

# ISWI Outreach and Capacity Building Activities

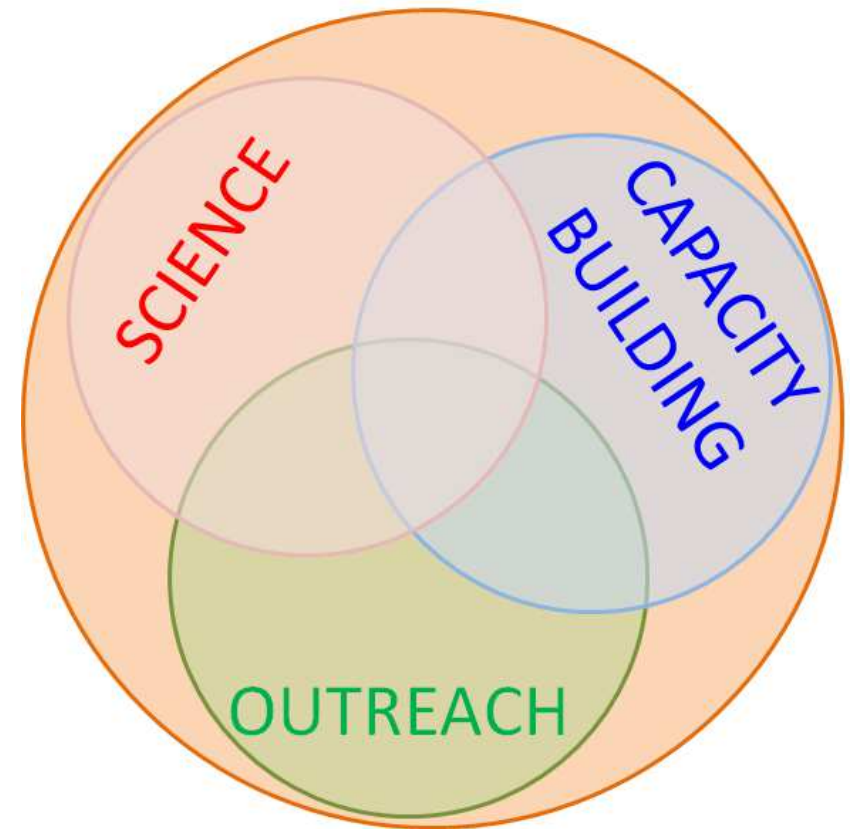
Nat Gopalswamy, ISWI Executive Director

NASA GSFC, Maryland, USA



# Science, Capacity Building & Outreach

- 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
- Grass-roots organization – **bottoms-up** approach to produce a space-weather-literate communities especially in developing countries
- Accomplished via **workshops, schools, and public events**
- Collaboration with SCOSTEP, ILWS, & COSPAR



# Objectives of Capacity Building

- Training in handling space-weather instruments
- Training in data handling
- Training in data analysis and interpretation
  
- Running advanced schools introducing topics from the solar interior to surface of Earth
- Hands-on experience to handle instruments and data sets
- Running intense mini workshops to target students/faculty handling a specific instrument group (OMTI, MAGDAS, SCINDA, CALLISTO, ...)
- Running ISWI workshops to enhance the general background in space weather

# Outreach

- Public lectures
- Teaching teachers

# General Guidelines

- To provide intense training to students and young scientists on the Sun – Earth System and Space Weather
- Tailored the suit the scientific interest of the region (expertise, instruments hosted, ...)
- Typically supported by local scientific bodies and ISWI
- Potential co-sponsors: SCOSTEP, EOARD, COSPAR, ICTP, ILWS, ...

