Variability of the Sun and Its Terrestrial Impact (VarSITI)
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VarSITI Newsletter

Inside this issue

Project ISEST

Article 1:

An introduction on ISEST (International Study of Earth-Affecting Solar Transients) Working Group on Theory

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Bojan Vrsnak

In June 2013, a kick-off meeting of the ISEST program (International Study of Earth-Affecting Solar Transients) was held at Hvar, Croatia (Figure 1), following an initiative by Jie Zhang, Yuming Wang, and Nat Gopalswamy. This workshop, organized by Hvar Observatory, was a kind of "forerunner" of the forthcoming launch of the VarSITI/ SCOSTEP program in January 2014.

Figure 1. ISEST Kick-off meeting, June 17-20 2013, Hvar, Croatia (http://spaceweather.gmu.edu/meetings/ ISEST/Home.html).

The workshop was attended by 36 participants from 14 countries (http://spaceweather.gmu.edu/meetings/ISEST/ Home.html). The main goal of the meeting was to formulate objectives of the ISEST program and its further activities. Beside plenary sessions, the work at the meeting was organized in four groups (WG1: Data, WG2: Theory, WG3: Simulation, WG4: Event Campaign), which became a backbone of the ISEST program. Later on, three more groups were added (WG5: Bs Challenge, WG6: Solar Energetic Particles, WG7: MiniMax Campaign).

The overall aim of WG2 is to advance our comprehension of the physical background of Earth-affecting solar transients. The main goals can be summarized as follows:

- to improve the understanding of the structure and evolution of coronal mass ejections (CMEs) as well as their origin and their magnetic structure, including the problem of modelling the southward magnetic field component (Bs);
- to improve comprehension of the coronal and heliospheric dynamics of CMEs, including the interaction with ambient solar wind and interplanetary magnetic field, causing deceleration/ acceleration and deflections;
- to get a better insight into how long does the Lorentz force dominate over the aerodynamic drag force, including the estimation of the drag parameter and/or the dimensionless drag coefficient;

- to compare the results derived by different analytic and numerical models with observations, e.g., 1 AU transit time, impact speed, impact magnetic field, etc.;
- to advance understanding of the structure and evolution of corotating interaction regions and physical relationship with coronal holes.

At this point, the WG2 operational activity is mainly directed to advancing analytic CME-propagation models that can be used for the forecasting purposes, such as the Drag Based Model (DBM, Žic et al. 2015 and references therein), the Deflection Model (DIPS; Wang et al. 2014) and Snow Plough Model (SPM; Tappin, 2006). In recent years, the DBM started to be frequently employed tool used to understand better various aspects of the heliospheric dynamics of CMEs (e.g., Wang et al. 2016 and references therein). The CME deflected propagation in the solar wind was reproduced in a 3D MHD simulation (Shiota et al. 2016). Comparisons of results based on analytical models and those based on numerical models have become another important aspect of WG2 activity, such as ENLIL, COIN-TVD, CESE, and H3DMHD (Figure 2; Vršnak et al. 2014).

