univ.)

Full Sun H α, H α ± 0.8 Å, continuum image
On video (2sec cadence) and CD-ROM(1min) with 4.2 arcsec pixel

Images of flares and prominence eruptions are now open through
http://www.kwasan.kyoto-u.ac.jp/Hida/FMT/

H α + 0.8 Å
Moreton waves

flare associated waves observed in $H\alpha$ (Moreton 1960)

chromospheric manifestation of fast mode MHD shocks in the corona (Uchida 1968)

Hida FMT
Discovered More than 15 Moreton Waves In 1997-2004

Whole Earth Observation
Solar wind observations
(Nagoya Univ., STE Lab.)
IPS observations

From Jackson’s homepage

UHF radio telescope
(327MHz)
Magnetosphere, ionosphere, thermosphere: scale coupling

Real time observations and space weather map modeling
Vertual Observatory
(Numerical Modeling of Space Weather based on real observational data)
based on the collaboration between solar physicists, space plasma physicists, and geophysicists
Working groups of theme 2 (space weather)

- Coordinated Data Analysis Working Group
  - Chair: Nat Gopalswamy (USA)

- Space Weather Applications Working Group (Prediction and User Groups)
  - Chair: R. Schwenn (Germany)

- Modeling, Simulations, and Data Asimilation Working Group
  - Chair: S. T. Wu (USA)

- Continuous H alpha Observations Working Group
  - Chair: H. Kurokawa (Japan)
Working group

- Continuous H alpha Observations Working Group

  • Chair: H. Kurokawa (Japan),
  Possible Members: H. Wang (USA), B. Schmieder (France), H. Zhang (China), etc.

  • Purpose: To bring representative of solar observatories together worldwide to construct a new CAWSES data analysis tool – continuous H alpha observations

  (global high resolution Hα network + Hida FMT + more)
GLOBAL HIGH-RESOLUTION Hα NETWORK

LATEST IMAGES FROM THE GLOBAL H-ALPHA NETWORK

Follow this link for all latest images in the archive

Upper Panel: Original data. Lower Panel: Contrast enhanced images.
Please click on the images to view the 2K x 2K versions.

http://www.bbso.njit.edu/Research/Halpha/
H alpha off band observations are important!

Moreton waves = flare associated waves observed in Hα (Moreton 1960)
chromospheric manifestation of fast mode MHD shocks in the corona (Uchida 1968)

To detect Moreton waves (Shocks) And filament Eruption (CMEs)

Hα center

1997/11/04 05:45:00

Hα +0.8A, -0.8A

Hida FMT Discovered More than 15 Moreton Waves In 1997-2004
Start to collaborate with observatories …

• Paris Observatory @ Meudon on July 21
Summary of Near Future Plans in the context of CAWSES program

• Japanese domestic CAWSES meeting on Sep 12-13, 2005 at Nagoya Univ.
• Solar B will be launched in 2006 August (Solar B science meeting on Nov. 8-11, 2005, in Kyoto)
• Hida/SMART regular observation will start in 2005 July and data will be open to the world
• International H alpha observation network will be extended in 2005 (Including H alpha off band observations and more observatories)
• Cooperative analysis of superstorm events of 6-10 November 2004 and Jan 2005 => workshop in 2006 March in Alaska ????
Plan of workshop (preliminary)

- 2005 data analysis workshop 30—50
  (2006 March ??? @ Alaska Farebanks ???)
- 2006 numerical modeling 30—50
  (2006 July, @Earth simulator center ???)
- 2007 CAWSES international meeting >100
  (2007 July @ Kyoto ???)
- 2008 space weather summer school 50—100
  (2008 July @ Nagoya ???)
- 2009 summary workshop ???

To encourage more and more collaboration between solar- and geo- physicists