The IHY was an extensive international program to study the universal physical processes in the heliospace for a better understanding of the Sun-heliosphere system.

The logical next step is to extend global studies into the heliosphere.
The objectives of ISWI are to develop the scientific insight necessary to understand the solar-terrestrial physical relationships inherent in space weather, to reconstruct and forecast near-Earth space weather and to communicate this knowledge to scientists and to the general public. This would be accomplished by (a) continuing to expand and deploy new and existing instrument arrays, following the successful practices of the International Heliophysical Year (IHY) 2007, (b) promoting data coordination and analysis to develop predictive models using ISWI data from the instrument arrays to improve scientific knowledge and to enable future space weather prediction services and (c) continuing to promote knowledge of heliophysics through training, education and public outreach.
1.2 Principles of the Instrument Array Program

• The lead scientist or principle investigator funded by his/her country provides instrumentation (or fabrication plans) and data distribution

• The host country provides the workforce, facilities, and operational support, typically at a local university

• Host scientists become part of the science team

• All data and data analysis activity is shared

• All scientists participate in publications and scientific meetings where possible
## 2. Instrument Array Program in Japan

<table>
<thead>
<tr>
<th>INSTRUMENT</th>
<th>Lead Scientist</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Continuous H-alpha Imaging Network (CHAIN)</td>
<td>Dr. Satoru Ueno, Prof. Kazunari Shibata (Kyoto U)</td>
<td>Time variation and 3D velocity field of solar activity, flares, filament eruptions and shock waves (Morton waves) by using multi-wavelength H-alpha images of the full-disk Sun.</td>
</tr>
<tr>
<td>2 Global Muon Detector Network (GMDN)</td>
<td>Prof. Kazuki Munakata (Shinshu U)</td>
<td>To identify the precursory decrease of cosmic ray intensity that takes place more than one day prior to the Earth-arrival of shock driven by an interplanetary coronal mass ejection</td>
</tr>
<tr>
<td>3 Magnetic Data Acquisition System (MAGDAS)</td>
<td>Prof. Kiyohumi Yumoto (Kyushu U)</td>
<td>Study of dynamics of geospace plasma changes during magnetic storms and auroral substorms, the electromagnetic response of iono-magnetosphere to various solar wind changes, and the penetration and propagation mechanisms of DP2-ULF range disturbances</td>
</tr>
<tr>
<td>4 Optical Mesosphere Thermosphere Imagers (OMTIs)</td>
<td>Prof. Kazuo Shiokawa (Nagoya U)</td>
<td>Dynamics of the upper atmosphere through nocturnal airglow emissions</td>
</tr>
<tr>
<td>5 South-East Asia Low - Latitude Ionodonde Network (SEALION)</td>
<td>Dr. Tsutomu Nagatsuma (NICT)</td>
<td>Monitoring and study on ionospheric disturbances occurred in the equatorial region by ionospheric and geomagnetic field observations.</td>
</tr>
</tbody>
</table>
The Continuous H-alpha Imaging Network (CHAIN) project was planned to monitor solar flares and erupting filaments continuously by using several types of telescopes.

The main three observatories of CHAIN project are mounted in Peru and Algeria. We are currently planning to install flare monitoring telescopes (FMT) in Ica University in Peru and Aures area, Algeria. Final tests of candidate sites for the new observatory are performed in Aures area, Algeria.

Observatories or institutes that volunteered to participate in the Chain project.
2.1-2 Typical Example of Solar Images Obtained from Flare Monitoring Telescope

Flare  Filament  Prominence

![Flare Image](1999/02/16 02:30:00 UT)

![Filament Image](2005/05/15 21:07:00 UT)

![Prominence Image](2000/10/22 00:28:03 UT)
2.2 Grand Muon Detector Network

Consisting of 9 institutes from 7 countries.

- Nagoya
- Hobart
- Sao Martinho
- Aragats
- Kuwait
- Greifswald

Pl: Prof. K. Munakata
Shinshu Univ.

Japan
USA
Australia
Brazil
Kuwait
Armenia
Germany

Kuwait, constructed in Mar. 2006
They are planning the following for improving sky-coverage with the GMDN

- Expansions of the detection area of each detector
  - Hobart (Australia), from current 3x3m² to 4x4m²
  - Sao Martinho (Brazil), from current 4x7m² to 4x9m²
  - Kuwait University muon hodoscope (Kuwait), from current 3x3m² to 5x5m²
- Deployments of new detectors
  - A new type of detector on the high-altitude mountain in Sierra-Negra (Mexico)
  - A new muon hodoscope in the Hermanus Magnetic Observatory, Hermanus (South Africa)
2.3 MAGDAS (MAGnetic Data Acquisition System) Network

PI: Prof. K. Yumoto
SERC, Kyushu Univ.

96° MM Chain

210° MM Chain

Magnetic Equator Chain

FM-CW radar

MAGDAS II Planned
MAGDAS II Installed

MAGDAS Planned
MAGDAS Installed
2.3-2 Space Weather Study on Coupling of Solar Wind-Magnetosphere-Ionosphere-Atmosphere

(left) Global equivalent ionospheric current pattern obtained by the ordinary MAGDAS/CPMN data.