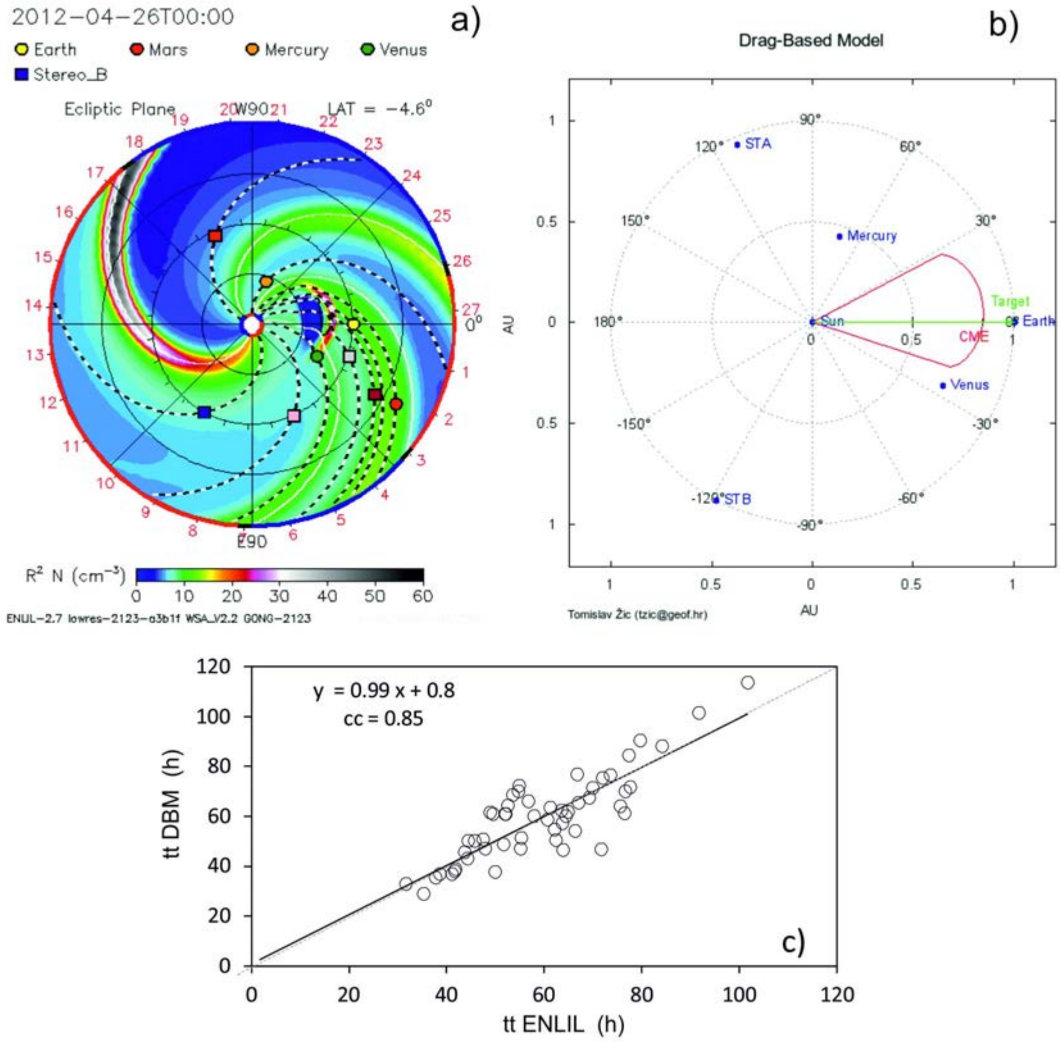

Figure 2. Comparison of numerical ENLIL code and analytic Drag-Based Model (DBM).
a) ENLIL simulation (http://iswa.gsfc.nasa.gov/iswa/iSWA.html); b) DBM output (http://oh.geof.unizg.hr/DBM/dbm.php). Snapshots show the situation on 2012 April 26 (12 UT and 07 UT for ENLIL and DBM, respectively), representing the CME that was launched on 2012 April 23. c) DBM-calculated vs. ENLIL-calculated Sun-1AU transit times for a sample of 50 CMEs (adopted from Vršnak et al. 2014).

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Shiota, D., Iju, T., Hayashi, K., et al.: 2016, AGU Fall Meeting, SH22B-03.
Tappin, S. J.: 2006, Solar Phys., 233, 233.
Vršnak, B., Žic, T., Temmer, M., et al.: 2014, ApJS, 213, 21.
Wang, Y., Wang, B., Shen, C., et al.: 2014, JGR, 119, 5117.
Wang, Y., Zhang, Q., Liu, J., et al.: 2016, JGR, 121, 7423.
Žic, T., Vršnak, B., Temmer, M.: 2015, ApJS, 218, 32.

