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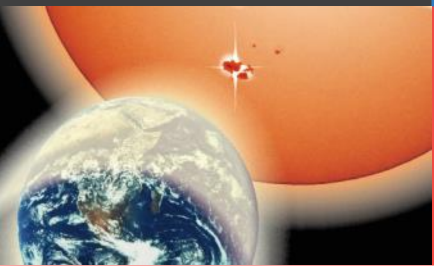

VarSITI Newsletter

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Project ISEST

Article 1:

Virtual Laboratory for the comprehensive analysis of Forbush-Effects and Interplanetary Disturbances

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The creation of the basis for the virtual laboratory for a comprehensive analysis of Forbush-effects and interplanetary disturbances (ViLaFEID) refers to the project ISEST/MiniMax24 (International Study of Earth-affecting Solar Transients) in the VarSITI Program. Inclusion of data for the long-lived periods (several solar cycles) with permanent updating will allow the estimation of variations and interrelation of many parameters of the interplanetary environment (a solar wind, cosmic rays, indexes of solar and geomagnetic activity) within Solar cycles.

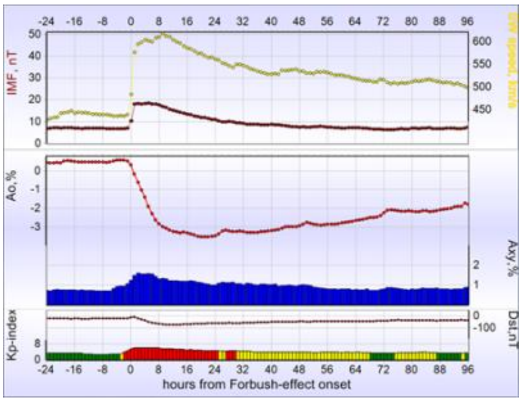

Figure 1. Profile of the Forbush effect by the epoch method obtained, for FDs with the amplitude AF>3% and associated with CMEs from active solar regions (mid panel). Similarly obtained behavior of the equatorial anisotropy (Axy), solar wind velocity and IMF intensity (upper panel), and geomagnetic activity indices (Kp and Dst) as well.

The purpose and of database description:

The purpose of this article is to describeof open network database created at IZMIRAN for research of disturbances and transient phenomena in the interplanetary medium and in cosmic rays. This database will allow us to study the solar ejections (ICMEs) and corotating interaction regions (CIRs) and their influence on the cosmic rays and parameters of the heliosphere.

Our final aim is to create aVirtual Laboratory by means of which a researcher could carry out detailed comprehensive analysis of Forbush effects and interplanetary disturbances (ViLaFEID). Now, due to support of VarSITI the data-base on the Forbush effects and interplanetary disturbances (FEID) exists in open access by the address http://spaceweather.izmiran.ru/eng/dbs.html (1,2). It contains information on the Forbush decreases (FD) up to the end of 2018 (> 7500 events).

As for (ViLaFEID) we need special database with the data on cosmic ray (CR) parameters for each hour during the period of neutron monitor network operation, our efforts in 2018 were focused to the elaboration of such a database on the CR variation (VCR) and transfer it in the open access. It contains the hourly values of the basic parameters of cosmic rays with rigidity 10 GV, first of all, variations of CR density and components of the CR anisotropy vector over the Earth atmosphere and magnetosphere, obtained by the global survey method (GSM) (3), using the data of world neutron monitor network (NMDB, 4). The base also includes data on the solar wind (solar wind speed, density, characteristics of IMF, etc.), and geomagnetic activity indices. It is important to note that the indicated parameters of the CR are global characteristics and do not depend on individual detector location. The presented database contains information for more than 60 years and covers the period from July 1957 to December 2017. This database is the largest and most comprehensive source of data on cosmic ray variations. It contains the following:

- Number of parameters for each hour: up to 37

- Possibility of Sorting, Selections and Export data: using SQL queries

- Permanent updating: yes

The presented database is one of the largest of all similar resources, and it is the main step in the Virtual Laboratory creation.

Link to this MySQL database is http://crsb.izmiran.ru/phpmyadmin. Select the desired language and enter your login and password (login – user, password – user). Further you need to enter database «VarSITI» and go to Table «VCR». A description of all the parameters in the Table is placed by the address http://spaceweather.izmiran.ru/docs/VarSITI/readme_vcr.pdf.

The handbook of work with PhpMyAdmin is here https://www.phpmyadmin.net/docs/. The SQL tutorial can be found here – https://www.w3schools.com/sql/.

Figure 1 and figure 2 are presented as the result of the analysis of some events using local FEID and VCR databases (Fig. 1-5).

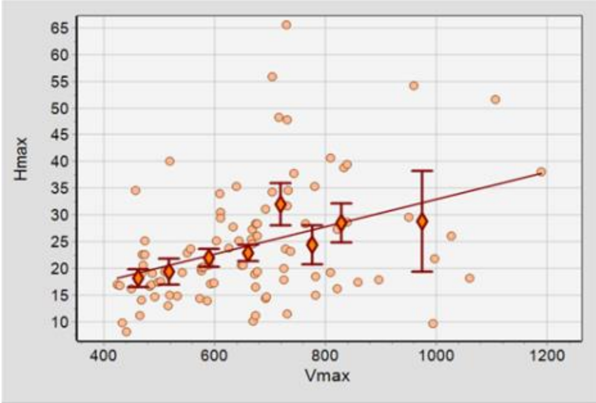

Figure 2. Correlation of maximum solar wind velocity (Vmax) and maximum IMF intensity (Hmax) for the same events as were used for construction Fig. 1.

The examples presented above and below are convincingly indicative of the possibilities of the neutron monitor network as an instrument yielding the hour -to-hour information on the CR intensity in the Earth vicinities and, hence on the configuration and dynamics of the interplanetary magnetic field.

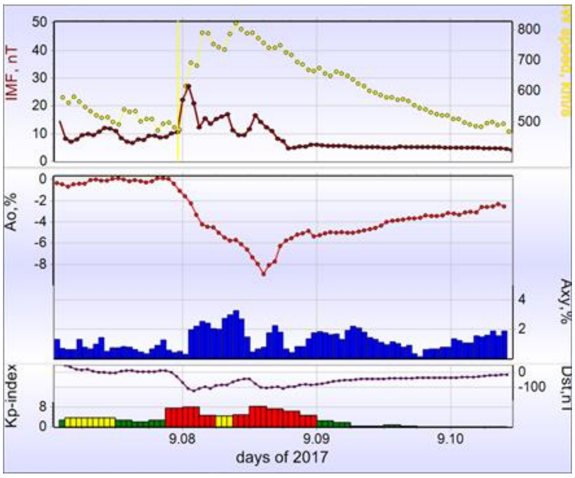

Figure 3. Forbush effect on September 7, 2017. Solar Wind velocity Vsw and IMF intensity – upper panel; Isotropic part of the CR intensity A0 and equatorial component of the CR anisotropy Axy – middle panel; indices of geomagnetic activity Dst and Kp.

