

The International Space Weather Initiative (ISWI)

Nat Gopalswamy

NASA Goddard

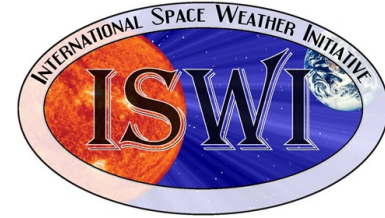
nat.gopalswamy@nasa.gov

and

Akimasa Yoshikawa

Kyushu University

ISWI, ILWS, & SCOSTEP

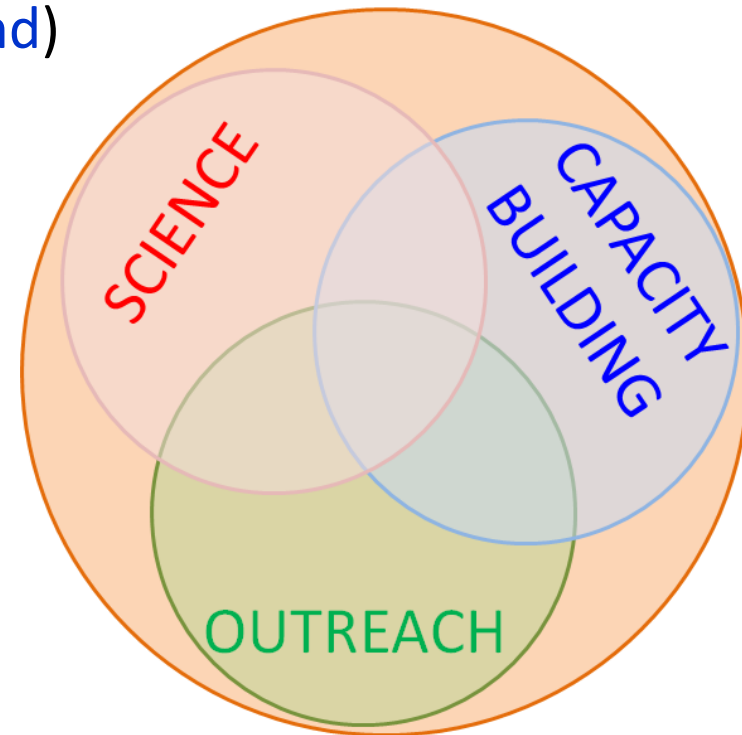


International Organizations interested in complementary aspects of the Sun – Earth System

- ISWI: International Space Weather Initiative (**ground**)
- ILWS: International Living with a Star (**space**)
- SCOSTEP: Scientific Committee on Solar Terrestrial Physics (**long-term science projects**)

ISWI is a program of international cooperation

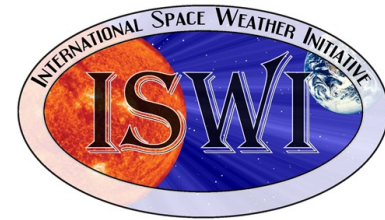
to advance the space weather science by a combination of instrument deployment, analysis and interpretation of space weather data, and Capacity building/public outreach