Article 2:

Database of global "EIT waves" identified by the Coronal Pulse Identification and Tracking Algorithm (CorPITA)

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"EIT waves" are globally-propagating bright wave-like features associated with a solar eruption that can traverse the solar disk in under an hour (see Figure 1). They were first observed by SOHO/EIT in 1997 (e.g., Moses et al., 1997; Dere et al., 1997; Thompson et al., 1998) but are not yet fully understood. However, they are strongly associated with coronal mass ejections (CMEs) and could provide opportunities to study both the solar corona through which they propagate (via coronal seismology) and the associated CME itself. Although they can be readily identified "by-eye" using moving images, identifying and tracking them over an extended period of time requires extensive image processing of individual images. This approach is complicated by the sheer volume of data provided by the Solar Dynamics Observatory (SDO), which has necessitated development of automated techniques for identifying and tracking dynamic solar features (cf. Martens et al., 2012).

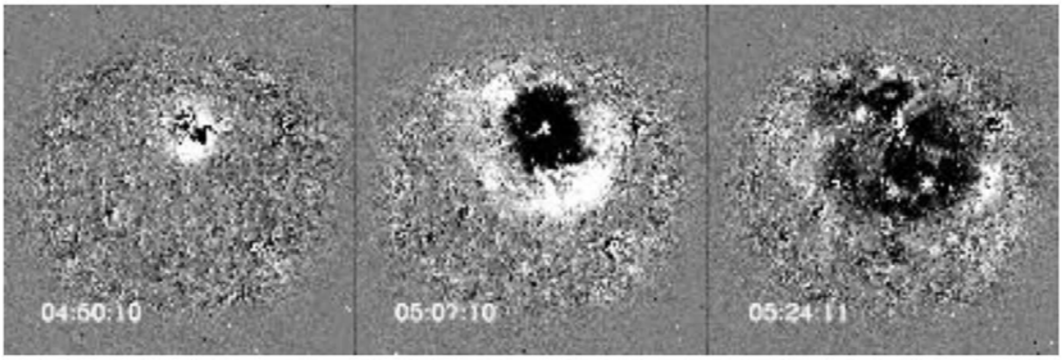

Figure 1. An "EIT wave" event observed on 12-May-1997 by the SOHO/EIT instrument. These running difference images (wherein a following image is subtracted from a leading image) are used to highlight the moving pulse and make it easier to identify in single images.

The Coronal Pulse Identification and Tracking Algorithm (CorPITA; Long et al., 2014) was designed to identify, track and analyse global "EIT waves" using SDO images in the 211Å passband. The code is triggered by the start time of a solar flare, using its location as a source and searching for any bright transient feature radiating from there. CorPITA uses a series of overlapping arc sectors to produce intensity profiles which are examined to identify a moving pulse. If a pulse is detected, the algorithm tracks it for as long as possible before measuring its velocity and acceleration in each arc. The derived properties of the pulse are then used to determine a quality rating, which defines the confidence that the detection is a true "EIT wave" pulse. An exam ple of the output provided by CorPITA is shown in Figure 2.

The process of putting the output from the CorPITA code online has begun thanks to a grant awarded by the VarSITI consortium. The grant was used to fund an undergraduate student who began running CorPITA systematically by applying it to 238 "EIT wave" events previously identified by Nitta et al. (2013). This is the first step in compiling a database of "EIT waves" and also provides a benchmark for the effectiveness of the code. The initial database is available online at https://sites.google.com/site/daithisolar/research/corpita, and will be added to as more events are processed.

