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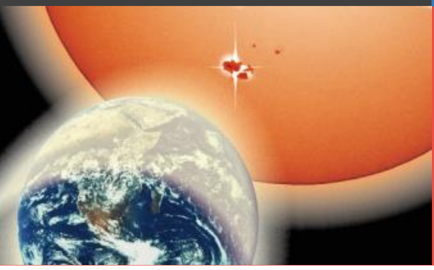

VarSITI Newsletter

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Project SEE / ROSMIC

Article 1:

Solar Irradiance Monitor on-board FengYun 3 Meteorological Satellites

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FengYun 3 (FY-3) series is second-generation polar-orbiting operational meteorological satellites of China, supporting weather forecasts, environmental monitoring and climate diagnosis. Solar Irradiance Monitor (SIM) is a key payload on-board FY-3 for total solar incident energy observation over the whole solar band using electrical substitution absolute radiometer (AR) as detector. FY-3 series has eight satellites which are divided into 3 batches; five of them are designed to monitor total solar irradiance with SIM-I/II (see Table 1 and 2).

Comparing to SIM-I, the FY-3C/SIM-II total solar irradiance (TSI) product has a great improvement in data accuracy and stability benefited from the new pointing system (see Figure 1). SIM-II TSI is traceable to World Radiometric Reference (WRR) by field calibration experiment before launch. On-orbit, the degradation is monitored by comparing with observation from the back-up absolute radiometer which is worked occasionally.

Figure 1. The instrument of FY-3C Solar Irradiance Monitor-II.

Table 1. Solar Irradiance Monitor launch plan.

batch	satellite	instrument	launch time	orbit	character
01	FY-3A	SIM-I	May 27, 2008	morning	3 ARs with big FOV
	FY-3B	SIM-I	Nov. 5, 2010	afternoon	3 ARs with big FOV
02	FY-3C	SIM-II	Sep. 23, 2013	morning	2 ARs with pointing system
03	FY-3E	SIM-II	*2018(plan)*	early-morning	3 ARs with pointing system
	FY-3F	SIM-II	*2020(plan)*	morning	3 ARs with pointing system

Table 2. The characters of SIM-I and SIM-II .

parameter	SIM-I	SIM-II (in FY-3C)
Spectral range	0.2-50um	0.2-50um
Absolute accuracy	0.5%	0.1%
Relative change over long-term	0.03%/3years	0.02%/4years
FOV	13.3º	2º
Pointing accuracy	-	0.1º
Temperature accuracy	-	0.3K

Figure 2 shows the ability of FY-3C/SIM-II for solar activity monitoring by comparing with sunspot data. Fig. 2(a) shows an obvious inverse correlation between SIM-II TSI and sunspot number data in 2014. Fig. 2(b) shows the monitoring results from SORCE/TIM, FY-3C/SIM-II and sunspot area data on a stronger solar event happened in Oct. 2014. It illustrates SIM-II has a good ability to capture the variation of solar energy.

Since TSI observation by FY-3 has been made nearly ten years, a work of reprocessing all TSI data supported by National Key Research and Development Program of China is ongoing.

In the future, a new instrument Solar Spectral Irradiance Monitor (SSIM) for solar spectral energy observation from 165nm to1650nm will be onboard the FY-3

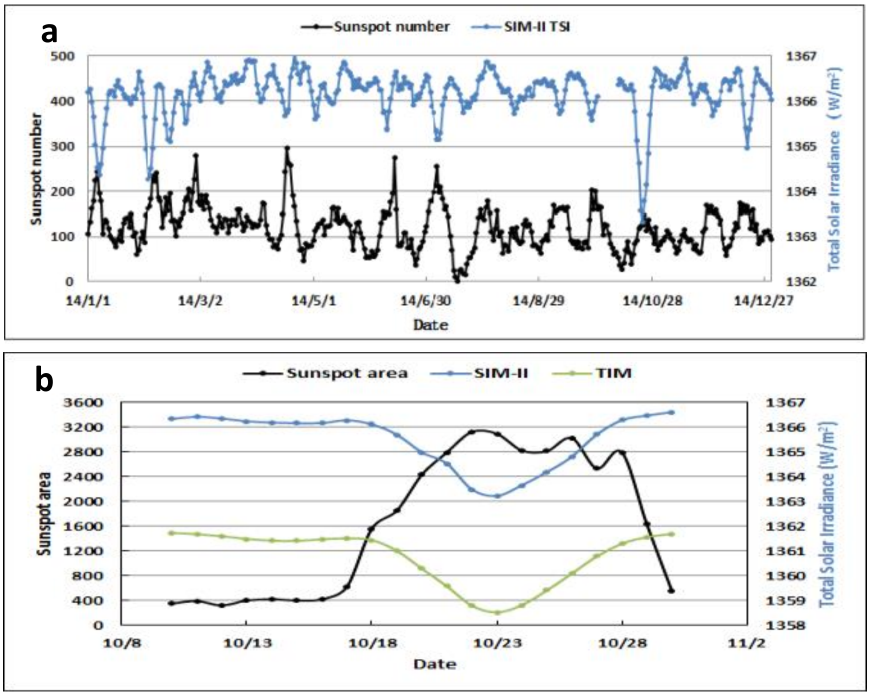

Figure 2. a: Comparison between FY-3C/SIM-II TSI and sunspot number during 2014; b: Sunspot area and TSI monitor results for the strong solar activity in Oct. 2014.

first early-morning satellite to obtain the simultaneous measurements of total and spectral solar irradiance on the same platform.

Acknowledgement

Thanks to SORCE team and Space Weather Prediction Center (SWPC) for providing the TSI and sunspot data.

Article 2:

Space Weather Studies of IONOLAB Group

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Space Weather (SW) is defined by the coupling of solar activity into the Earth's magnetosphere and the variability that is observed in the surrounding atmosphere. The ionosphere is one of the key components of SW affecting the ground-based and space-based systems for communication, navigation and positioning. The solar magnetic field and coronal mass ejections are proven to be the most important contributors of solar wind, and thus, they represent factors of risk from above. The lithosphere-atmosphere-ionosphere coupling provides evidence for impact of seismic activity on the ionosphere. The investigation of the risk factors affecting man-made devices and electromagnetic signals in the ionosphere from the solar, geomagnetic and seismic sources presents a major challenge.

IONOLAB is an interdisciplinary group where researchers have come together to develop state-of-the-art tools to model, image and predict the structure of ionosphere using GPS and ionosonde data. IONOLAB group is in close collaboration with IZMIRAN Institute from Russian Federation and Atmospheric Sciences Institute of Czech Republic (AS CR). IONOLAB group has been sponsored by the grants from The Scientific and Technological Research Council of Turkey (TÜBİTAK). There are six completed and one continuing projects since 2006, with more than 40 journal papers and 150 conference presentations.

For modeling and prediction of spatio-temporal variability, reliable and accurate observation of ionospheric state is necessary. IONOLAB has developed state-of-the-art observation, imaging and analysis tools for ionospheric parameters using ground-based dual-frequency Global Positioning System (GPS) and ionosonde recordings. Total Electron Content (TEC) in local vertical direction and Slant TEC (STEC) between receiver and satellite can be computed from any GPS-RINEX format automatically with highest possible temporal resolution for any station in polar, midlatitude or equatorial regions using IONOLAB-TEC and IONOLAB-STEC which includes the unique receiver differential code bias, IONOLAB-BIAS [1-3]. Examples are provided in Figure 1.

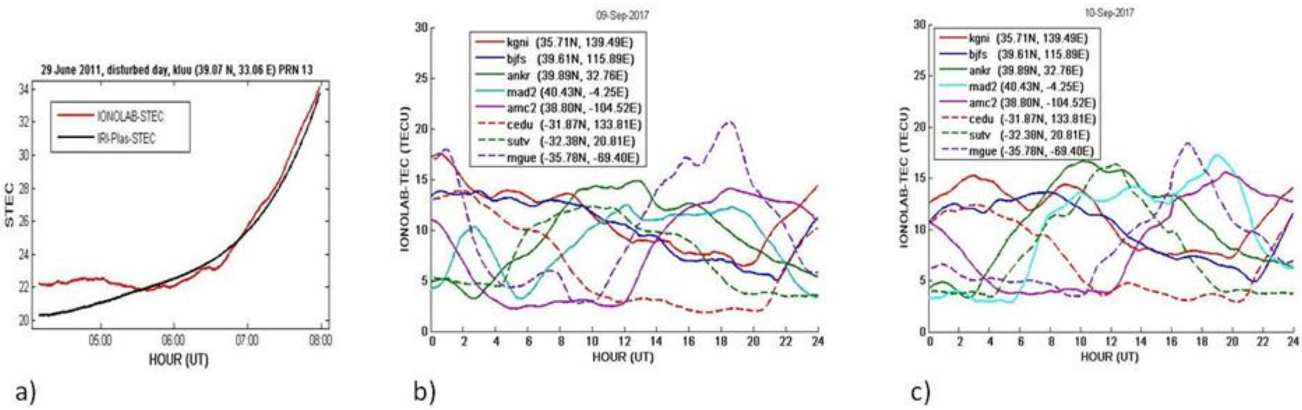

Figure 1. a) IONOLAB-STEC and IRI-Plas-STEC for kluu, PRN 13, June 29, 2011 disturbed day; IONOLAB-TEC for kgni, bjfs, ankr, mad2, amc2, cedu, sutv, mgue for b) September 9, 2017; c) September 10, 2017.