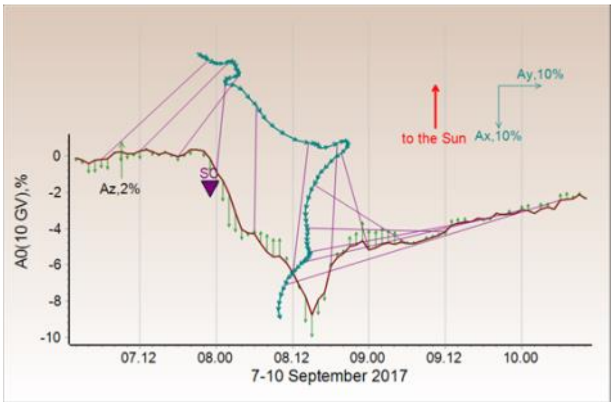

Figure 4. Behavior of the 10 GV cosmic ray density A0 (brown curve) and anisotropy (blue vectors).Vertical green arrows show changes of the north-south CR anisotropy (Az); thin violet lines connect the same time -points on two curves in each 6 hours. SSC-moment of Sudden Storm Commencement.

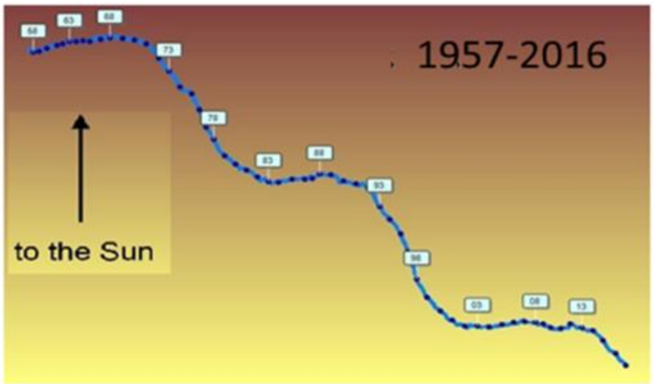

Figure 5. Behaviour of the GCR (10GV) vector anisotropy (Axy) during 1957-2016 (VCR database). Value information on the long-term changes of the heliomagnetospheric structure. The figure is composed of >500000 Axy hourly vectors and reveals the 22-year magnetic and 11-year cycles in the Axy amplitude.

All these pictures are constructed by the data from local FEID and VCR databases which exist in open access, content only data so far and give the basis for ViLab. The next step in this direction is developing various software tools for different types of the statistical analysis (regression, size distribution, comparative analysis) and obtain required information in graphic and digital form. It is necessary also to create a convenient user web interface for operation with the Virtual Laboratory.

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4. NMDB: http://www.nmdb.eu/.

Project SPeCIMEN

Article 2:

Ionosphere and Magnetic Data - Klyichi (IMD-K)

Report on the results from the Department of solar-terrestrial physic (Observatory "Klyichi") of Trofimuk Institute of Petroleum Geology and Geophysics of Siberian Branch of Russian Academy of Sciences (IPGG SB RAS, Novosibirsk, Russia)

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Continuous monitoring of the ionosphere has been carried out in the Department of Solar-Terrestrial Physics (Klyuchi Observatory) of the Institute of Petroleum Geology and Geophysics. Trofimuk, Siberian Branch of the Russian Academy of Sciences (IPGG SB RAS, Novosibirsk, Russia) by the AIS (automatic ionospheric station) and the digital ionosonde "Parus" since 1969. Flux-Gate Magnetometer LEMI-008 has been carrying out continuous monitoring of variations components of the Magnetic field of Earth at the Observatory "Klyichi" IPGG SB RAS since 2005.

During this project, the database of these observations was constructed and put in the open access by using the password which is provided to all VarSITI members free of charge. The title of the database is "Ionosphere and Magnetic Data - Klyichi" (IMD-K).

It contains the basic parameters of the ionosphere with the one-hour temporal resolution:

• minimum frequency (fmin),

• critical frequencies of the ionosphere layers (foF2, foF1, foE, foEs),

• virtual heights of the ionosphere layers (h'F2, h'F1, h'E, h'Es),

and the values of variations of North (X), East (Y), vertical (Z) component of the Magnetic field of Earth with the second temporal resolution.

The numerical values in the IMD-K are given in the following dimension: fmin, foF2, foF1, foE, foEs – 0,1 MHz, h'F2, h'F1, h'E, h'Es – km, values of variations of component of the Magnetic field in nT.

This database is updated once a day.

During the period from March to December 2018 the IPGG Team carried out the following work:

1. Creation of technical facilities for the project.

We purchased the hardware for the two computers for the creation and operation of the database.

2. Creation of IMD-K database.

The ionospheric data were digitized.

Files with second variations of the geomagnetic field components were created.

The ionospheric and geomagnetic field data were copied to the created IMD-K database.

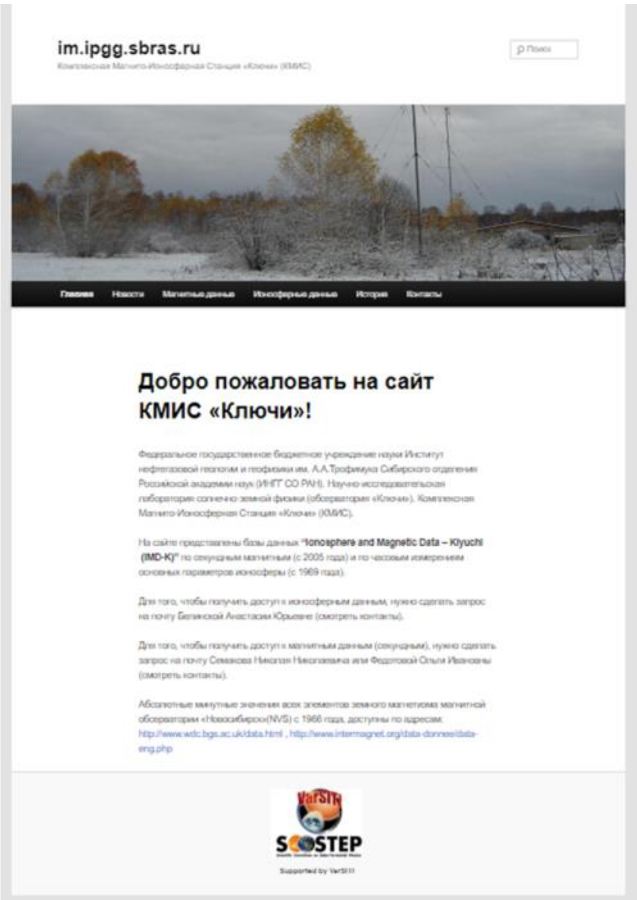
The software for working with IMD-K (daily amplifying the database, obtaining new numerical data and plotting graphs for a given period) was developed using php, HTML, Mysql.

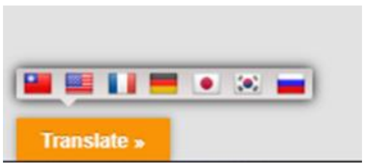
3. Creation of Web site for IMD-K

The website design has been developed. The database was placed on it. The site was set up to work with it over the Internet.