# ISWI School – Bahir Dar Ethiopia: 28 Oct – 4 Nov 2010



## SPONSORS





# 2011 ISWI-Europe Summer School in Space Science

August 21-27, 2011, Astronomical Institute of the SAS, Tatranská Lomnica, Slovakia

Background Information >

## Background Information

 Print

Major Topics

Poster

Scientific Program

Lecturers

Selected Candidates

Co-organizers

Venue and Transportation

Accommodation

Technical Remarks

Local Organizing Committee

Visa Information

Contacts

Sponsors

Photo Gallery

Movies of A. Gojdicova

The ISWI is a follow-up activity to the successful IHY 2007 (that conducted many programs not only to popularise space science all over the world but also to create favorable conditions for joint research and training in some sort of global framework), but focusing exclusively on space weather. European scientists are successfully participating in the ISWI and many research level scientific instruments have been installed in many parts of Europe in the framework of the IHY and ISWI. In order to make maximum use of these and other similar initiatives and establish strong space research groups in Europe, a high level training of young students and researchers is very crucial. The present summer school is a continuation of the African Regional ISWI School, which was conducted during October 28-November 4, 2010 in Ethiopia and its major objectives include teaching the fundamental knowledge and skills in

- Fundamental and Space Physics
- Computational Space Physics
- Modern data analysis and Interpretation Methods
- Scientific Instrumentation for Space Exploration
- Programming using Open source.

[http://stara.suh.sk/id/iswi/summer\\_school/](http://stara.suh.sk/id/iswi/summer_school/)

<https://iswi-secretariat.org>

# Excursion to the Lomnický Peak Observatory

24 August 2011





# Space Science Schools: SCOSTEP as an Equal Partner with ISWI



Indonesia (Sep 2012); Kenya (October 2013), Peru (2014), India (2016)

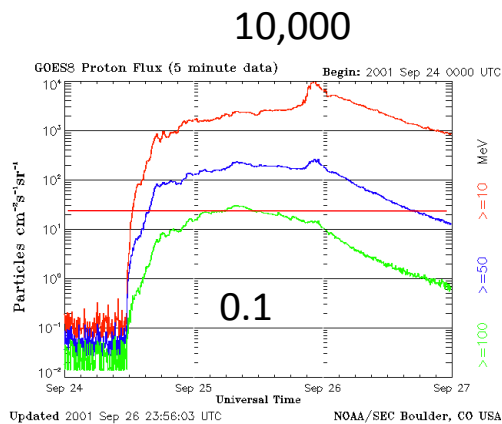
ISWI/SCOSTEP School Nairobi, Kenya Oct 21-Nov 1, 2013



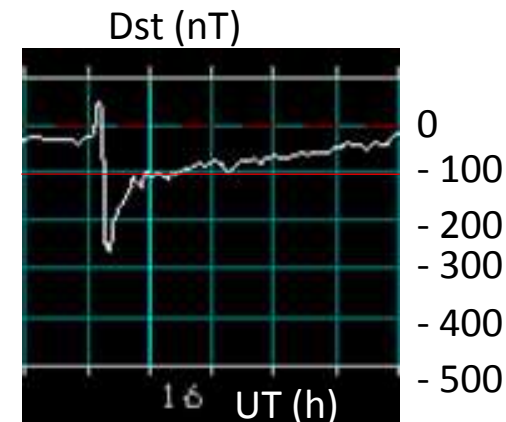
World-class scientists in discussion with students:  
John Raymond is one of the 2017 AGU Fellows!

# ISWI Instruments as a Capacity Building Activity

Also solar flare effects



CMEs  
CIRs  
from the Sun



Radio telescope network  
H-alpha Telescope network  
Particle detector networks

SEPs

Space systems  
Airplanes  
atmosphere

Magnetic storms

Space systems  
Magnetosphere  
Ionosphere  
Atmosphere  
Ground

Combine in-situ and  
space measurements

magnetometer networks  
GPS receiver networks  
VLF receiver network  
Atmospheric instruments