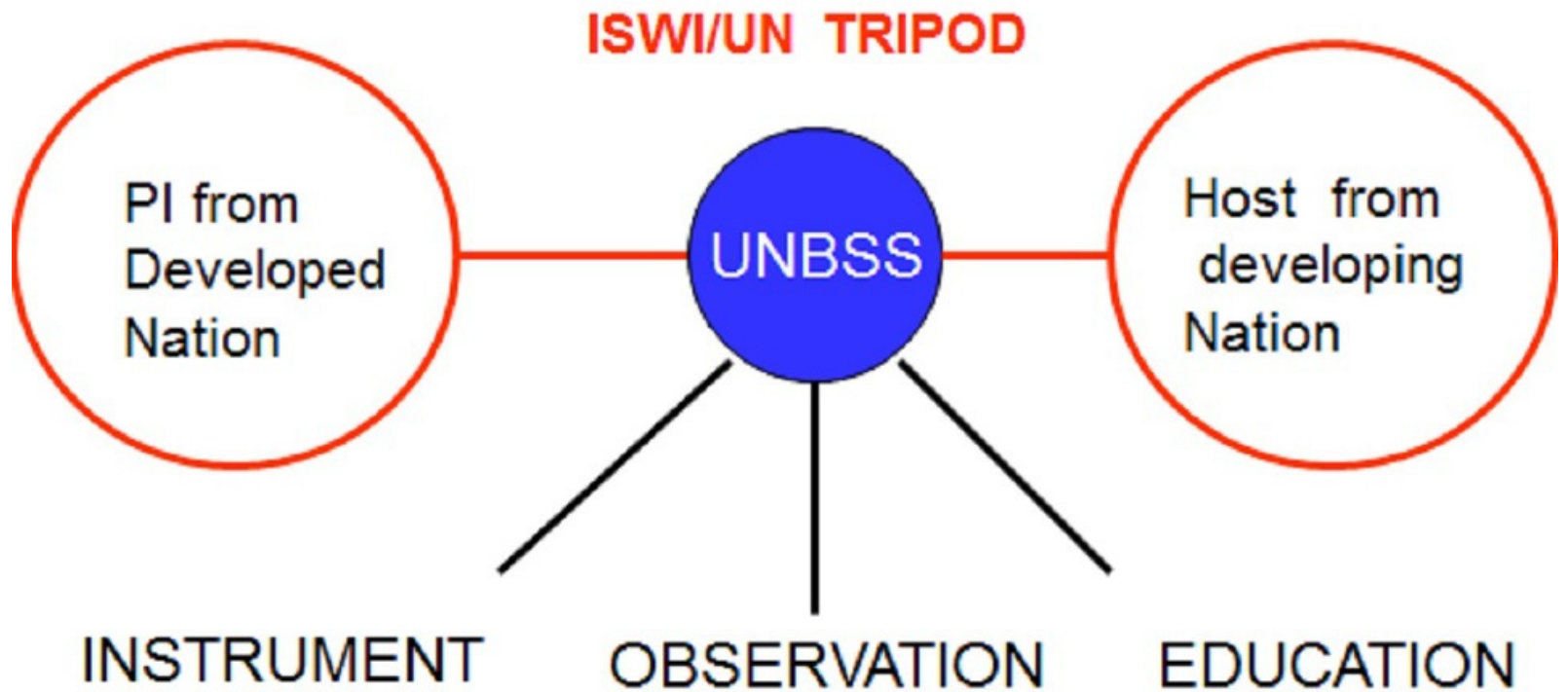
Overview

- 2005 – 2008 International Heliophysical Year (IHY)
- 2009 – International Space Weather Initiative (ISWI)
- IHY/ISWI have created a large community of space weather scientists in developing countries
- Many have matured to be scientists of international recognition
- ISWI community readily understands the need for forecasting service
- ISWI scientists have established space weather centers: e.g. Mexico, South Korea