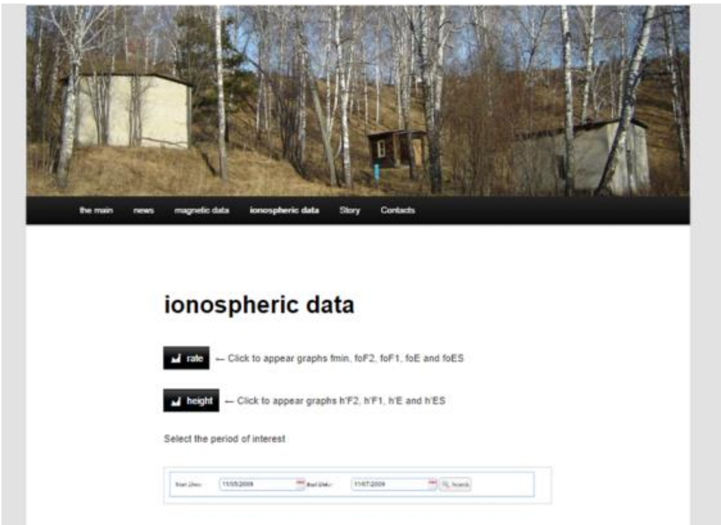
4. We conducted testing and commissioning of the database and web site of IMD-K.

Automatic translation from Russian into English, Chinese, French, Japanese and Korean is available on our website.

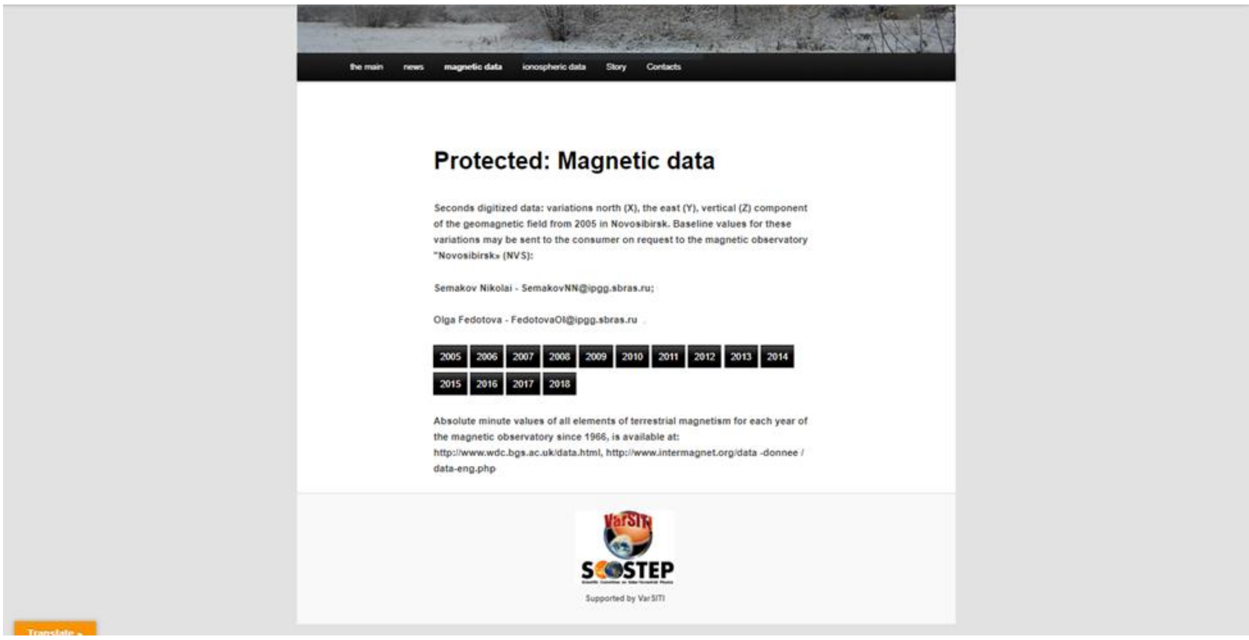




You can see graph of Ionospheric Data and save it in CSV, Excel or JSON formats on http://im.ipgg.sbras.ru/?page_id=20.



Magnetic Data are placed on http://im.ipgg.sbras.ru/?page_id=148 in text files in archives for each day of the year. The baseline values for these variations may be sent to user by the request to Semakov Nikolai (SemakovNN@ipgg.sbras.ru) or Olga Fedotova (FedotovaOI@ipgg.sbras.ru), magnetic observatory "Novosibirsk» (NVS).



The password for access was sent to all members of VarSITI in the letters of the General mailing. To access these other researchers need to contact us at the specified addresses on the Web site.

Highlight on Young Scientists 1:

An observational study on CME flux ropes near the Sun

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CMEs are energetic events observed in the corona. It is widely accepted that CMEs, flares are different aspects of the same physical process (Shibata et al 1995; Forbes 2000; Priest and Forbes