IONOLAB supports International Reference Ionosphere extended to Plasmasphere (IRI-Plas) model that can provide ionospheric parameters up to GPS satellite orbital height of 20,000 km. IRI-Plas can incorporate TEC values for updating the ionospheric state to its current value. Also, 10 different solar and geomagnetic indices can be chosen for better representation of geomagnetic storm effects [4,5]. IONOLAB-TEC [6], Online IRI-Plas [7], IRI-Plas-MAP [8] and IRI-Plas-STEC [9] are provided as unique online SW services at www.ionolab.org. Examples are given in Figures 1 and 2.

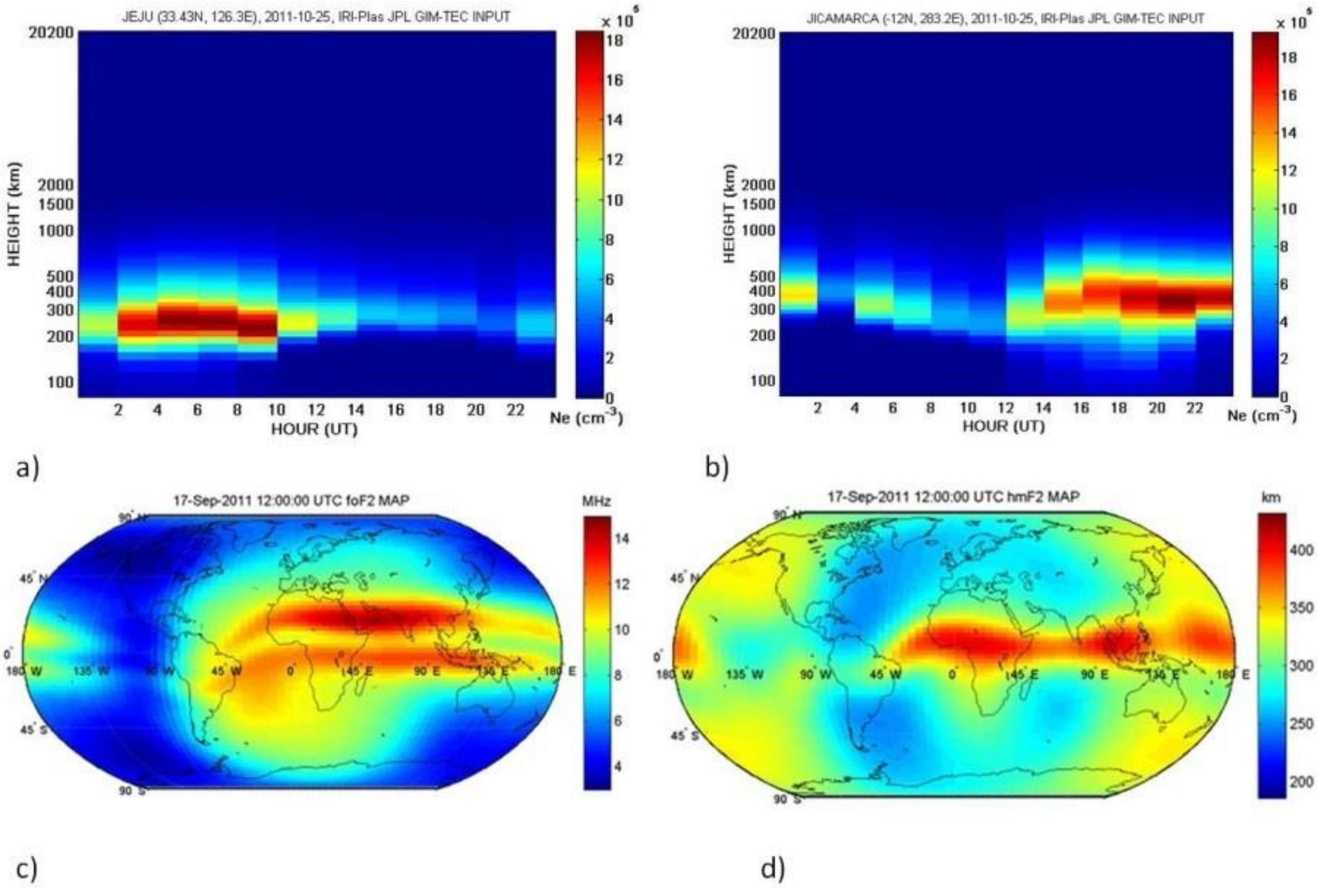

Figure 2. IRI-Plas Electron density profiles with JPL GIM-TEC input for October 25, 2011, disturbed day a) Jeju, b) Jicamarca; IRI-Plas-MAP with JPL GIM-TEC input for September 17, 2011, disturbed day at 12:00 UT c) foF2, d) hmF2.

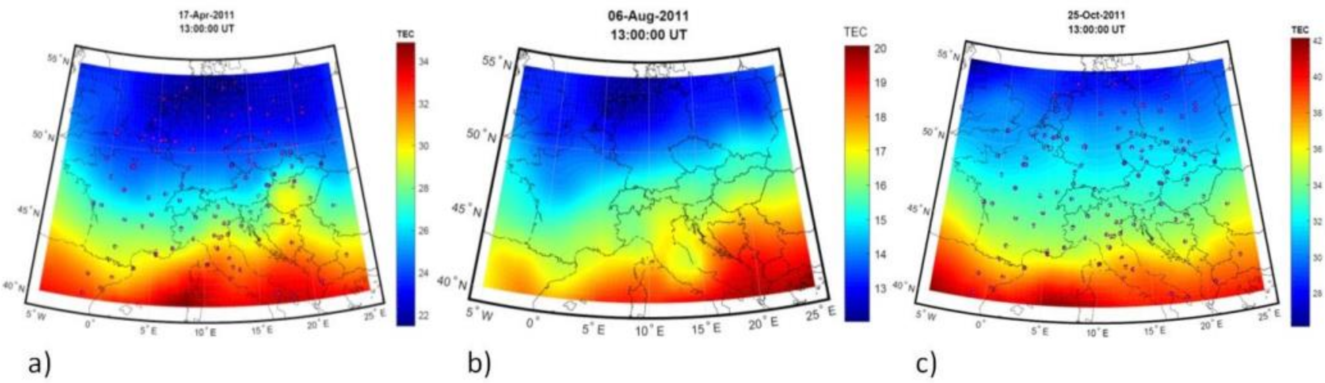

Figure 3. IONOLAB-MAP TEC maps of Europe with spatial resolution of 0.5° in latitude and longitude at 13:00 UT on a) April 17, 2011, quiet day; b) August 6, 2011, negatively disturbed day; c) October 25, 2011, positively disturbed day.