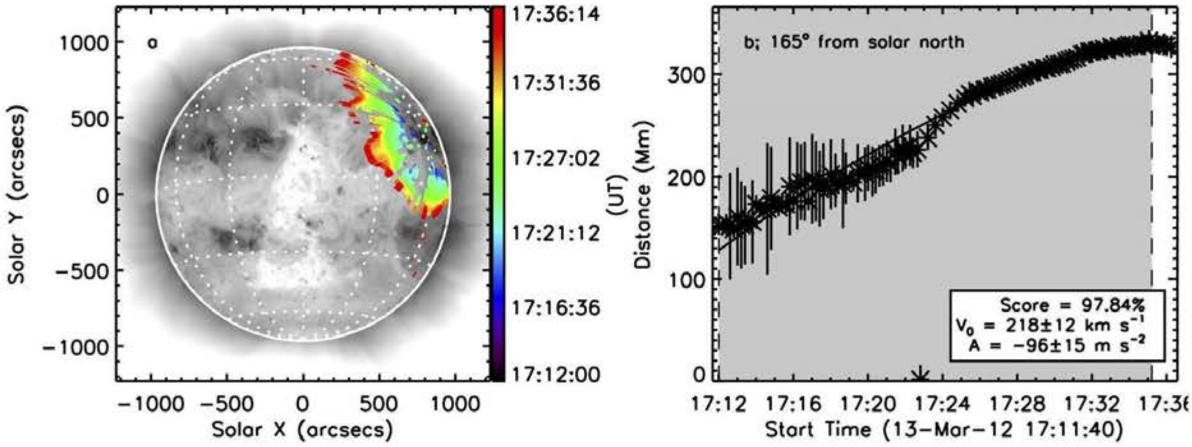

Figure 2. An example of the output from CorPITA, in this case an event from 13-March-2012. The code provides a visual output of the identified pulse (left panel) and a plot of the fitted kinematics of the highest rated arc sector (right panel).

References:

Dere, K. P., Brueckner, G. E., Howard, R. A., et al., 1997, Solar Physics, 175, 601.

Long, D. M., Bloomfield, D. S., Gallagher, P. T., & Pérez-Suárez, D., 2014, Solar Physics, 289, 3279.

Martens, P. C. H., Attrill, G. D. R., Davey, A. R., et al., 2012, Solar Physics, 275, 79.

Moses, D., Clette, F., Delaboudinière, J.-P., et al., 1997, Solar Physics, 175, 571.

Nitta, N. V., Schrijver, C. J., Title, A. M., & Liu, W., 2013, The Astrophysical Journal, 776, 58.

Thompson, B. J., Plunkett, S. P., Gurman, J. B., et al., 1998, Geophysical Research Letters, 25, 2465.

Article 3:

ULF Wave Power Index for Space Weather and Geophysical Applications

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The interaction between the solar wind (SW) and terrestrial magnetosphere is the primary driver of the processes occurring in the near-Earth environment. This interaction has often been viewed using the implicit assumption of a laminar plasma flow. Various geomagnetic indices and averaged SW/IMF parameters quantify the energy supply in certain regions of the SW-magnetosphere-ionosphere system, and are used as primary tools in studies of solar-terrestrial relationships. However, these indices characterize the steady-state level of the electrodynamics of the near-Earth environment. The turbulent character of SW drivers and the existence of natural MHD waveguides and resonators in the ULF frequency range (~2-10 mHz) ensures a quasi-periodic response to forcing at the boundary layers. We have elaborated a new index, coined a "ULF wave power index," characterizing the turbulent character of the energy transfer from the SW into the upper atmosphere and the short-scale variability of near-Earth electromagnetic processes.

Even a provisional version of the index has been successfully used in various areas of space geophysics. An hourly ULF wave index, using the spectral features of ULF power in the Pc5 band (periods from ~500 sec to ~150 sec) is derived from a world-wide array of magnetometers in the Northern hemisphere.

For any UT hour, the magnetic stations in a chosen MLT sector and in a selected CGM latitude range are selected. The amplitude spectra $F(f)$ of each horizontal component are calculated in a 1 hour running window. A discrimination line, separating the background noise and signal spectra $S(f)$, is determined as the linear fit in log-linear plot of $F(f)$ (Figure 1). A spectral bump above the discrimination line is considered as a contribution from a narrow-band signal.