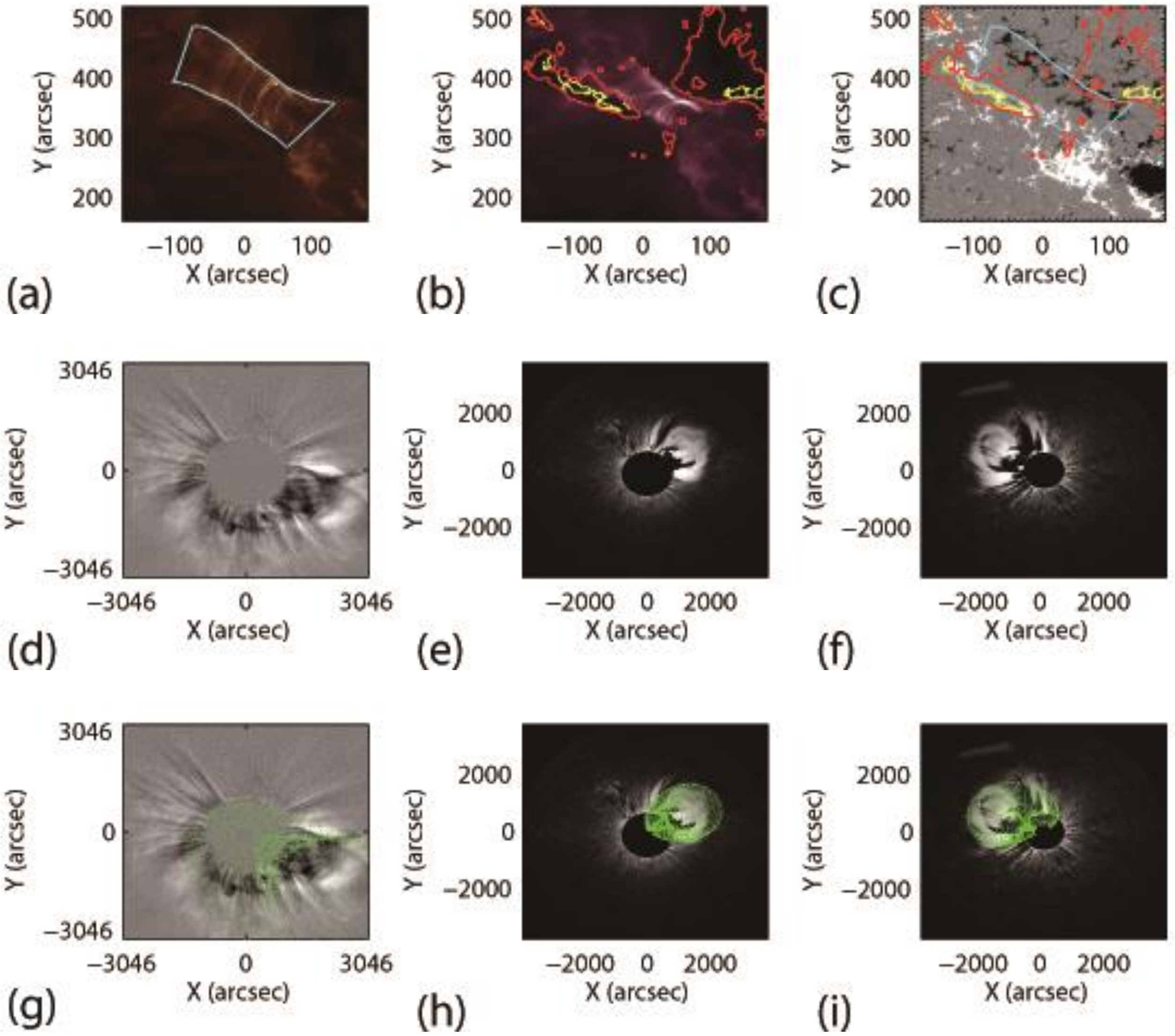

Figure 1. The solar source, flare and CME in the 2011 December 26 eruption. (a) The post eruption arcade observed in EUV 193Å by SDO/AIA with the footpoints of the arcade marked by blue lines, (b) SDO/AIA 211Å with the total dimming region identified during the impulsive phase (red contours) and potential core dimming regions (yellow contours) overplotted. (c) SDO/HMI line-of sight magnetogram with the dimming region and PEA overplotted. (d) LASCO C2 difference image (e) STEREO A and (f) STEREO B difference images. (g-i) the same as (d-f) with GCS fitting overplotted.

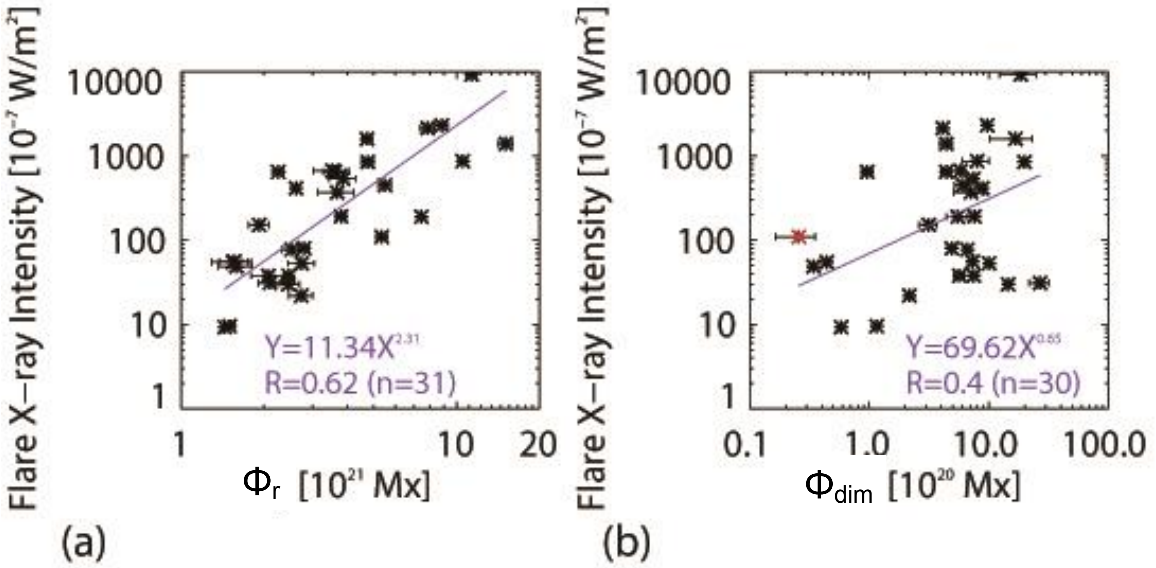

Figure 2. Scatter plot between (a) RC flux/poloidal flux and the soft X-ray flare size and (b) Dimming flux/ toroidal flux and the soft X-ray flare size. The violet line is the regression of the data set. The correlation coefficients (r) and the number of data points (n) are shown on the plots. In the RC flux - flare size correlation, the correlation coefficient (cc) is within the 95% confidence interval (0.34,0.79); in the Dimming flux - flare size correlation, cc is within the 95% confidence interval (0.047,0.664). The cc obtained are significant. Outliers are shown in red.

2002). These energetic phenomena are most likely associated with their source region properties (Sun et al 2012; Wang 2006).

We examined the dimensions and magnetic content of flux ropes near the Sun for cycle 24 (Sindhuja and Gopalswamy 2019). Gopalswamy et al (2017) introduced a new method of estimating the reconnected flux (Φ_r) based on just post eruption arcade (PEA) (*see*, Figure 1a). We estimated the reconnected flux using this method. The reconnection/poloidal flux (Φ_r) of the flux rope exhibits a positive correlation with the flare fluence, flare intensity, CME speed, CME kinetic energy (0.78, 0.62, 0.48, 0.54, respectively) (e.g., Figure 2a). We measured the core dimming flux (Φ_{dim}) using the minimum intensity method (Dissauer et al 2018a). The core dimming flux is comparable to the toroidal flux of the flux rope (Qiu and Yurchyshyn 2005). We found a positive correlation between Φ_{dim} derived from the core dimming regions (*see* Figure 1b,c) and that derived from the Lundquist solution, flare fluence, flare intensity and the CME mass (0.43, 0.4, 0.4, 0.35, respectively) (*e.g.*, Figure 2b). The dimensions of the flux rope are determined by using the graduated cylindrical shell (GCS, Thernisien 2011) model (*see*, Figure 1d-i).

Thus we obtained the dimensions and the magnetic content of flux ropes near the Sun that occurred in solar cycle 24. These flux-rope properties can be utilised as realistic input to global MHD models to improve space weather prediction.

I would like to acknowledge that this research work is supported by the SCOSTEP Visiting Scholar (SVS) program.

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Highlight on Young Scientists

Project SPeCIMEN

Highlight on Young Scientists 2:

Antenna Problems Concerning Excitation and Reception of Quasi-Electrostatic Waves in the Near-Earth Plasma


Evgenii A. Shirokov

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Quasi-electrostatic waves propagate in magnetoplasmas along the resonance cone direction. They can have a continuous and relatively wide spectrum of wave numbers that can be arbitrarily large. Consequently, analysis of antenna excitation and reception of these waves is nontrivial, though significant progress has been made on these issues [1].

We have analyzed how the method of moments works for a numerical solution of the integral equation that describes the surface charge distribution along the antenna wire exciting quasi-electrostatic waves [2]. Despite the fact that the kernel of this equation is singular at the resonance cone surface, the computation error can be relatively small (about 1 %). This is important for spacecraft antenna design when analytical solutions of this equation cannot be obtained.

Also we have calculated the receiving antenna effective length when quasi-electrostatic chorus emissions are detected [3]. This length can be more than an order of magnitude greater than the geometric length because of intensive reradiation. Consequently, care should be taken when calculating the wave electric field value from the voltage data if the waves propagate in the quasi-electrostatic mode.