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

# ISWI Instrument Sites: 1000s trained

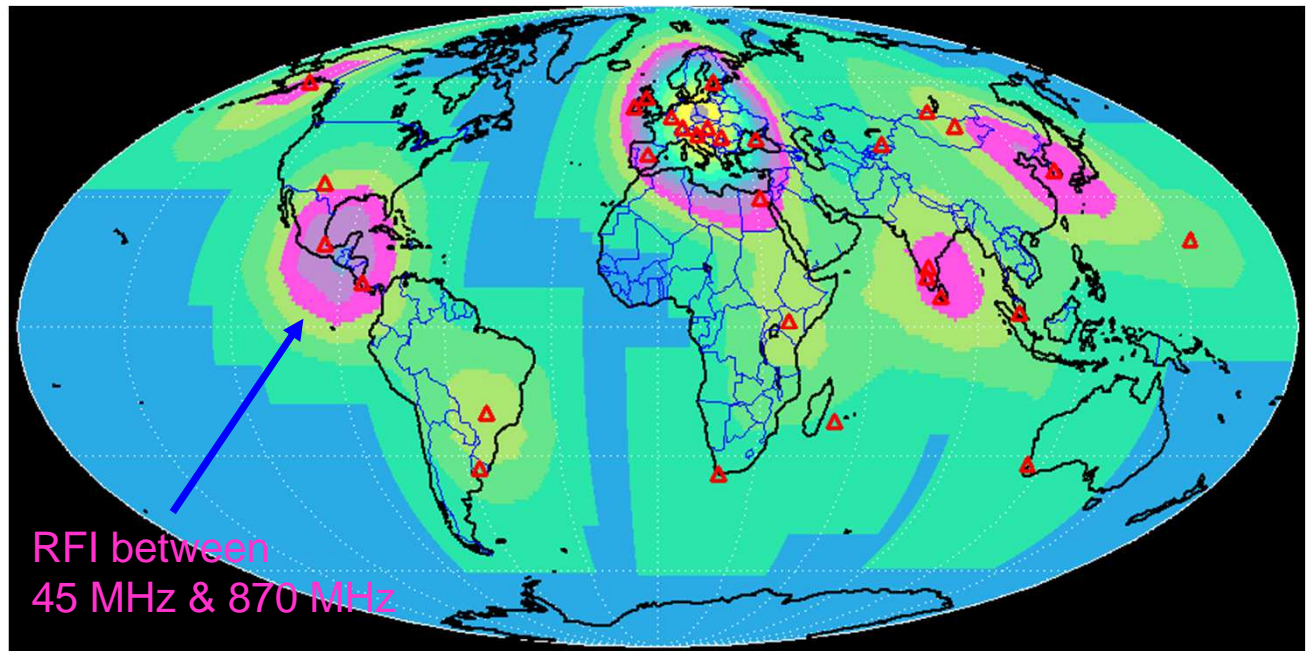


- Scientists from developing and developed nations work together in deploying and operating space weather instruments (currently there are more than 1000 deployments in more than 100 countries)
- Students and faculty participate at all levels of the instrument project and science
- 18 instrument networks from 8 countries (USA, Germany, Japan, Brazil, France, Israel, Armenia, Switzerland)