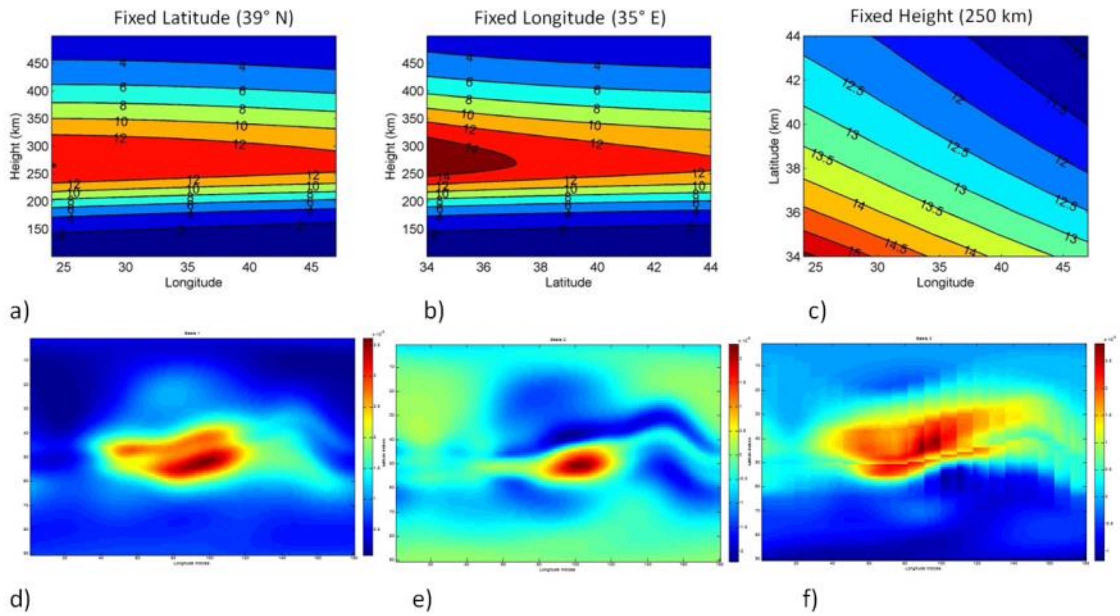

Figure 4. IONOLAB-CIT Electron density reconstruction slices over Turkey on March 10, 2011, positively disturbed day at 12:00 UT a) for fixed latitude 39° N, b) fixed longitude 35° E, c) fixed height 250 km; SVD basis for Global CIT for July 2004 at 0200 UT, altitude 390 km d) first basis, e) second basis, f) third basis.

IONOLAB-MAP is a high resolution 2-D mapping tool for any ionospheric parameter. IONOLAB-MAP uses a two stage algorithm that involves Inverse Distance Weighting (IDW) and Kriging where theoretical semivariogram is computed from Matern Family using Particle Swarm Optimization (PSO) [10].

IONOLAB-CIT is a unique regional Computerized Ionospheric Tomography (CIT) algorithm that incorporates GPS-STEC into IRI-Plas with advanced optimization techniques [11]. The ionospheric state is tracked in 4-D using an advanced Kalman Filter. Global CIT can be obtained with unique IONOLAB Singular Value Decomposition (SVD) based algorithm [12]. Examples are given in Figure 4.

IONOLAB continues to contribute investigation of SW with other algorithms and tools [13] such as DROT [14], IONOLAB-FFT [15], IONOLAB-RAY [16] and IONOLAB-PDF [17].

Acknowledgment

The IONEX files that include GIM-TEC, Satellite DCB and ephemeris data that are used in computation of IONOLAB products are obtained from IGS Iono Working Group Data Analysis Center of Jet Propulsion Laboratory at ftp://cddis.gsfc.nasa.gov/pub/gps/products/ionex/. The study is currently supported by grant TUBITAK 115E915.

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Article 3:

Progress reached by ROSMIC WG3 “Trends in Mesosphere and Lower Thermosphere”

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Selected new results attained by participants of the ROSMIC project working group WG-3 over 2016-2017 are presented. In this period WG-3 also co-organized the 9th biennial workshop “Long-Term Changes and Trends in the Atmosphere”, which was held in Kühlungsborn, Germany on 19-23 September 2016.

A key result concerns the CO_2 volume mixing ratio (VMR). Trends derived from satellite observations (TIMED/SABER and ACE/FTS) at heights between 80-110 km were shown to be significantly higher than model trends, which is consistent with the surface trend of CO_2 VMR (e.g., Yue et al., 2015). Observed trends are only reproducible by models with unrealistic assumptions. However, careful analysis of the derivation method of CO_2 VMR from measurements “returned” profile trends to values quite consistent with current models (Qian et al., 2017), as shown in Fig. 1.

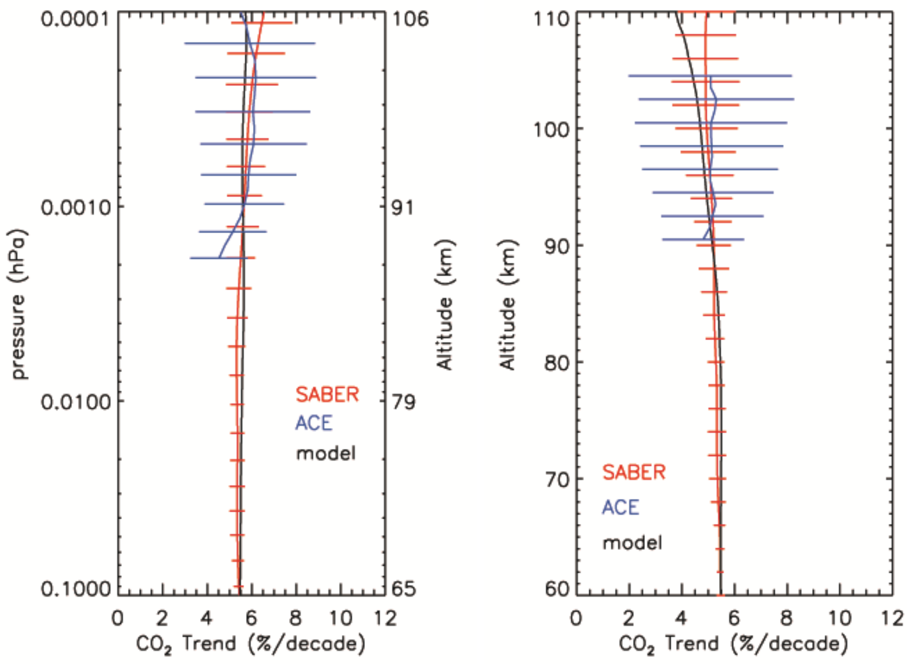

Figure 1. CO2 volume mixing ratio trends in the mesosphere and lower thermosphere in pressure (left panel) and altitude (right panel) coordinates. Black curve – model WACCM; blue curve – ACE/FTS measurements; red curve – TIMED/SABER measurements. Adopted from Qian et al. (2017).

Stratospheric temperature trends derived from AMSU/Aqua satellite observations during 2002-2013 are approximately -0.5 K/decade in the middle stratosphere (e.g. 30 km), while lidar trends at middle latitudes reach -2 K/decade in the middle stratosphere near 35 km (Khaykin et al., 2017). Temperature trends derived from GPS radio occultation measurements were found to be comparable with satellite-based trends in the middle stratosphere but weaker in the lower stratosphere. For mesopause region temperatures, various recent results indicate a change from no trend in the past to a negative trend in more recent years, likely due to changes in ozone trends.

Polar mesospheric cloud (PMC) ice water content (IWC) in bright clouds increased rapidly in 1979-1990s, but became almost constant in 1990s-2013. This pattern correlates with the behavior of stratospheric ozone. Sensitivity analysis shows comparable role for temperature and H2O influence on NH trends in IWC but mainly temperature influence on SH trends in IWC (Hervig et al., 2016).

A combined long (1979-2016) series of low frequency and meteor radar wind measurements at Collm (51oN), Germany reveals a trend of gradual change of zonal wind from strong eastward to weak eastward, and a trend to weakening of meridional wind (both northward and southward) in all months of the year. Figure 2 also illustrates this result, with fewer regions exceeding ±8 m/sec (orange and red in winter, blue and green in summer) in recent years.

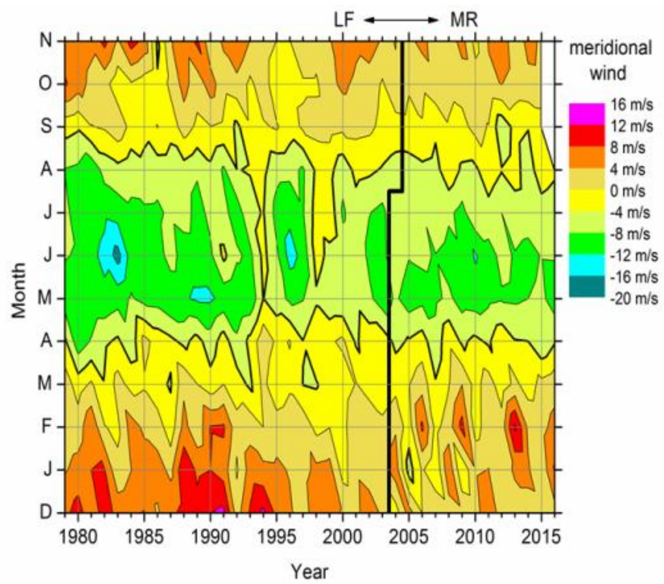

Figure 2. Meridional wind near 90 km, Collm, Central Europe, 1979-2016.