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Highlight on Young Scientists 3:

Nonlinear wave structures driven by whistler-mode chorus waves

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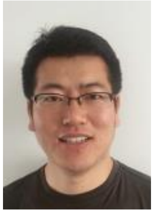

Xin An

With the advent of regular high-resolution measurements of electric and magnetic fields in the Earth's inner magnetosphere, a variety of different nonlinear wave structures are often observed in association with whistler-mode chorus waves and are found to permeate this region. Figure 1 shows a number of typical examples, including Langmuir waves [1, 2], unipolar electric fields [3] and bipolar electric fields [4]. These nonlinear wave structures can interact with thermal electrons in the energy range between tens of eV to a few keV, causing efficient pitch angle scattering and acceleration of thermal electrons. Since chorus emissions are excited by the electron population of tens of keV, these nonlinear wave structures provide an important energy channeling mechanism from the intermediate energy (tens of keV) to the thermal energy (tens of eV to a few keV). However, the linkage between the chorus emissions and nonlinear wave structures is not clear, and direct measurements of electron phase space structures responsible for these nonlinear wave structures have been difficult to obtain.

Our recent simulation [see Figure 2 and Ref. [5]] offered the first clues that these three seemingly unrelated nonlinear wave structures (i.e., Langmuir waves, unipolar electric fields and bipolar electric fields) originate from the same nonlinear electron trapping process and that only a single quantity, the ratio of the Landau resonant velocity to the electron thermal velocity, controls the type of nonlinear wave structure that will be generated. When the tail of the electron distribution is trapped by chorus, the trapped electrons form a spatially modulated bump-

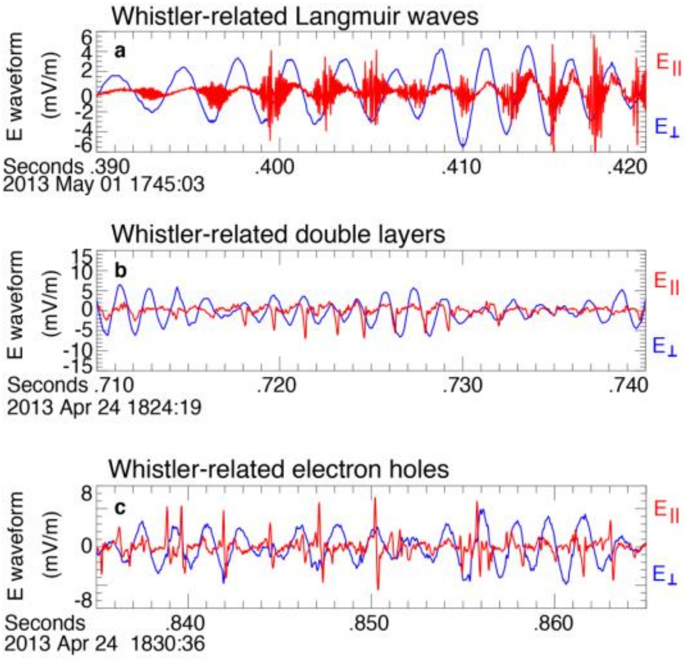

Figure 1. Typical nonlinear wave structures associated with whistler-mode chorus waves observed with the EMIFISIS instrument on Van Allen Probes. The red and blue curves correspond to the parallel and perpendicular electric waveforms, respectively and show whistler-related: (a) Langmuir waves, (b) double layers, observed as unipolar electric fields, and (c) electron holes, observed as bipolar electric fields.

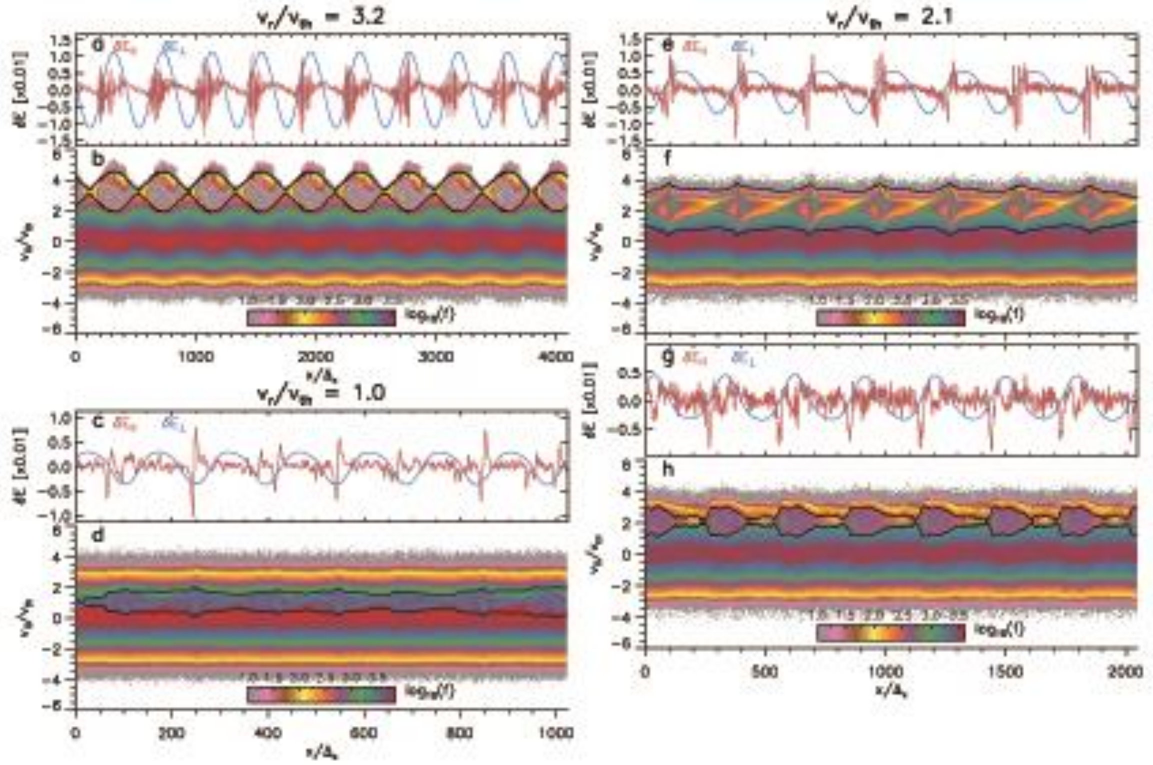

Figure 2. A simulation of the whistler-related electrostatic structures, with each pair of panels showing a snapshot of the parallel (red) and perpendicular (blue) electric field as a function of the spatial coordinate x normalized to the grid spacing $\triangle_x$, and the bottom panels show the Phase Space Density in color, as a function of *x*, and $v_{\parallel}/v_{th}$. (a-b) Langmuir waves with v_r/v_{th} = 3.2. (c-d) bipolar structures with v_r/v_{th} = 1. (e-h) Electron acoustic waves observed with v_r/v_{th} = 2.1 (e,f) and subsequent steepening of whistler electric field into unipolar structures (g, h). Here v_r is the Landau resonant velocity and v_{th} is the initial electron thermal velocity.

on-tail distribution and excite Langmuir waves. When the thermal electrons are trapped by chorus, they form phase space holes and hence produce bipolar electric fields. Between these two regimes, trapped electrons generate nonlinear electron acoustic waves, which in turn disrupt the trapped electrons and accumulate them in a limited spatial region, leading to the unipolar electric field structures. This insight gleaned from our simulation paves the way for understanding the nonlinear physics behind these kinetic wave structures.