# e-CALLISTO: ISWI Instrument from Switzerland

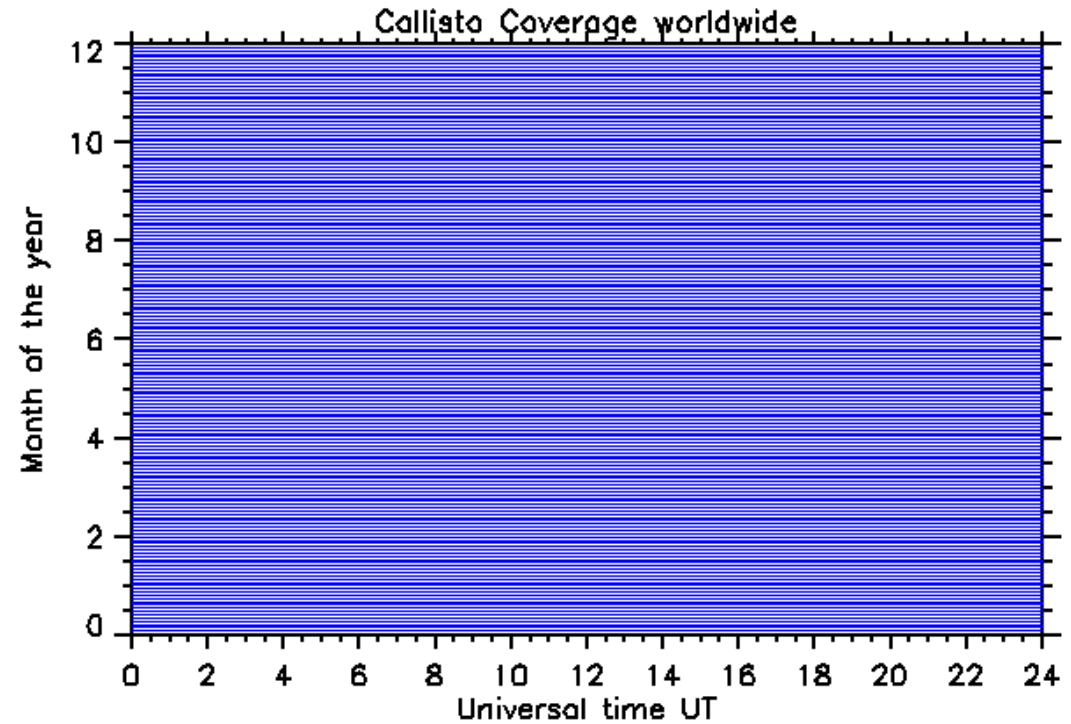
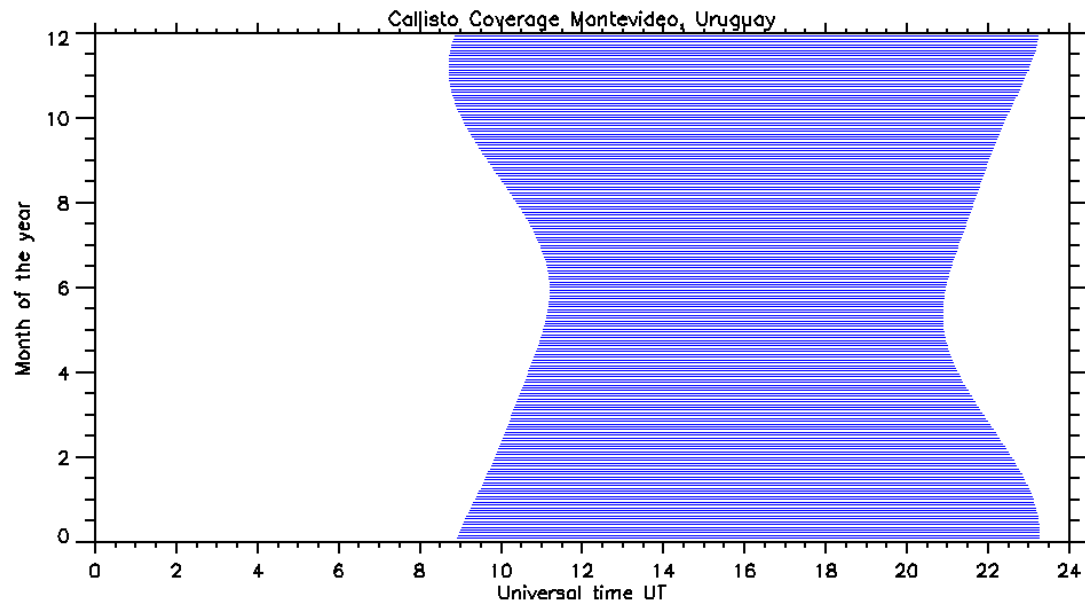