The global infrared (IR) energy budget of the thermosphere has been reconstructed back 70 years (to 1947) based on SABER observations of NO and CO2 IR cooling in 2002-2016. Its close relation to the long-term behavior of a combination of F10.7, Ap and Dst indices is shown in Fig. 3. The IR cooling, integrated over a solar cycle, is relatively constant over the 5 complete cycles (19 – 23) studied (Mlynczak et al., 2016) – areas corresponding to individual solar cycles in Fig. 3 are quite comparable. Figure 3 also shows that CO2 is the dominant cooling agent above 100 km (particularly in the lower thermosphere), with less sensitivity to solar activity than NO cooling.

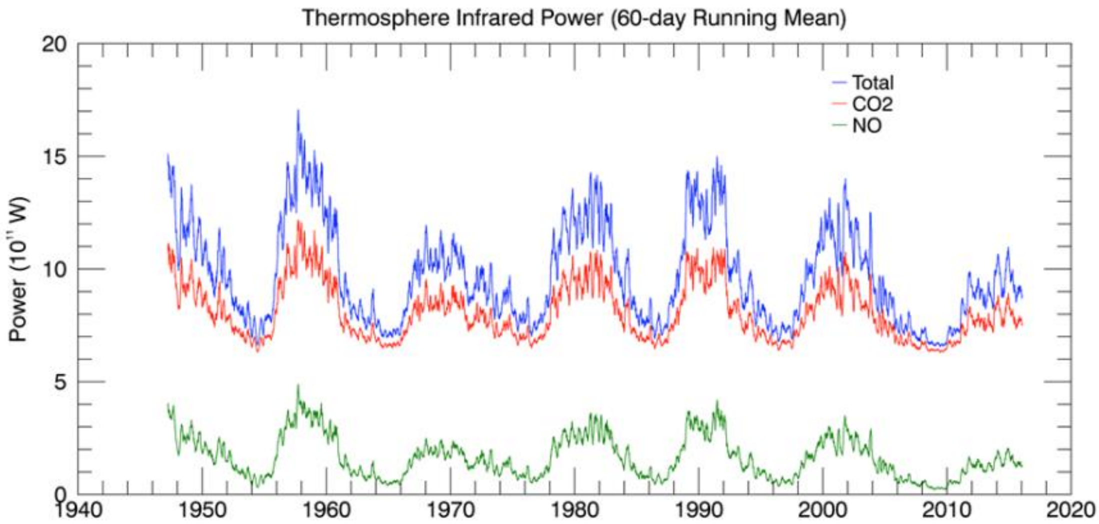

Figure 3. The reconstructed time series of infrared cooling of the thermosphere above 100 km back to 1947 using extant F10.7, Ap and Dst. Blue curve – total cooling; red curve – CO2 cooling; green curve – NO cooling. Adopted from Mlynczak et al. (2016).

Calculation of ionospheric trends requires removal of solar cycle effects from the data. Analysis of trends in foE shows that the solar correction (using both F10.7 and solar Lyman-α flux) changes with time, perhaps due to changing relation between solar ionizing radiation and solar proxies (there are indications of such changes on the Sun in cycles 23 and 24). Figure 4 shows that the pattern of foE residuals is not plausible with a single solar correction (left panel), whereas using three different consecutive solar corrections (right panel) it is quite reasonable (Lastovicka et al., 2016).

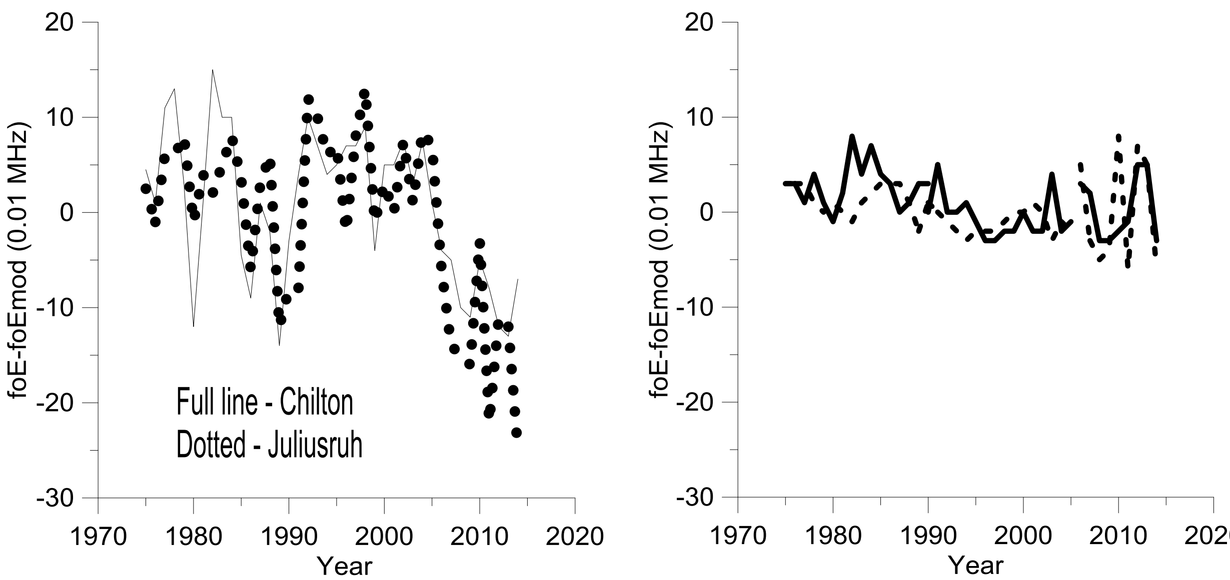

Figure 4. Residuals foE-foEmod for European stations Juliusruh and Chilton with one solar correction (left panel) and solar corrections for three separated intervals (right panel). Adopted from Lastovicka et al. (2016).

Further progress on trends in the upper atmosphere will be presented at the 10th workshop "Long-Term Changes and Trends in the Atmosphere" to be held in Hefei, China in May 2018 with ROSMIC WG-3 as co-organizer.

Acknowledgement

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Magnetic Field Modeling in Solar Flares

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(Foto: Sissi Furgler)

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Solar flares and coronal mass ejections are the most energetic events in our solar system, yet is the physics behind still not well understood. They are caused by the interaction of coronal magnetic field that is rooted in strong surface magnetic field of active regions [1].

The surface magnetic field is routinely measured by, e.g., the Solar Dynamics Observatory Helioseismic and Magnetic Imager [2,3] at a high spatial resolution and temporal cadence. In contrast, direct measurements of the coronal magnetic field are difficult to perform and usually not at hand on a regular basis [4]. To circumvent that limitation, we use the measured photospheric magnetic field as an input to sophisticated 3D nonlinear force-free (NLFF) models, and in that way retrieve information on the coronal magnetic field indirectly [5].

Tracing NLFF model magnetic field from the location of flare kernels/ribbons (assumed to resemble the low-atmosphere intersection of newly reconnected magnetic field; Fig.1a) allows it to make the flare-involved coronal magnetic field visible (Fig.1b). The similarity of the model field and the observed flare-associated coronal EUV emission (Fig.1c) supports the validity of the model approach. More importantly, it allows us to understand the observed strong coronal flare emission, which in the presented case stemmed from magnetic field with a high degree of shear and/or twist [6].