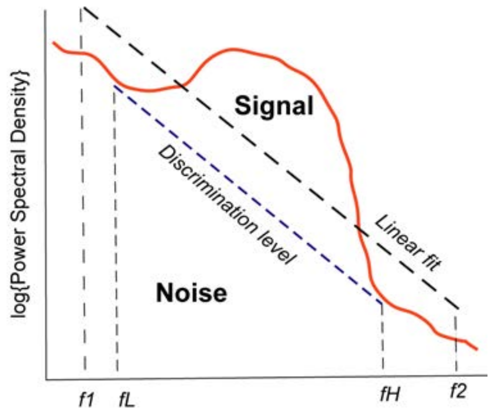

Figure 1. Schematic plot of the technique for the discrimination of signal and noise from the power spectral density of ULF variations.

The global ULF wave index is calculated from the 2.0-7.0 mHz band-integrated total power at each station. The station with a maximal amplitude is selected for each UT. For the calculation of the provisional version of the ground ULF index stations have been selected from LT_1=05 to LT_2=15 to suppress the contribution of nighttime substorm activity, and in the CGM latitude range 60°-75°. The output value has been normalized by the spectral width to make the index dimension [nT].

Ground magnetic fluctuations are not always a perfect image of ULF waves in the magnetosphere. Therefore, the ground global index needs to be augmented by a similar index, estimated from space magnetometer data. This wave index, coined the GEO ULF-index, is calculated from 1-min 3-component magnetic data from GOES satellites to quantify the ULF fluctuations and waves in the region of geostationary orbit. Additionally, to quantify the short-term variability of IMF and SW plasma, the interplanetary ULF indices are estimated using 1-min data from the OMNI database.

The hourly ULF index database has been compiled for the period since 1991 up to nowadays, and is permanently updating. The database is freely available via the specially designed website http://ulf.gcras.ru/. The website provides a user the possibility:

- to browse and download monthly plots and ASCII files with basic space weather information, including the ground, geosynchronous, and interplanetary ULF indices;
- to browse and download daily plots with world-wide magnetometers, GOES magnetometers, and basic SW/IMF parameters;

Additionally, the website provides a list of downloadable journal publications and conference talks related to the use of ULF wave index in space weather studies.

A wide range of space physics studies already benefited from the introduction of this new index. ULF waves in the Pc5 band have emerged as a possible energy reservoir ("geosynchrotron") for resonant acceleration of magnetospheric electrons to relativistic energies. The introduced ULF wave index became a convenient tool in a correlative statistical studies of high-energy particle energization. The daily relativistic electron flux at geostationary orbit can be predicted with multiple regression analyses using a set of variables, including ground ULF and VLF wave powers. The combined effect of ULF and VLF waves shows a synergistic interaction, where each increases the influence of the other on flux enhancement. The elaborated statistical models are able to predict (with accuracy ~80%) (Figure 2) increases of relativistic electron fluxes at geosynchronous orbit.

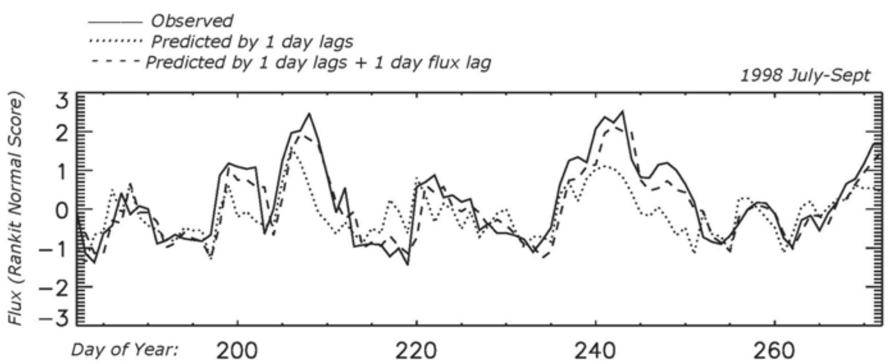

Figure 2. A time plot of the observed (solid line) and predicted values with the one day lag model (dashed line) of electron flux at geosynchronous orbit from Simms et al. , JGR 2016.