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Comparison between the magnetic properties of magnetic clouds and those of associated coronal flux ropes

Sanchita Pal

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Coronal mass ejections (CMEs) are high speed magnetised plasma emanating from the solar active regions due to magnetic field dynamics on the solar photosphere (e.g. Nandy et al. 2007). If a CME has a twisted flux rope structure while propagating through the interplanetary medium, it is classified as a magnetic cloud (MC). The comparative study between magnetic properties (i.e. magnetic flux and helicity) of an MC and its corresponding coronal flux rope has important implications in understanding the cause of twisted coronal flux rope formation, namely, whether it is pre-existing or formed due to low coronal magnetic reconnections.

The kinematics of CME flux ropes have a strong dependency on the photospheric flux threading through the area under the post-eruption arcades (PEAs) rather than the global magnetic flux of associated solar active regions (Pal et al. 2018). The PEAs are formed due to low coronal magnetic reconnections during eruptions. Several studies (Qiu et al. 2007, Gopalswamy et al. 2017a) show a good correspondence between the magnetic flux budget in low coronal magnetic reconnections and associated interplanetary CMEs (ICMEs), where the flux of ICMEs are measured using force-free cloud fitting models (e.g., Lepping et al. 1990, Marubashi 1997) and Grad-Shafranov (GS) reconstruction techniques (e.g., Hu & Sonnerup 2002). During propagation, an MC may interact with the ambient solar wind magnetised plasma via magnetic reconnection that can erode a substantial amount of the MC's magnetic flux and helicity. Only the Direct method (Dasso et al. 2006) allows us to measure the magnetic properties of an MC before it reconnects with the ambient solar wind. The measurement accuracy improves if the impact parameter (Y_0, a vertical distance between the spacecraft trajectory and the MC axis) is small. Figure 1 shows the accumulated azimuthal magnetic flux (φ_{az}) and helicity (H_{MC}) per unit length of an MC along with its azimuthal magnetic field component ($B_{y,cloud}$). The $B_{y,cloud}$ is derived using the MC axis orientation and observations of MC magnetic field vectors at 1 AU in Geocentric Solar Ecliptic (GSE) coordinate system. Longcope & Bev-

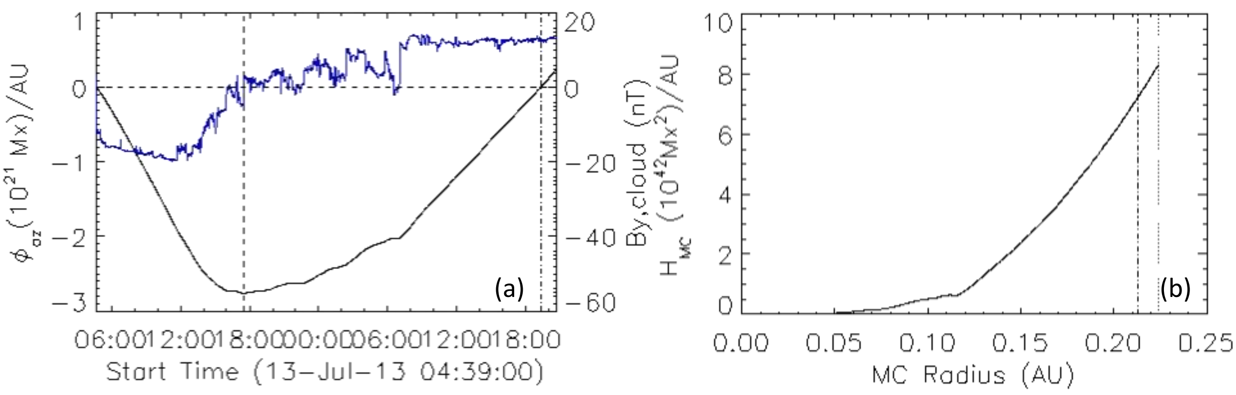

Figure 1. (a) The accumulated azimuthal magnetic flux per unit length over plotted on $B_{y,cloud}$ (blue line) during an MC interval started on 13 April 2013 at 04:40 UT. Vertical dashed line shows the centre of the MC determined using the Direct method. The dashed-dotted vertical line indicates the zero crossing of φ_{az}. (b) The accumulated helicity per unit length is plotted as a function of MC radius. MC radius= 0 corresponds to the MC centre. The dotted vertical line shows the end boundary of the MC. The total φ_{az} and H_{MC} in this MC is estimated as $3\times10^{21} Mx/AU$ and $8.3\times10^{42} Mx^2/AU$, respectively.

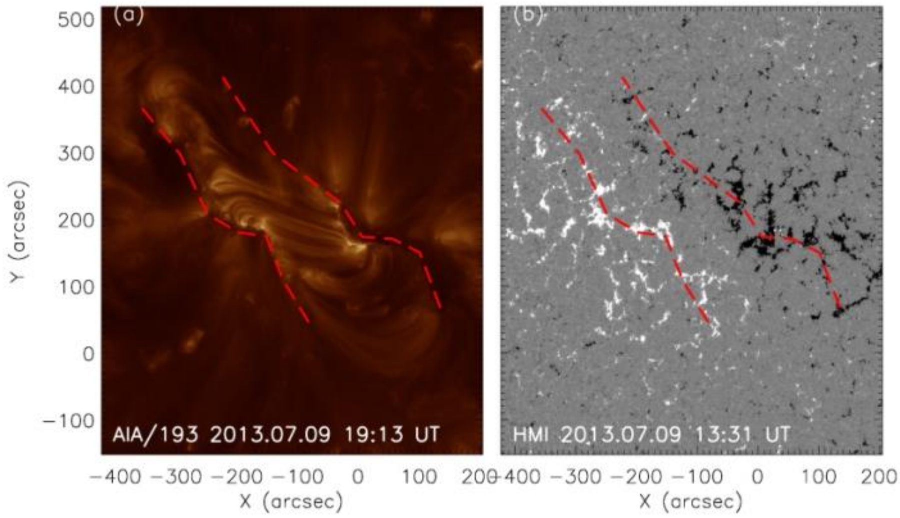

Figure 2. (a) Post eruption arcade (PEA) observed by AIA/193 Å on board SDO. PEA footprints are indicated by red dashed lines. (b) The PEA footprints are over plotted on SDO/HMI LOS magnetograms at 30 mins before the associated CME eruption. φ_{RC} =3.82×10^{21}*Mx*.