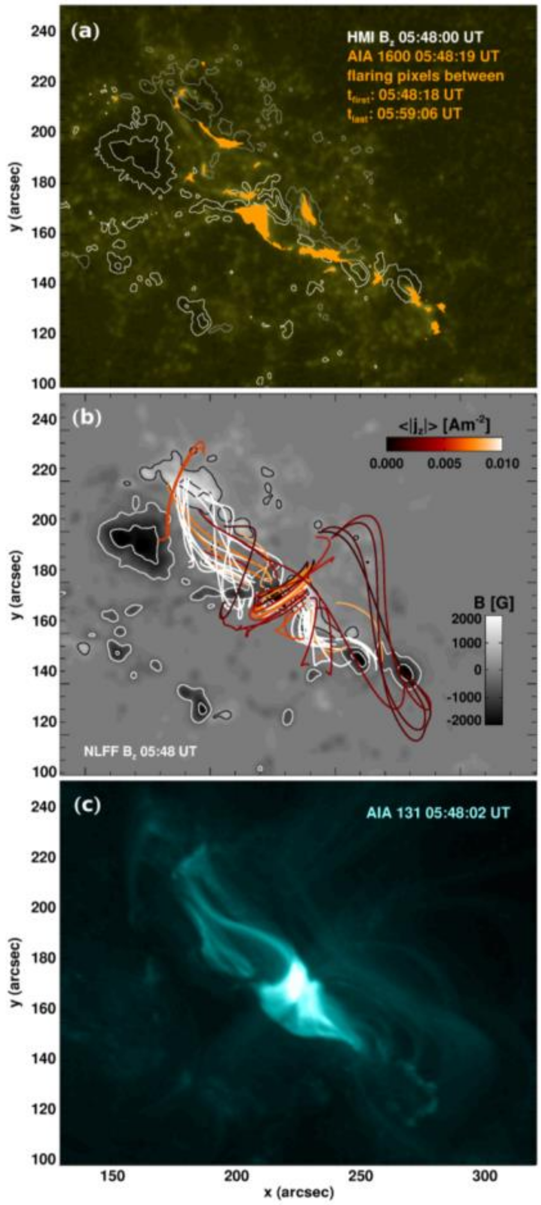

Figure 1. Flare-related emission and reconstructed NLFF field of AR NOAA 11261. (a) Accumulated flare pixel positions (orange filled contours) on top of a AIA 160 nm image. Black and white contours outline vertical photospheric fields of ±[0.5,1.5] kG, respectively. (b) NLFF field lines that originate from the accumulated flare pixels shown in (a). The coloring of the field lines is proportional to the inherent vertical electric current density. (c) AIA 13.1 nm image, showing hot flare plasma. (Adapted from Fig. 5 of [6].)

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Measuring the Meridional Flow and Differential Rotation of the Sun from Magnetograms

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Two large-scale flows are believed to govern the dynamics of magnetic field inside the Sun: Meridional Flow and Differential Rotation. Komm, Howard & Harvey (1993) and Hathaway & Rightmire (2010) showed that local correlation tracking performed on solar magnetograms gives us reliable measurements of these flows on the solar surface (Fig. 1). We have measurements of these flows over the last two decades from high cadence observations, but their long term evolution is not well established yet. We are adapting Hathaway & Rightmire's feature tracking algorithm to analyze daily magnetograms from KPVT, SPMG, MDI and HMI (1973-2017) so that we can have continuous measurements spanning four solar cycles.

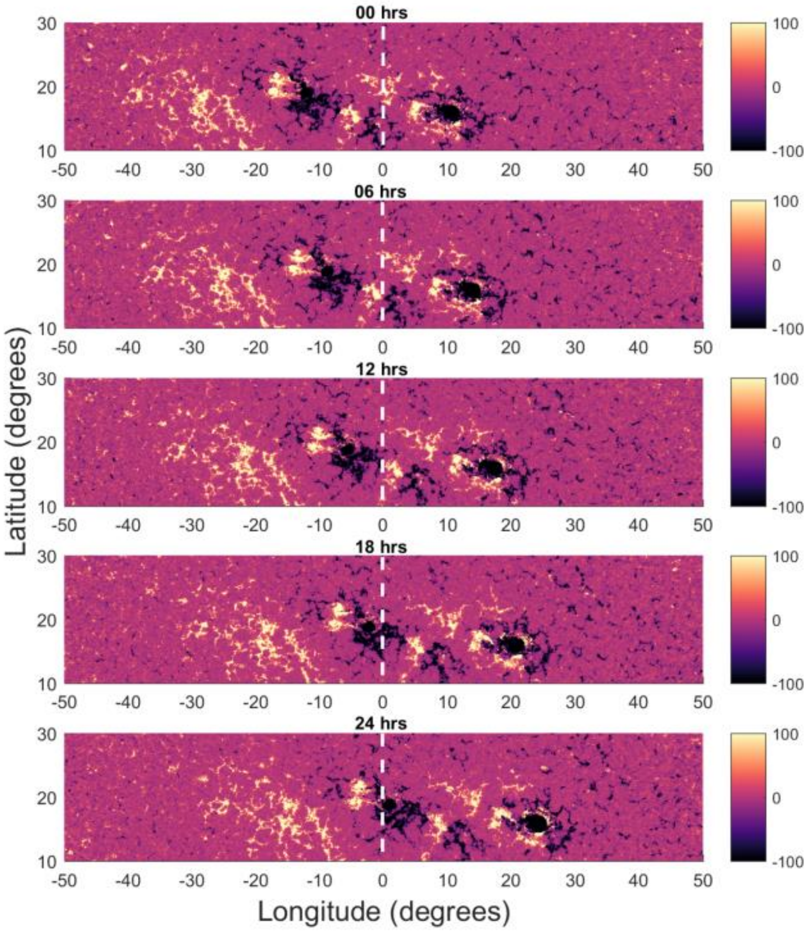

Figure 1. A section of solar magnetograms from HMI on 3rd July 2012 projected onto a uniform latitude-longitude grid showing the evolution of magnetic features as well as their transport by differential rotation of the Sun. Time increases in steps of six hours from top to bottom and the magnetic field is in Gauss. We mask out sunspots to track the weak but large scale network of magnetic features. It is not possible to notice vertical transport by the meridional flow in these panels by eye, which is what makes measuring it very difficult.

Measuring meridional flow requires incredible sensitivity because detecting it requires sub-pixel accuracy; even in HMI magnetograms (which have the best resolution for full disk). We fixed a systematic error (peak-locking) in the tracking algorithm which increased its accuracy by an order of magnitude (Figs. 2a & 2b), and have found another systematic error which appears to be a center-to-limb effect that varies as a function of the timelag (Figs. 2c & 2d) between two successive images. Such a center to limb effect is fairly common in correlation tracking on solar images but its source still remains a mystery. Work is in progress on fixing this error. This work will help constrain the differential rotation and meridional flow profile which can be used as inputs for kinematic solar dynamo simulations.