<http://www.e-callisto.org/>

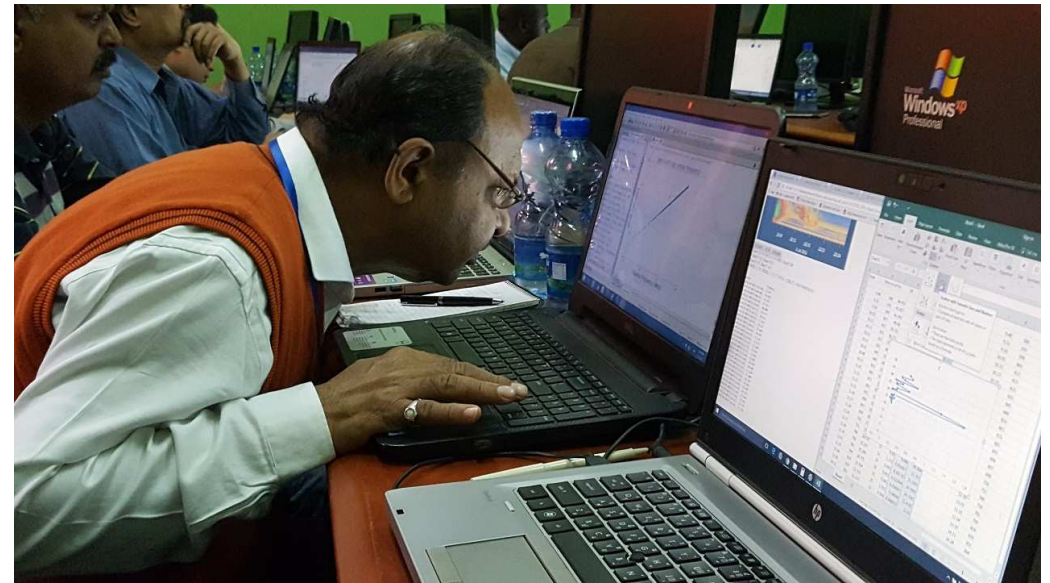
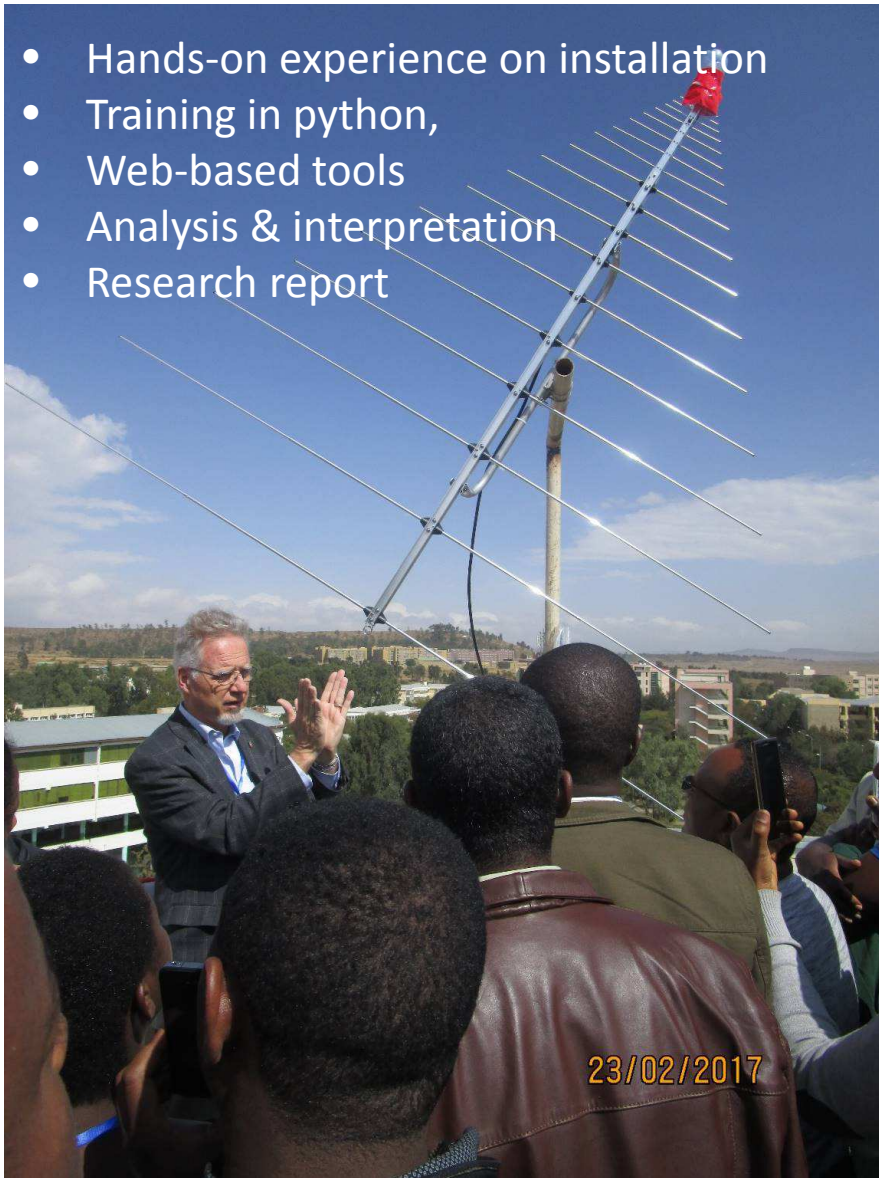