The level of upstream SW turbulence determines the degree of the flow coupling with the magnetosphere. Using the ULF index of the IMF variability, it was confirmed that when the SW is more turbulent, the effective degree of its coupling to magnetosphere is higher, and the magnetosphere is driven more strongly (Figure 3).

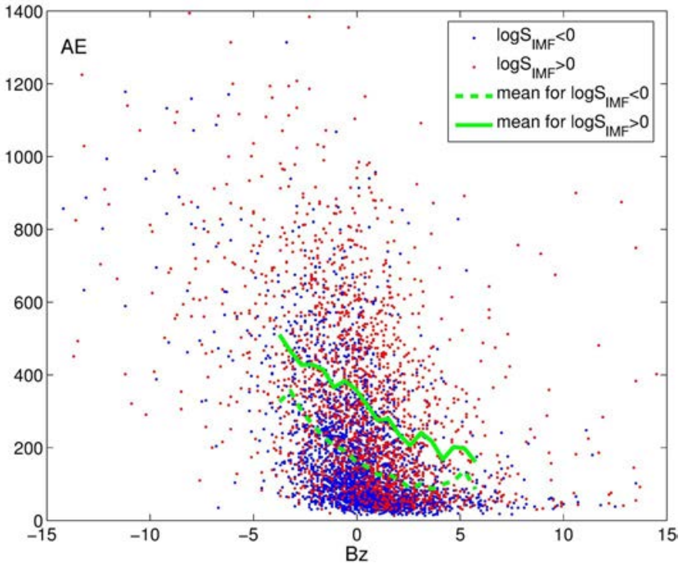

Figure 3. Comparison of the auroral response, as characterized by hourly *AE* index, with the strength of the SW driver, determined by the IMF *Bz* component, for the calm (log S_{IMF}<0, blue dots) and turbulent (log S_{IMF}>0, red dots) IMF for the period 1994-1995 from Romanova et al . , 2008.

ULF wave power in the SW was proposed to be an additional factor in controlling the coupling of the SW – magnetosphere - ionosphere system. Elevated ULF wave power can substantially enhance the convection in the high latitude ionosphere. The average cross polar cap potentials show a roughly linear dependence on the ULF interplanetary index. The variability of the SW might be an important factor in triggering magnetospheric substorms. Application of statistical methods for the search for wave precursors of substorms will benefit from the development of an index quantifying ULF activity.

A wide range of space physics studies may benefit from the introduction of the new hourly wave indices. Comments and requests for the ULF index construction are welcomed via website (http://ulf.gcras.ru/feedback.html). This research was supported by a grant from SCOSTEP/VarSITI.

Predicting CME Deflections and Rotations and their Effect on the Magnetic Field of Near Earth CMEs

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Coronal mass ejections (CMEs) often do not propagate radially following an eruption. Single coronagraph observations show latitudinal deflections and multiple coronagraphs can be used to reconstruct longitudinal deflections (e.g. [1]). Observations and simulations also show that CMEs can rotate, changing their orientation with respect to the solar equator. The largest deflections and rotations occur in the corona, but interplanetary deflection can also occur [2].

We developed a model, Forecasting a CME's Altered Trajectory (ForeCAT, [3]), to predict the coronal deflection and rotation of CMEs using the background magnetic pressure gradients and magnetic tension. We have shown that ForeCAT matches the general trends in CME deflection and rotation [3] and can reproduce individual observed CMEs (e.g. [4]). Figure 1 shows a sample ForeCAT simulation.

The presence of southward magnetic field is one of the key drivers of geomagnetic storms, so understanding a CME's near-Earth magnetic field is critical for accurate space weather predictions. ForeCAT determines the location and orientation of a CME, which we use to simulate the passage of a flux rope past a spacecraft in a new model, the ForeCAT In Situ Data Observer (FIDO, [5]). Figure 2 compares FIDO results with observations showing that FIDO can reproduce a CME's in situ magnetic field on large scales.