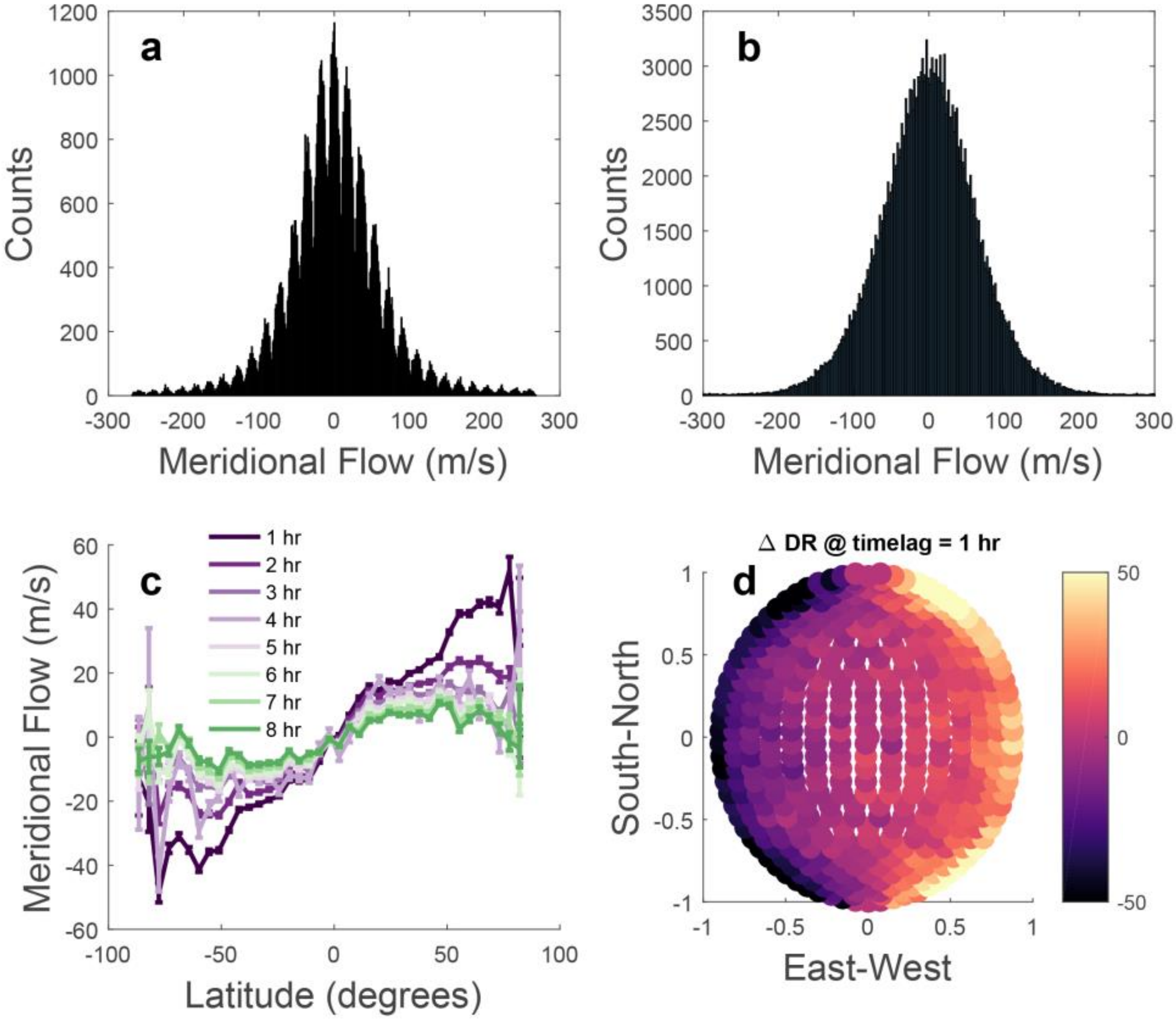

Figure 2. a: A histogram of meridional flow measurements with a timelag of 8 hrs between successive images. There appear to be more measurements at integer pixel shifts (every 18 m/s) than in between. All correlation tracking routines used for sub-pixel shift detection show this peak-locking phenomenon unless it is dealt with, b: results from our new algorithm -- gets rid of peak-locking and can track a shift of 0.04 pixels reliably, thereby increasing tracking accuracy by an order of magnitude, c: meridional flow profiles at different timelags show a large variation, d: the measured residual of differential rotation after subtracting the longitudinal average (in m/s). It appears as if the left half of the Sun rotates 100 m/s slower than the right half. Along with Fig. 2c, this is representative of a center-to-limb effect like a flow away from disk center.

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Hathaway, D.H. and Rightmire, L., "Variations in the Sun’s Meridional Flow over a Solar Cycle", Science, Mar 2010, 327, 1350.

Meeting Report 1:

The Second VarSITI General Symposium, 10-15 July 2017, Irkutsk, Russia

Kazuo Shiokawa
Institute for Space-Earth Environmental Research, Nagoya University, Nagoya, Japan

Kazuo Shiokawa

The 2nd VarSITI General Symposium was held at Irkutsk, Russia on July 10-15, 2017 with the local support by the Institute of Solar-Terrestrial Physics of the Russian Academy of Science. This symposium was held with 162 participants from 26 countries to overview the progress of various activities in the four VarSITI projects at the fourth year of the program. The symposium consists of 7 sessions, 1) Solar and heliospheric drivers of earth-affecting events, 2) Long-term variation of the sun, geomagnetic activity, and climate, 3) Coupling between the earth's atmosphere and space and its relation to quiet and active sun, 4) Understanding the earth's space environment and its connection to space weather, 5) Sun to mud campaign event study, 6) Atmospheric response to solar variability and modulation of its impact on timescales from minutes to decades, and 7) Data archiving and analysis tools. A special issue of JASTP will be published with papers based on the Symposium presentations, with promotional access (free for the authors, 9 months free to download). The sponsors of the symposium are SCOSTEP, ROSTEC/FASO/RFBR/ISTP of Russia, JSPS core-to-core program/PWING Project/PSTEP Project/IEEE, Nagoya University of Japan, COSPAR, and NSF of USA.

Figure 1. Group Photo of the 2nd VarSITI general symposium.

VarSITI

Meeting Report 2:

International Capacity Building School on "Advanced Concepts in Solar-Terrestrial Coupling in the Context of Space Weather"

D. Nandi[1] and L. Kashapova[2]
[1]Center of Excellence in Space Sciences India and Department of Physical Sciences, IISER Kolkata, Kolkata, India
[2]Institute of Solar-Terrestrial Physics, Irkutsk, Russia

Dibyendu Nandi

Larisa Kashapova

This school targeting graduate students and early-career scientists was held in Irkutsk, Russia during 9-14 July, 2017 on the sidelines of the VarSITI 2017 General Symposium. The school – broadly based on the Space Weather Research, Education and Development Initiative –introduced the 35 participants to interconnected themes in space weather sciences through tutorial lectures and trained them in accessing and analyzing web-based space weather data products. The school was organized in collaboration with personnel from the Community Coordinated Modeling Center (CCMC/NASA), the Institute of Solar-Terrestrial Physics (Irkutsk, Russia), the Center of Excellence in Space Sciences India (CESSI, IISER Kolkata), Institute for Space-Earth Environmental Research (ISEE, Nagoya University) and the SCOSTEP-VarSITI program.

Figure 1. Group photograph of School students and lecturers.

School Webpage: http://en.iszf.irk.ru/Space_weather_summer_school_2017

Meeting Report

Project ROSMIC

Meeting Report 3:

LPMR workshop

Franz-Josef Lübken
Leibniz Institute of Atmospheric Physics, Kühlungsborn, Germany

Franz-Josef Lübken

Figure 1. Participants of the LPMR workshop in front of the main building of IAP.

The well established biannual workshop on 'Layered Phenomena in the Mesopause Region' took place from 18-22 September 2017 at the Leibniz Institute of Atmospheric Physics (IAP) in Kühlungsborn.

A total of appr. 70 scientists and students from 11 countries participated in this workshop. A total of 48 oral talks and 12 posters were presented and highlighted the actual status and recent progress in our understanding of layered phenomena in the mesopause region. Presentations covered atmospheric observations, laboratory measurements, numerical modeling and theoretical studies. There was common sensus to publish the results from this workshop in a special issue of an international peer reviewed journal, most likely Atmospheric Chemistry and Physic (ACP).

The workshop was co-sponsored by the ROSMIC program of VarSITI (SCOSTEP), and the Leibniz Institute of Atmospheric Physics (IAP).

VarSITI

Meeting Report 4:

2nd International School on Equatorial and Low-Latitude Ionosphere (ISELLI-2)

K. Shiokawa[1] and B. Rabiu[2]
[1]Institute for Space-Earth Environmental Research, Nagoya University, Nagoya, Japan
[2]Center for Atmospheric Research (CAR), National Space Research and Development Agency (NASRDA), Anyigba, Nigeria

Kazuo Shiokawa

Babatunde Rabiu

Figure 1. Participants of ISELLI-2.

The 2nd International School on Equatorial and Low-Latitude Ionosphere (ISELLI-2) was held at the Covenant University, Ota, Nigeria on 11-15 September 2017. Participants are 38 students and young scientists from 7 countries from Nigeria, Uganda, Kenya, Egypt, Cote D'Ivore, Cameroon, and India. Fourteen lecturers are from Japan, US, Cote D'Ivore, and Nigeria introduced ionospheric dynamics, measurement techniques, Spread-F/plasma bubbles, and space weather. A training of SPEDAS GUI system under IUGONET was held on Thursday. Participants enjoyed lively discussions with the lecturers and mutual communications during this one-week school. This school was supported by Centre for Atmospheric Research (CAR) of NASRDA, Covenant University, Institute for Space-Earth Environmental Research (ISEE) of Nagoya University, JSPS core-to-core program B. Asia-Africa Science Platforms, Japan, International Center for Space Weather Science and Education (ICSWSE) of Kyushu University, PSTEP and PWING Projects, and SCOSTEP/VarSITI.

Meeting Report 5:

IAU Symposium 335

Claire Foullon
University of Exeter,
Exeter, Devon, UK

Claire Foullon

Figure 1. Symposium photograph.

The recent IAU Symposium 335 on "Space Weather of the Heliosphere: Processes and Forecasts" held at the University of Exeter, UK in July 17-21 2017, was linking various aspects of research in solar, heliospheric and planetary physics, emphasizing cross-disciplinary developments. We welcomed 185 participants (36.8% women) from 30 different countries and 21 accompanying persons, exhibitors or public lecturer. Thanks to IAU and cosponsors such as VarSITI, we supported 47 scientists from around the world to come and present their work. A number of excursions were organized to local facilities and places of interest. The poster competition engaged 28 young scientists and 34 judges, and 5 worthy winners were celebrated during the conference dinner. An active parallel education/public outreach program on the first 3 days engaged 14 of the participants and members of the LOC to share their enthusiasm about space weather with schools, teachers and the general public (~300 people).