- Shocks and electron beams from the Sun
- Full coverage of the Sun with high redundancy
- Opportunity for hands-on experience

# Continuous Coverage of the Sun



- Hands-on experience on installation
- Training in python,
- Web-based tools
- Analysis & interpretation
- Research report



ISWI Mini Workshop – Mekelle University Feb 19-25, 2017



Outreach Activities: ISWI School lecturers give public lectures and interact with high school students

- Question-answer session with about 100 science students from local high schools during the ISWI/SCOSTEP School on Space Science in India – Nov 2016



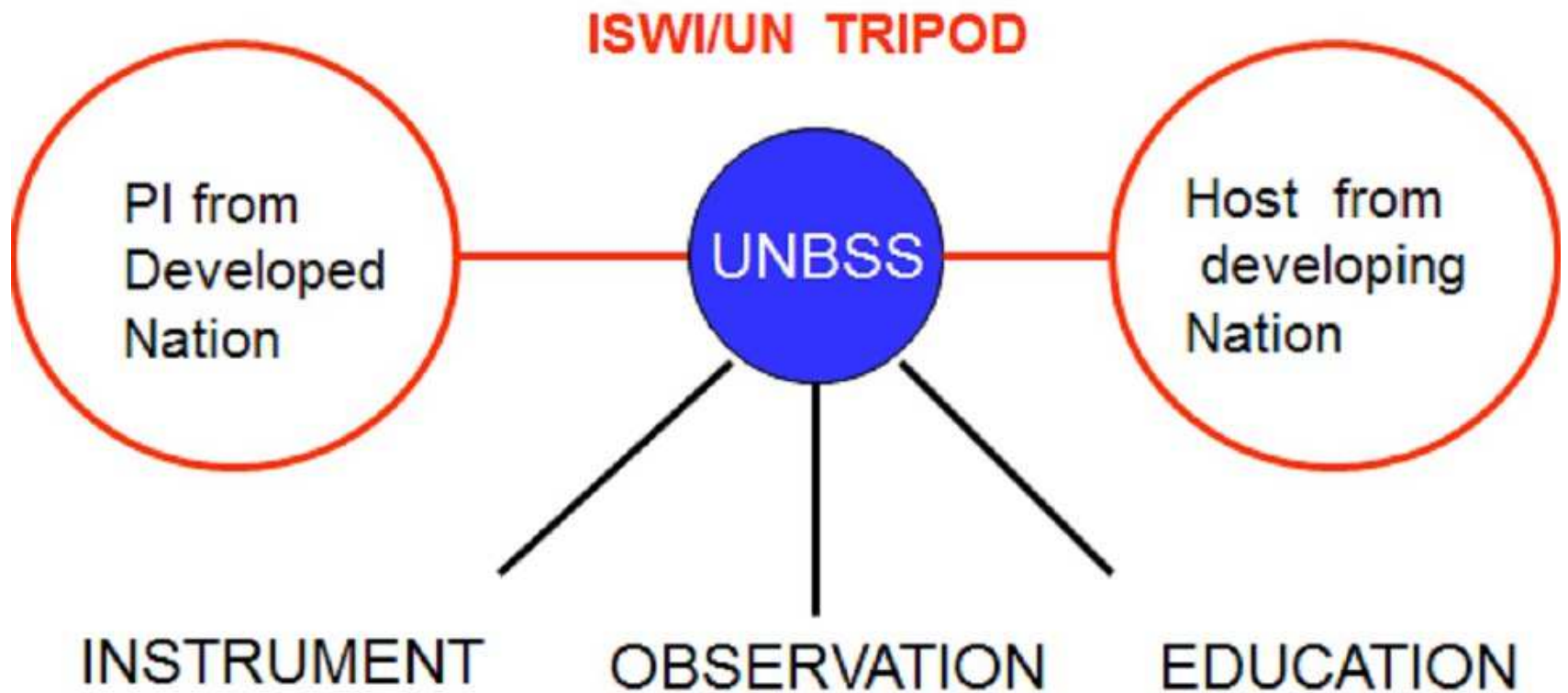


Debbie Scherrer explains how to make a spectrograph during the teacher workshop



# The UN Connection

GNSS  
for Space  
Weather  
Applications



More from Shafa Gadimova