ISWI Instrument Program & UN

GNSS
for Space
Weather
Applications



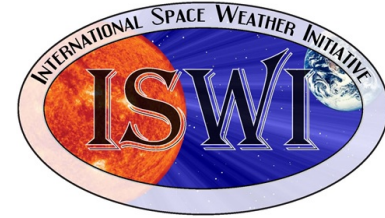
Started during IHY 2007

ISWI Part of the Permanent Space Weather Agenda of UNCOUOS

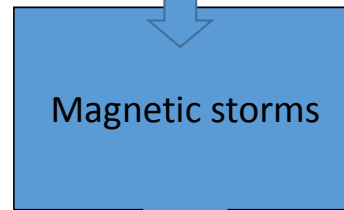
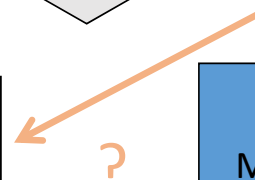
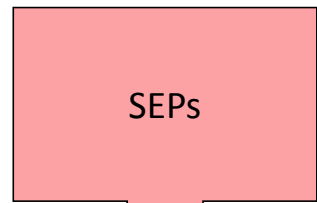
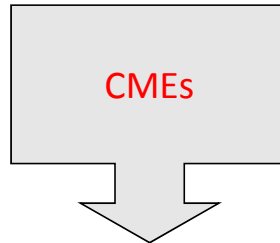
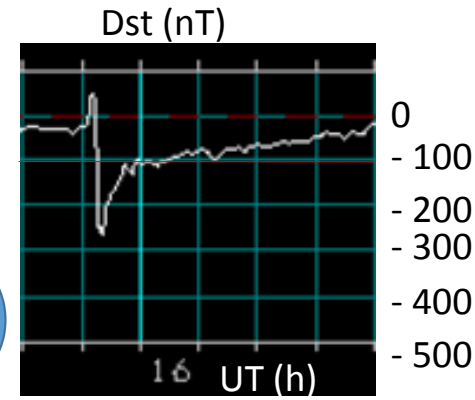
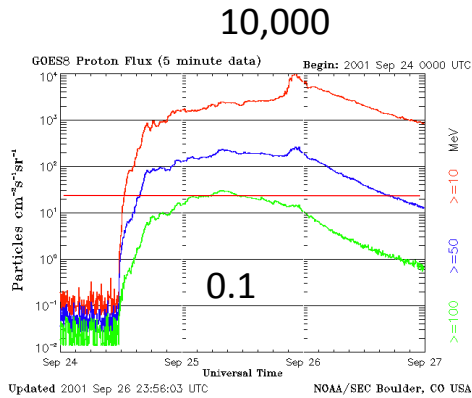


17 Instrument Concepts from 8 Countries

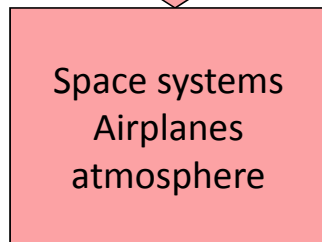
- 17 Approved Instrument Concepts: AMMA, AMBER, AWESOME/SID, CALLISTO, CHAIN, CIDR, GIFDS, GMDN, LISN, MAGDAS, OMTI, RENOIR, SOFIE, SAVNET, SCINDA, SEVAN, UEV
- from Armenia (1), Brazil (1), France (1), Germany (2), Israel (1), Japan (4), Switzerland (1), and USA (6)
- Details about the projects and Lead Scientists in: iswi-secretariat.org



ISWI Instruments in Sun-Earth Connection



Combine with in-situ space measurements



magnetometer networks
GPS receiver networks
VLF receiver network
Atmospheric instruments