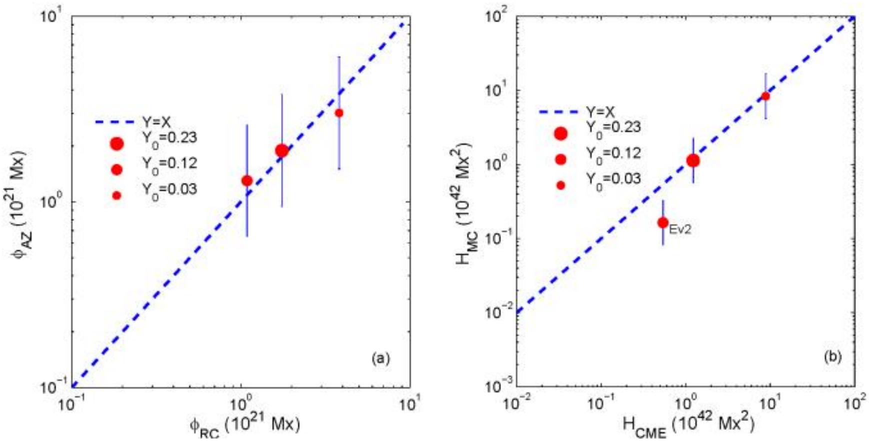

Figure 3. (a) Scatter plots between φ_{az} and φ_{RC} obtained from the arcade method, and (b) H_{MC} and H_{CME}. The data point marked by "Ev2" has uncertainty in its geometrical parameter estimation as it appears very faint in the field of views of coronagraphs. The φ_{az} and H_{MC} are calculated assuming L_{MC}= 1 AU. Vertical blue error bars represent the uncertainty in MC flux and helicity measurements due to errors in L_{MC} estimation. We consider the range of L_{MC} as 0.5-2.0 AU. The radius of each data point decreases with decreasing Y_0 values. The identity lines (Y=X) are represented by dashed blue lines.

eridge 2007 suggests that the azimuthal magnetic flux of a coronal flux rope formed due to low coronal magnetic reconnection is equivalent to the reconnection flux (φ_{RC}). Employing the FRED (Flux Rope from Eruption Data) technique that combines the reconnection flux and flux rope geometrical properties, the near-Sun flux rope helicity (H_{CME}) can be estimated (Gopalswamy et al. 2017b, Pal et al. 2017).

Recently, we investigate the magnetic flux and helicity of three MC events (with, Y_0<0.3) before they reconnect with the ambient solar wind and compare with those of the associated coronal flux ropes. Each of the flux ropes forms PEA in the low corona as a signature of magnetic reconnection occurring at the region of eruption. Figure 2 shows a PEA corresponding to one of the three events observed in the low corona and photosphere. The near-Sun geometrical properties of flux ropes are estimated using the Graduated Cylindrical Shell (GCS) forward modelling method developed by Thernisien et al. 2009. In Figure 3, φ_{az} and H_{MC} are plotted against φ_{RC} and H_{CME}, respectively. Here the blue dashed lines are the identity lines (Y=X). In each plot of Figure 3, the data points including their error bars (representing uncertainties in MC length (L_{MC}) estimation) are on the identity line or very near to it. This result indicates that the magnetic flux and helicity of MCs are almost equal to those injected by low coronal magnetic reconnection in associated coronal flux ropes. Based on our result, we suggest that the contribution of pre-existing eruptive filaments in formation of coronal eruptive flux ropes is less significant than the low coronal magnetic reconnection at the time of eruptions.

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Meeting Report

VarSITI

Meeting Report 1:

2019 African Geophysical Society Conference on Space Weather

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The African Geophysical Society AGS formally established on 2012 during the first Chapman Conference on Space Weather in Africa, organized by the American Geophysical Union (AGU) at Addis Ababa, Ethiopia. This year it was held in Cairo, Egypt from 25-28 March 2019. The workshop was attended by 80 participants: South Africa - 6, Japan - 1, Algeria - 1, Sudan - 2, USA - 2, France - 1, UK – 1, Kenya -1, Korea -1, Saudi Arabia -1, China -2, Norway -1, Egypt -60.

More than 180 people applied for the workshop, and 50 abstracts were accepted. After some cancellations, 36 oral and 8 posters were presented. A 20-min time slot was given for each oral talk. The following session themes were identified, being held in a sequence:

Figure 1. Group Photo of Participants.

- Space Weather Capacity Building
- Ionospheric Irregularities and geomagnetic disturbances
- GNSS and communication systems
- Space environment effects on satellite systems
- Solar active phenomena and their impact on different aspects.

The meeting was supported by SCOSTEP/VarSITI, IAGA, ISWI, SANSA, and COSPAR. A more detailed summary of the meeting including the program and abstracts can be found at http://www.spaceweather.edu.eg/AGS2019.html.

Upcoming meetings related to VarSITI

Conference	Date	Location	Contact Information
Japan Geoscience Union Meeting 2019 (JpGU)	May 26-30, 2019	Chiba, Japan	http://www.jpgu.org/en/index.html
VarSITI Completion Symposium	Jun. 10-14, 2019	Sofia, Bulgaria	http://www.varsiti.org/
Space Climate Symposium 7	Jul. 8-11, 2019	Canton Orford, Québec, Canada	http://craq-astro.ca/spaceclimate7/
27th IUGG General Assembly	Jul. 8-18, 2019	Montreal, Canada	http://iugg2019montreal.com/
AOGS 2019 16th Annual Meeting	Jul. 28-Aug.2, 2019	Singapore	http://www.asiaoceania.org/society/index.asp
IRI Workshop	Sep. 2-13, 2019	Nicosia, Cyprus	http://iri2019.frederick.ac.cy/
The 4th COSPAR Symposium	Nov. 4-8, 2019	Herzliya, Israel	http://www.cospar2019.org/
VarSITI Summarizing Workshop	Nov. 11-15, 2019	Nagoya, Japan	http://cicr.isee.nagoya-u.ac.jp/site1/info/workshop.html
The 9th VERSIM workshop	Mar. 23-27, 2020	Kyoto, Japan	http://pcwave.rish.kyoto-u.ac.jp/versim/

Short News 1:

Predictability of the Variable Solar Terrestrial Coupling (PRESTO): The New Scientific Program of SCOSTEP

Nat Gopalswamy

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

Introduction: The VarSITI program just ended at the end of 2018 after an extremely successful and productive five-year run from 2014. The closing symposium in Sofia, Bulgaria in June 2019 will highlight the major achievements of VarSITI. Finally, there will be a planning meeting in Nagoya, Japan in November 2019 to kick off a series of review articles that will serve as VarSITI's legacy.

Overview: While VarSITI was still in progress, SCOSTEP initiated discussion to towards planning a successor to VarSITI. In September 2017, the "Next Scientific Program (NSP)" committee was appointed with Professor Ioannis Daglis (Greece) as the chair. The NSP committee was encouraged to interact with the Solar Terrestrial Physics (STP) community in various possible ways: town halls, white papers, newsletters, expert inputs, and fora. The process involved reviewing the status of the STP field, identifying major knowledge gaps, and devising projects to fill the gaps. In February 2018, SCOSTEP reached out to the International Space Science Institute (ISSI) to convene a Forum to bring STP experts together to brainstorm and further develop the scientific program. In April 2018, a formal proposal was submitted to ISSI and was approved in June 2018. In the meanwhile the input received over the first six months were made available to the community via about a dozen newsletters involved in STP for further feedback until the ISSI Fora. The ISSI Forum was convened in two parts, one at ISSI-Beijing (November 2018) and the other at ISSI (February 2019 in Bern). The idea of the two-part forum is to encourage participation from a wider cross-section of the community and to minimize travel cost. The participants in the ISSI Fora consisted of the community experts, the NSP committee members, and SCOSTEP Bureau members. Based on the community feedback and ISSI-BJ deliberations, the NSP document was further refined and made available for further discussion in the community. The final document took shape during the ISSI Forum in February 2019. It was decided that the next program will be named as "Predictability of the Variable Solar Terrestrial Coupling" or PRESTO for short. The PRESTO report was submitted to the Bureau in March 2019. SCOSTEP sent the report to a number of community leaders for a critical review. After incorporating the comments by the reviewers, the PRESTO document was approved by the Bureau in May 2019.