Upcoming meetings related to VarSITI

Conference	Date	Location	Contact Information
The IRI 2017 Workshop	Nov. 13-17, 2017	Taoyuan City, Taiwan	https://sites.google.com/view/iri2017workshop-tw/home
14th European Space Weather Week	Nov. 27-Dec. 1, 2017	Ostend, Belgium	http://www.stce.be/esww14/
IAU Symposium 340: Long–Term Datasets for the Understanding of Solar and Stellar Magnetic Cycles	Feb. 19-24, 2018	Jaipur, India	https://www.iiap.res.in//iaus340/
AGU Chapman Conference: Particle Dynamics in the Earth's Radiation Belts	Mar. 4-9, 2018	Cascais, Portugal	http://chapman.agu.org/particle-dynamics/
The International School on Equatorial and Low Latitude Ionosphere (ISELION 2018)	Mar. 5-9, 2018	Sumedang, Indonesia	http://pussainsa.sains.lapan.go.id/event/iselion2018/
VLF/ELF Remote Sensing of Ionospheres and Magnetosphere (VERSIM) 8th Workshop	Mar. 19-23, 2018	Apatity, Kola Peninsula, Russia	http://pgi.ru/conf/view?eventId=1
10th International Workshop on "Long-Term Changes and Trends in the Atmosphere"	May 14-19, 2018	Hefei, China	http://trends2018.ustc.edu.cn/home.html
SCOSTEP 14th Quadrennial Solar-Terrestrial Physics Symposium	Jul. 9-13, 2018	Vancouver, Canada	http://www.yorku.ca/scostep/
42nd COSPAR Scientific Assembly	Jul. 14-22	Pasadena, CA, USA	https://www.cospar-assembly.org/
15th International Symposium on Equatorial Aeronomy	Oct. 22-26, 2018	Ahmedabad, India	http://www.prl.res.in/isea15

Short News 1:

Effort towards the Next Scientific Program of SCOSTEP

Nat Gopalswamy (President, SCOSTEP)
NASA Goddard Space Flight Center, Greenbelt, MD, USA

Nat Gopalswamy

SCOSTEP has three main activities that overlap somewhat: science, capacity building, and public outreach. Advancing our understanding of the solar-terrestrial relationship is therefore the primary goal of SCOSTEP. As an Interdisciplinary Body (IDB) of ICSU (International Council for Science), SCOSTEP is tasked with running long-term scientific programs that are beneficial to the society. SCOSTEP promotes ICSU's mission to strengthen international science for the benefit of society.

The current scientific program is the Variability of the Sun and Its Terrestrial Impact (VarSITI). VarSITI has been extremely successful as was the previous one, CAWSES (Climate and Weather of the Sun-Earth System). SCOSTEP scientific programs typically run for 4-5 years allowing enough time for the community focus on certain topics to make significant program. VarSITI was established through a process of extensive interaction with the STP community using townhalls, white papers, presentations at scientific meetings, and finally a Forum at the International Space Science Institute (ISSI) in Bern. The organizational structure of VarSITI is shown in Fig. 1. The rich experience the community gained in setting up the VarSITI program compels us to follow a similar process to establish the next scientific program (NSP).

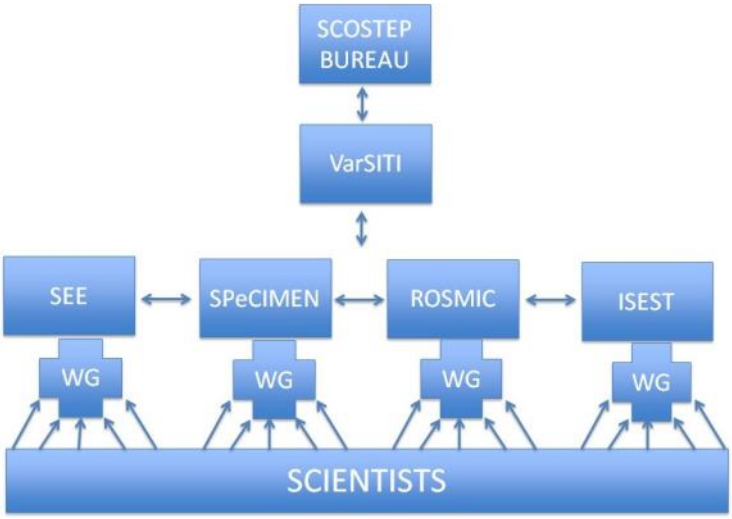

Figure 1. Organizational structure of VarSITI, starting from the community members forming working groups (WGs) that provided input in defining the four projects.

One of the steps that we initiated last year to start discussing the NSP was to hold a joint session with COSPAR (Committee on Space Research) during the 41st General Assembly in Istanbul. Unfortunately, the assembly was cancelled due to the 2016 Turkish coup d'état attempt. However, a townhall meeting was conducted at the Fall Meeting (December 2016) of the American Geophysical Union (AGU), where several community leaders presented their ideas. One of the positive outcomes of the interaction with COSPAR is the involvement of the Main Scientific Organizers (MSOs) of COSPAR sessions relevant to STP. SCOSTEP has its own Scientific Discipline Representatives (SDRs) who provide a collective scientific expertise that covers the range of STP sub-disciplines. The SDRs not only collectively serve as a source of scientific advice to SCOSTEP, they also generate proposals for new programs. The SDR pool is important in identifying SCOSTEP leaders for running scientific programs and serving on various subcommittees. Thus the combined set of MSOs and SDRs has been contacted in generating input. Of course, we need to reach out to the entire STP community via various communication means to make sure that an outstanding scientific program is established.

The effort that has been initiated aims at developing community consensus in defining the NSP. The process of reaching a consensus obviously need to include surveys of (i) current status of STP, (ii) knowledge gaps, (iii) future directions in observations, theory and modeling needed to fill the gaps. In order to coordinate the activities related to NSP, the Bureau has established a committee of international experts that is charged with defining the NSP and provide a report to the Bureau. Table 1 shows the membership of the NSP committee.

- Ioannis Daglis (Chair), Greece
- Loren Chang of National Central University, Taiwan
- Sergio Dasso, INAF, Argentina
- Sarah Gibson NCAR, USA
- Dan Marsh, NCAR USA
- Katja Mathes, Germany
- Dibyendu Nandi ISSER/Kolkata India
- Vladimir Obridko Russia
- Annika Seppälä, University of Otago, New Zealand
- Rémi Thiéblemont LATMOS, France
- Qiugong Zong, Peking University, China

The SCOSTEP executives and VarSITI co-chairs will serve as ex-officio members of the subcommittee and support your deliberations. The NSP committee will solicit input from the community on the key issues that need to be addressed in making progress in solar terrestrial physics. In particular, issues related to the following topics were recommended by the Bureau:

- Solar Dynamo and the Solar Cycle
- Solar Activity in the Coming Decades
- Solar electromagnetic emission and climate
- Solar mass emission and climate
- Solar Flares and their Geospace impact
- CMEs and their Geospace Impact
- Coronal Holes and their Geospace impact
- Energetic particles in the inner heliosphere
- Geospace and Atmospheric Impact of Energetic Particles
- New Developments in Magnetospheric Studies
- Space Weather
- Terrestrial Weather – Space Weather Connection

The NSP committee will have full freedom in organizing focused sessions during meetings. A significant target would be a panel discussion during STP 14 to be held in Toronto Canada during July 9-13, 2018. ISSI is willing to host two Fora, one in Beijing and the other in Bern. This is very significant because we can minimize the cost by holding two ISSI meetings, while maximizing the participation from the global community. We ask that a quarterly progress report be sent to SCOSTEP.

We anticipate that the inputs from the community will be compiled and developed into a document that will be used by the SCOSTEP Bureau in defining the next SCOSTEP scientific program. We anticipate the report to be ready by the end of 2018, so the Bureau will have enough time to discuss and endorse the report during its Bureau meeting in April 2019.

Short News 2:

SCOSTEP's 14th Quadrennial Solar-Terrestrial Physics Symposium (STP 14)
July 9 - 13, 2018, York University, Toronto, Canada

Nat Gopalswamy

Nat Gopalswamy (SOC Chair)
NASA Goddard Space Flight Center, Greenbelt, MD, USA

SCOSTEP has been conducting Solar Terrestrial Physics (STP) symposia for over the past 40 years to showcase important results obtained from the long-term international scientific programs run by SCOSTEP. The fourteenth (STP14) will take place in York University, Toronto Canada during the summer of 2018 (July 9-13) (www.scostepevents.ca). These are quadrennial meetings, so typically involve results from the ongoing scientific programs such as CAWSES and VarSITI as well as general progress made in STP over a four-year period.