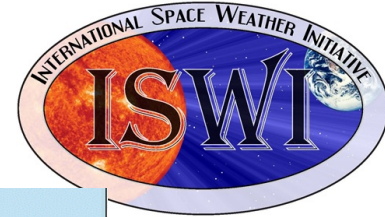
Also solar flare effects

Radio telescope network
H-alpha Telescope network
Particle detector networks

Combine with remote-sensing space- and ground-based measurements



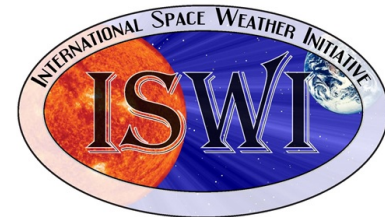
ISWI Instrument Sites



MAGDAS

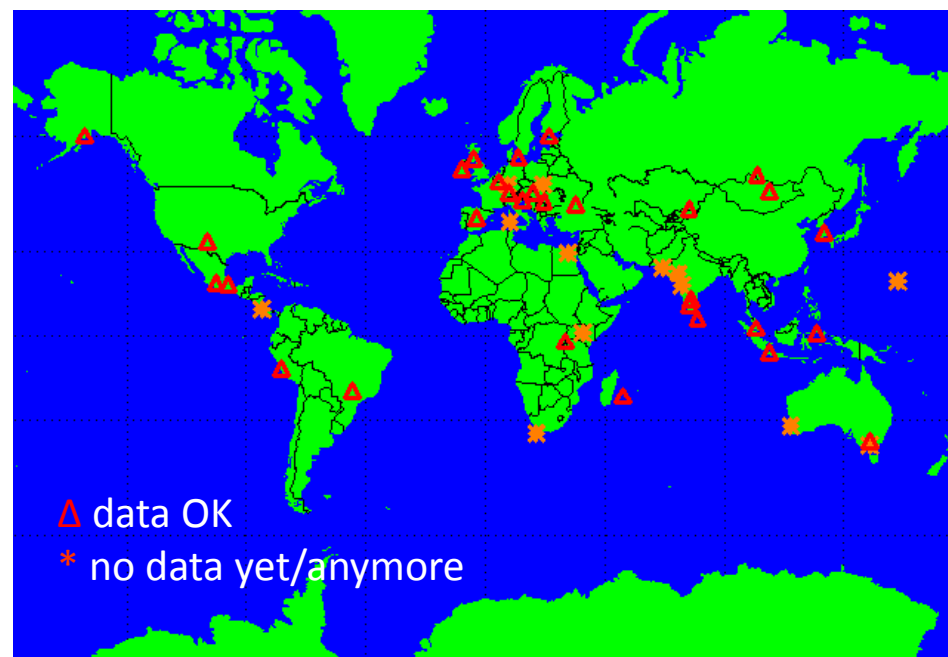
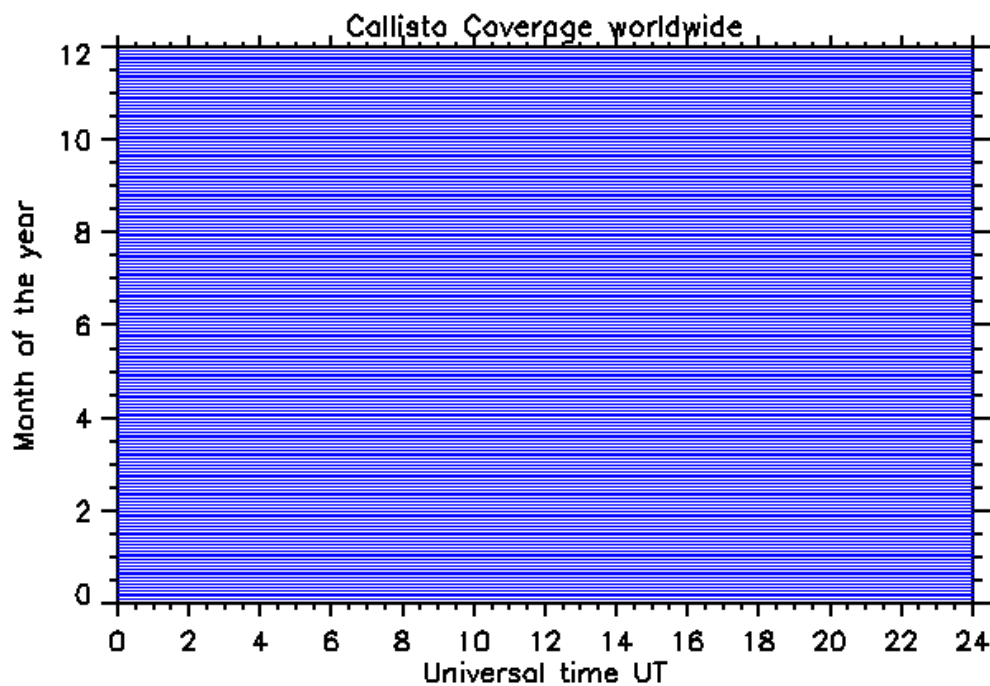
Scientists from developing and developed nations work together
 Students and faculty participate at all levels of the instrument project and science
 Data gaps closed due to deployment in crucial locations
 Heavy focus on Africa, with added schools and workshops