PRESTO Theme: The PRESTO program will focus on fundamental research that has the promise to advance predictive capability with societal implications. PRESTO, like previous SCOSTEP scientific programs, will consider the short- and long-term variability of the Sun-Earth system including space weather and climate impacts with an emphasis on predictability. PRESTO will also link to the World Climate Research Program (WCRP) Grand Challenge Near-Term Climate Predictions as well as the Intergovernmental Panel on Climate Change (IPCC). The final document will be published as an article in Taikong magazine, which carries the output of the Forums organized at ISSI-BJ. The community will have access to this publication.

Under PRESTO, the research focus will be on three pillars and nine focused science topics as listed below:

Pillar 1: The Sun, Interplanetary Space and Geospace:

1.1 Occurrence and properties of flares and CMEs/CIRs and the propagation of CMEs/CIRs from the Sun to the Earth

1.2. Predictability of interplanetary shocks and energetic particle flux enhancements

1.3. Predictability of substorms and storms

1.4. Solar wind-magnetosphere coupling and internal magnetospheric dynamics

Pillar 2. Space Weather and Earth System

2.1 Multiscale vertical and horizontal coupling between atmospheric regions and its effects on space weather

2.2 Effect of atmospheric waves on the global circulation in the middle and upper atmosphere

Pillar 3. Solar Activity and its Influence on Climate

3.1 Understanding and predicting solar activity

3.2 Sub-seasonal to decadal variability of the terrestrial system

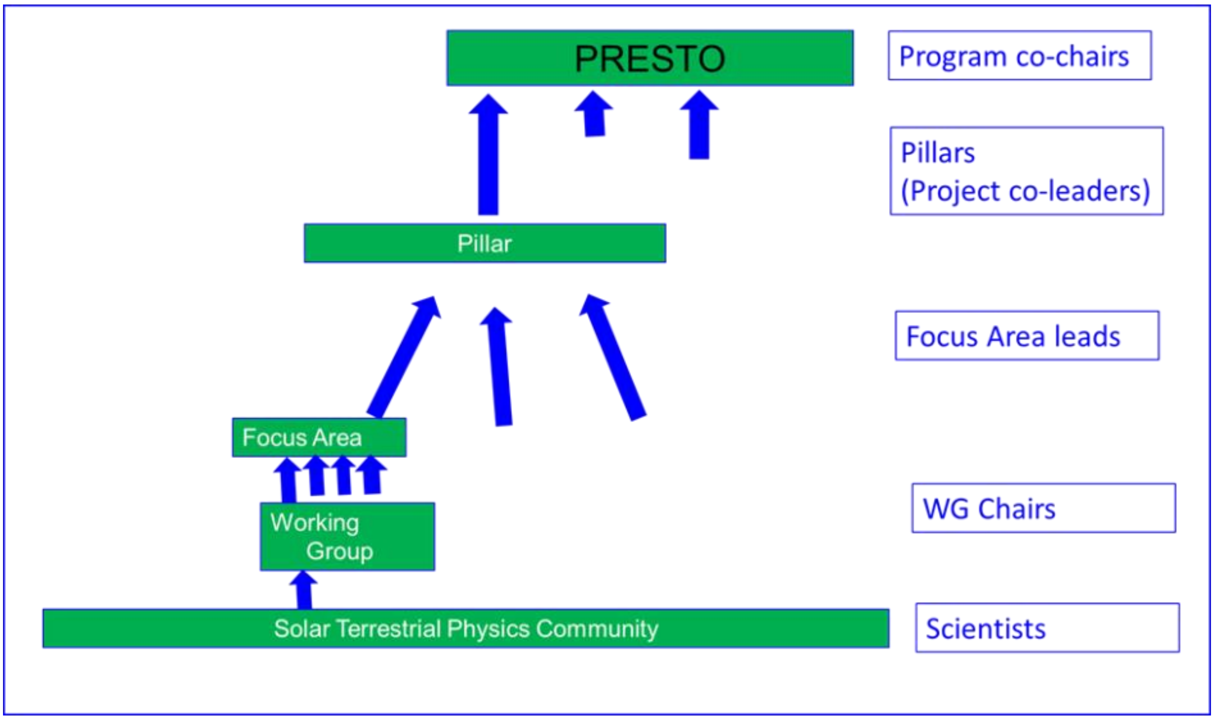

Figure 1. Schematic of the simple organizational structure of SCOSTEP/PRESTO.

The implementation of PRSETO will involve the community in the form of a steering committee with Program co-chairs, Pillar co-leaders, Focus-area leaders, and Working group leaders (see Fig. 1). The implementation plan will include multiple symposia, ISSI Working Groups, special sessions during major scientific meetings, special issues of journals and other publications, and capacity building.

Acknowledgment: The PRESTO definition was truly a community effort because of the continuous and innumerable contributions from the community. The dedicated work done by the NSP committee chaired by Professor Ioannis Daglis is highly commendable and SCOSTEP highly appreciates it. SCOSTEP thanks the NSP committee, the experts who participated in the ISSI Fora and the community at large in this endeavor. The financial and logistics support provided by ISSI under the leadership of Drs. Rudolf von Steiger and Maurizio Falanga are gratefully acknowledged. Special thanks are also due to Professor Chi Wang, Director General of the National Space Science Center of the Chinese Academy of Sciences for additional financial support to some participants of ISSI-BJ Forum.

Short News 2:

Acknowledgements

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Kazuo Shiokawa

Katya Georgieva

Since the VarSITI program has officially ended at the end of 2018, this is the last volume of the VarSITI Newsletter. Since the start of the VarSITI program in January 2014, we had 60 articles, 49 highlights of young scientists, 85 meeting reports, and 24 short news from 41 countries in these 21 newsletter volumes. At this moment we express our sincere thanks to all the authors of the newsletter articles. We are also grateful to the four newsletter secretaries, Mai Asakura, Miwa Fukuichi, Megumi Nakamura, and Ayumi Asai, for their skillful support to bring out the VarSITI newsletters, and to the financial support of the Institute for Space-Earth Environmental Research, Nagoya University.

The scientific achievements of the VarSITI program will be summarized at the VarSITI Completion General Symposium, to be held in Sofia, Bulgaria during June 10-14 (http://newserver.stil.bas.bg/VarSITI2019/), after which the next SCOSTEP's scientific program will start – PRESTO: Predictability of the Variable Solar-Terrestrial Coupling.

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

<u>The editors would like to ask you to submit the following articles to the VarSITI newsletter.</u>

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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