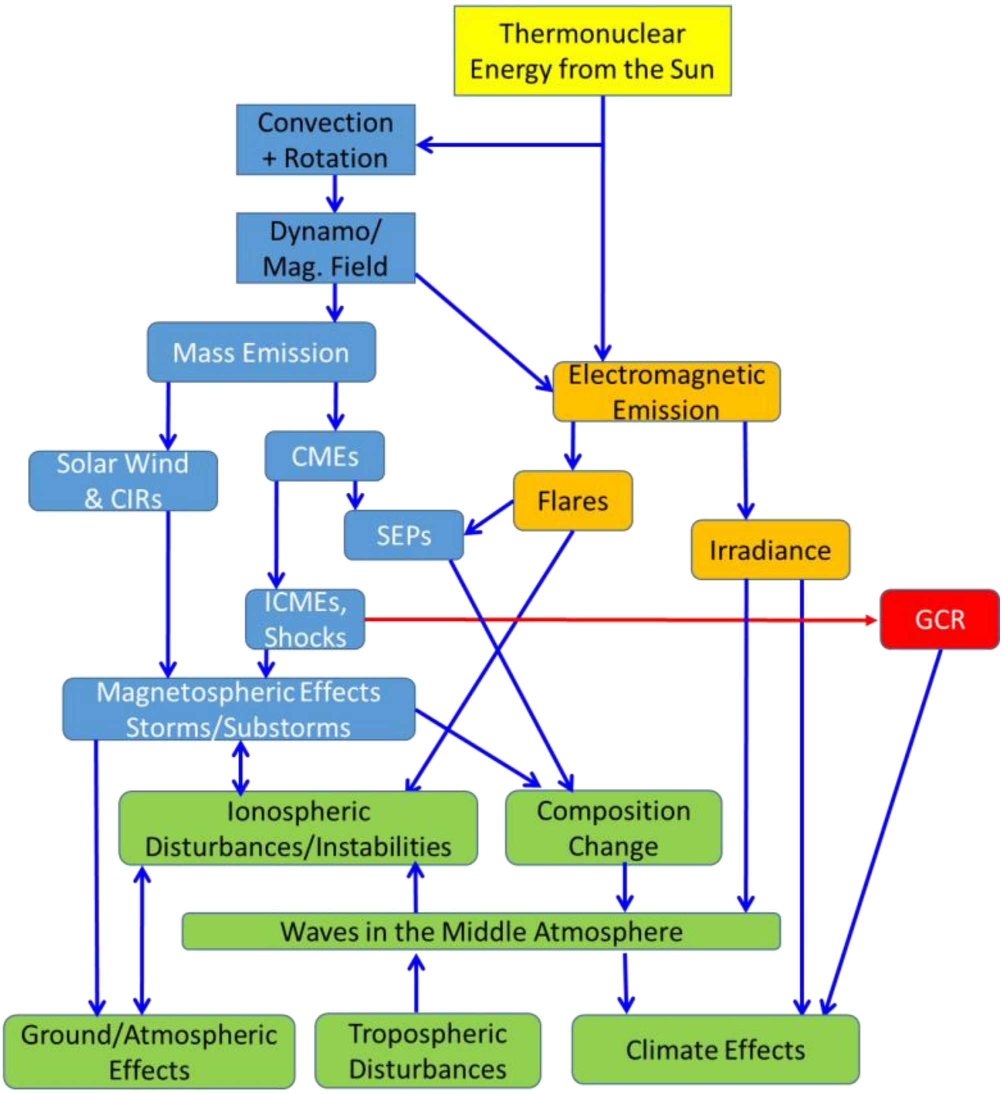

Figure 1. Chains indicating the directions of energy flow in the Sun-Earth system. The mass channel is closely related to solar magnetism, while the electromagnetic emission is related to the luminosity of the Sun. Energy also flows from Earth into space and from our galaxy into the heliosphere in the form of cosmic rays.

Short News

The STP14 scientific sessions will cover all aspects of solar-terrestrial connections (see Figure 1 for a sketch of the connectivities in the Sun-Earth system). The sketch shows four different channels of energy flow: two from the Sun, one from Earth and the fourth from outside the heliosphere in the form of galactic cosmic rays. It is beneficial to recognize the importance of considering the entire system, Earth and Sun being just at the boundaries of this system.

The specific sessions during STP14 will be the following:

1. Mass Chain
   a. Origin, evolutions, and Earth impact of coronal mass ejections
   b. Origin, evolution, and Earth impact of high speed streams
   c. Origin, evolution, and Earth impact of energetic particles from solar, magnetospheric and galactic sources
2. Electromagnetic Chain
   a. Long-term solar variability (magnetism, total irradiance, and spectral irradiance) and its impact on geospace and Earth
   b. Origin of solar flares and their impact on Earth's ionosphere/atmosphere
   c. Coronal and Interplanetary and Terrestrial radio bursts
3. Intra-Atmospheric Chain
   a. Geospace response to variability of the lower atmosphere
   b. Trends in the entire atmosphere, including anthropogenic aspects
   c. Regional, hemispheric and inter-hemispheric couplings and transport in the atmosphere
   d. Mgnetosphere – Ionosphere - Thermosphere coupling in SC 24
4. Special Topics
   a. Long-term Sun-Earth-Climate chain
   b. Space Weather
   c. Will Cycle 25 be special?

The membership of the three committees are given below. Please feel free to contact any of the committee members to see how you can participate/contribute to STP14.

Scientific Organizing Committee
Nat Gopalswamy (Chair), Heliophysics Division, NASA/GSFC, USA
Franz–Josef Lübken (Vice-Chair), Leibniz-Institute of Atmospheric Physics, Kühlungsborn, Germany Kyung-Suk Cho, KASI, South Korea
Vladimir Kuznetsov, IZMIRAN, Russia
Mark Lester, University of Leicester, UK
Daniel Marsh, NCAR, USA
Takuji Nakamura, National Institute of Polar Research, Japan
Craig Rodger, University of Otago, New Zealand
Annika Seppälä, University of Otago, New Zealand
Katya Georgieva, Space Research and Technologies Institute (SRTI), Bulgaria
Kazuo Shiokawa, Institute for Space-Earth Environmental Research (ISEE), Japan
Jacob Bortnik, Dept. of Atmospheric and Oceanic Sciences, UCLA, USA
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Donald Danskin, Natural Resources Canada, Canada
Ian Mann, University of Alberta, Canada
Petrus Martens, Georgia State University, USA
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James Whiteway York University
William Ward, University of New Brunswick, Canada

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Donald Danskin, National Resources Canada
Greg Enno, University of Calgary
Ian Mann, University of Alberta
John Manuel, Canadian Space Agency
Jean-Pierre St. Maurice, University of Saskatchewan

The purpose of the VarSITI newsletter is to promote communication among scientists related to the four VarSITI Projects (SEE, ISEST/MiniMax24, SPeCIMEN, and ROSMIC).

The editors would like to ask you to submit the following articles to the VarSITI newsletter.

Our newsletter has five categories of the articles:

1. Articles— Each article has a maximum of 500 words length and four figures/photos (at least two figures/photos).
   With the writer's approval, the small face photo will be also added.
   On campaign, ground observations, satellite observations, modeling, etc.
2. Meeting reports—Each meeting report has a maximum of 150 words length and one photo from the meeting.
   With the writer's approval, the small face photo will be also added.
   On workshop/conference/ symposium report related to VarSITI
3. Highlights on young scientists— Each highlight has a maximum of 200 words length and two figures.
   With the writer's approval, the small face photo will be also added.
   On the young scientist's own work related to VarSITI
4. Short news— Each short news has a maximum of 100 words length.
   Announcements of campaign, workshop, etc.
5. Meeting schedule

Category 3 (Highlights on young scientists) helps both young scientists and VarSITI members to know each other. Please contact the editors if you know any recommended young scientists who are willing to write an article on this category.

TO SUBMIT AN ARTICLE

Articles/figures/photos can be emailed to the Newsletter Secretary, Ms. Mai Asakura (asakura_at_isee.nagoya-u.ac.jp). If you have any questions or problem, please do not hesitate to ask us.

SUBSCRIPTION - VarSITI MAILING LIST

The PDF version of the VarSITI Newsletter is distributed through the VarSITI mailing list. The mailing list is created for each of the four Projects with an integrated list for all Projects. If you want to be included in the mailing list to receive future information of VarSITI, please send e-mail to "asakura_at_isee.nagoya-u.ac.jp" (replace "_at_" by "@") with your full name, country, e-mail address to be included, and the name of the Project you are interested.

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