1000 instruments in 100 countries



24/7 Coverage of the Sun

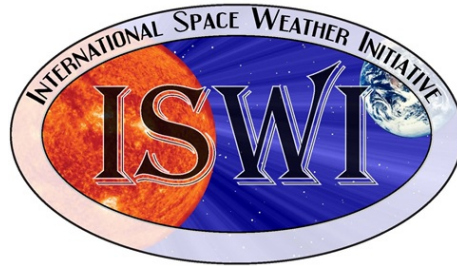
CALLISTO Locations



100% coverage achieved

<http://soleil.i4ds.ch/solarradio/callistoQuicklooks/>

CALLISTO spectrometer is a programmable heterodyne receiver built in the framework of IHY2007 and ISWI by former Radio and Plasma Physics Group (PI Christian Monstein) at ETH Zurich,



ISWI Governance

Secretariat

Nat Gopalswamy Executive Director

George Maeda Newsletter Editor

Mitko Danov Webmaster

Sharafat Gadimova UN Liaison

Pat Doherty Meeting Coordination

ISWI-secretariat.org

Steering Committee

Christine Amory-Mazaudier Jean Lilensten

Sharafat Gadimova Katya Georgieva

Nat Gopalswamy (chair) Keith Groves

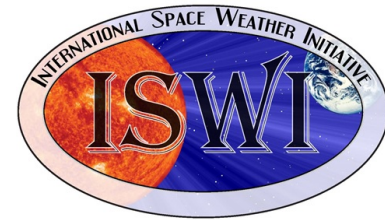
Lika Guhathakurta Norbert Jakowski Ian Mann

Christian Monstein Terry Onsager Babatunde Rabiou

Jean-Pierre Raulin Deborah Scherrer Kazunari

Shibata Chi Wang and Akimasa Yoshikawa

~80 Member countries



ISWI Sponsors

National Aeronautics and Space Administration
(Secretariat, Overall Support)



NASA

United Nations Office for Outer Space Affairs
(Workshop Support)



UN OOSA

Japan Aerospace Exploration Agency
(Workshop Support)



JAXA

Space Research and Technology Institute
(ISWI Website)



SRTI-BAS

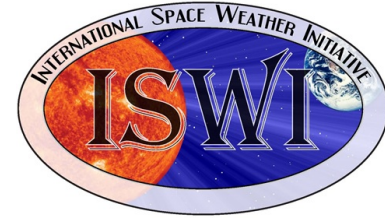
Kyushu University, Fukuoka, Japan (Newsletter)



Kyu Dai

(ISWI Newsletter, Workshop & School Support, MGDAS)

United Nations/Japan Workshop on Space Weather “Science and Data Products from ISWI Instruments” March 1-6, 2015 Fukuoka, Japan



- Hosted by ICSWSE (A. Yoshikawa LOC)
- Highly International
- Co-located with AOSWA
- Space Weather Joint Workshop
- Fukuoka Resolution for Open Data Policy
- Sun & Geosphere Publications



FCVB



SOOSTEP
Scientific Committee on Solar-Terrestrial Physics



Capacity Building



Recent schools in
Indonesia, Kenya, & Peru
in cooperation with SCOSTEP

Lectures are available online
in SCOSTEP and ISWI websites

Long-term interaction has helped
produce 28 PhDs in 9 countries
using ISWI data

Debbie Scherrer explains
how to make a spectrograph
during the teacher workshop in Kenya



Outreach:
Teacher
workshops

Lectures in
local high schools

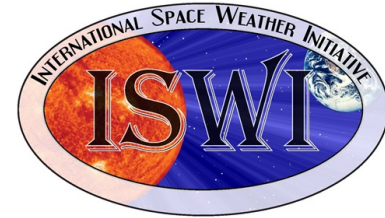




Lecture in a Nairobi High School



Dalmiro Maia
in Brookfield School
in Nairobi



Summary

- ISWI is a program of international cooperation in space weather activities: science, capacity building, and outreach - Active in about 80 countries
- Has synergistic relationship with many international organizations
- Continues to explore space weather overlap with other UNOOSA activities to enhance ISWI activities (e.g. GNSS, Space Debris,)
- Interact with the space weather service/operational community to inject ISWI data into operational models
- Continue to identify gaps and expand the networks; do life-cycle analysis of networks
- Open Data Policy being formulated [Fukuoka Resolution]
- Data infrastructure being developed for free and prompt access of ISWI data