(right) Three-dimensional current system in geo-space.
2.3-3 Sq Currents in the Ionosphere and Lithosphere as a function of Solar Cycle Activity (F10.7) 11/21

External Sq current system

Internal Sq current system

Solar activity factor P: 74.2

$1_{\text{ex}}^\text{total} : 170.0$ [kA]

$1_{\text{in}}^\text{total} : 75.2$ [kA]

$1_{\text{in}}^\text{total} / 1_{\text{ex}}^\text{total} : 0.44$
2.4 OMTIs Network

Plasma Bubble and Gravity Wave by Optical Mesosphere Thermosphere Imagers (OMTIs)

PI: Prof. K. Shiokawa
STEL, Nagoya Univ.

homepage: http://stdb2.stelab.nagoya-u.ac.jp/omti/index.html
2.4-2 Imaging of ITD by OMTIs

- ring current particles
- radiation belt plasmasphere
- aurora
- thermospheric waves from high latitudes
- gravity wave
- plasma bubble
- electrodynamc coupling

Locations:
- Russia
- Canada
- Moshiri Rikubetsu
- Shigaraki
- Sata
- Indonesia
- Australia
2.5 SEALION Network

PI: Dr. T. Nagatsuma
NiCT

Magnetometer & HF radar observations in Far East Siberia

South-East Asia low latitude Ionosonde Network (SEALION)

Domestic Ionosonde Network & Hiraiso Solar Observatory
3.1 Field Training of MAGDAS Installations in Africa (8/30-9/30, 2008)
3.2 Education on MAGDAS & Space Weather

Training on MAGDAS in Sudan

Lecture on Space Weather in Kenya

in Sudan

in Kenya

in Indonesia
## 4.1 Data Coordination in Japan

<table>
<thead>
<tr>
<th>Database Item</th>
<th>Agency/University</th>
<th>CoP (Contact Person)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Wind Data</td>
<td>Solar Terrestrial Environment Laboratory, Nagoya University (STEL)</td>
<td>Prof. Munetoshi Tokumaru</td>
</tr>
<tr>
<td>Space Environment Data (Satellite Measurements)</td>
<td>Japan Aerospace Exploration Agency (JAXA)</td>
<td>Dr. Takahiro Obara</td>
</tr>
<tr>
<td>Geomagnetic Field Data</td>
<td>WDC for Geomagnetism, Kyoto University</td>
<td>Prof. Toshihiko Iyemori</td>
</tr>
<tr>
<td>Space Weather Data</td>
<td>National Institute of Information and Communications Technology (NiCT)</td>
<td>Dr. Shinichi Watari</td>
</tr>
<tr>
<td>CHAIN, GMDN, MAGDAS, OMTIs, SEALION Data</td>
<td>Kyoto U., Shinshu U., SERC, STEL, NiCT</td>
<td>S. Ueno, K. Munakata, K. Yumoto, K. Shiokawa, T. Nagatsuma</td>
</tr>
</tbody>
</table>

To create awareness of ISWI in Japan, the STPP sub-committee is organizing a “ISWI-Japan Kick-Off Meeting” at Kyushu University that will take place in March of 2010. Soon after that, the “ISWI-Japan International Symposium” will be held at Makuhari in May of 2010 with the help of the Japan Geophysical Union (JpGU). This symposium will be held every year in Japan during ISWI (2010 through 2012).
4.2 Data Analysis & Publications

Analysis

Discussion

Publications

Presentation
5.1 Int’l Space Environment Service (ISES) for Public Outreach

PI: Dr. S. Watari

NiCT operates one of thirteen ISES centers. Each center makes forecasts of flares, geomagnetic storms, and high-energy proton events every day.

Space weather information service from NiCT
(http://swc.nict.go.jp/contents/index_e.php)

ISES Space Weather Center at NiCT, Tokyo
At the request of UNOOSA (Office for Outer Space Affairs), the Space Environment Research Center (SERC) at Kyushu Univ. (Japan) became the publisher for the ISWI Newsletter. In this photo, the editor of the newsletter is holding the inaugural newsletter at his desk at SERC.

Currently, the newsletter is being distributed via email to over 300 subscribers. The purpose of the newsletter is to deliver timely news and information to all participants of ISWI and is produced separate from the ISWI website. The publisher of the newsletter is the director of SERC, Prof. K. Yumoto.
6. Summary of Japan’s ISWI

1. Instrument Array Program
   2.1 CHAIN Network
   2.2 GMDN Network
   2.3 MAGDAS Network
   2.4 OMTIs Network
   2.5 SEALION Network
2. Training & Education
3. Data Coordination & Analysis
4. Outreach and ISWI Newsletter

Thank you for your attention!!

JAPAN ISWI; http://www2.nict.go.jp/y/y223/sept/ISWI/ISWI.html