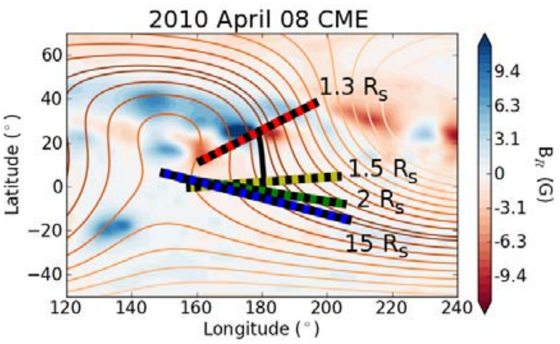

Figure 1: ForeCAT results for the 2010 April 8 CME, which match the observed trajectory. The color contours show the magnetic field at the solar surface. The line contours show the magnetic field farther out, with the darkest lines indicating the location of the Heliospheric Current Sheet (HCS). The CME is initiated parallel to the polarity inversion line of an active region. The CME deflects south along the HCS and the rotation brings the CME orientation more parallel to that of the nearby HCS.

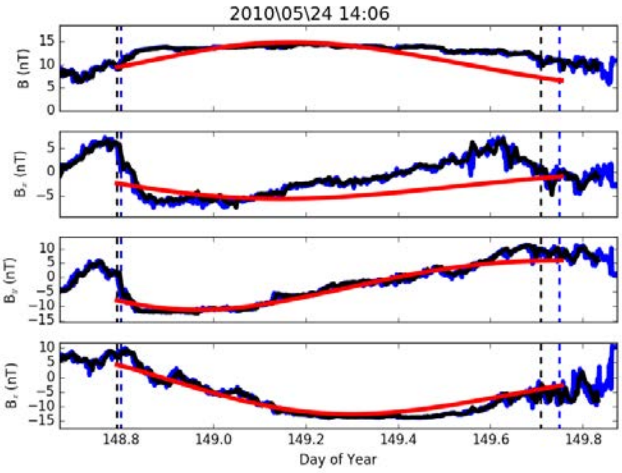

Figure 2: FIDO results for the 2010 May 24 CME. The black and blue lines correspond respectively to the ACE and Wind data and the red line shows the FIDO simulation.

References:

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2. Wang, Y., Wang, B., Shen, C., Shen, F., and Lugaz, N. (2014), Deflected propagation of a coronal mass ejection from the corona to interplanetary space, J. Geophys. Res. Space Physics, 119, 5117–5132, doi:10.1002/2013JA019537.
3. Kay, C., Evans, R. M., and Opher, M. (2015), Global Trends of CME Deflections Based on CME and Solar Parameters, ApJ, 805, 168, doi:10.1088/0004-637X/805/2/168.
4. Kay, C., Opher, M., Colannino, R. C., and Voulidas, A. (2016), Using ForeCAT Deflections and Rotations to Constrain the Early Evolution of CMEs, ApJ, 827, 70, doi:10.3847/0004-637X/827/1/70.
5. Kay, C., Gopalswamy, N., Reinard, A., and Opher, M. (2017), Predicting the Magnetic Field of Earth-Impacting CMEs, ApJ, 835, 117, doi: 10.3847/1538-4357/835/2/117.

Highlight on Young Scientists 2:

VLF-based Flare Detection

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Daniela Wenzel

In my PhD studies at the German Aerospace Center in Neustrelitz, I took part in the construction of a ground based Global Ionospheric Flare Detection System (GIFDS). GIFDS is based on a globally distributed network of Very Low Frequency (VLF) receivers tuned to receive signals from Navy VLF stations in order to continuously monitor the dayside lower ionosphere. Since X-ray flares cause an enhanced ionisation of the daytime D-region, corresponding VLF paths experience a related change measured in the amplitude. In my analysis of flare events from April 2014 to May 2015, the VLF amplitude was compared to the original solar X-ray flux measured by GOES. The relative changes of both observations follow a trend shown in Fig. 1.

In order to confirm a flare activity, GIFDS is combining multiple VLF signals by a weighted arithmetic mean [1] . The weights depend on the solar elevation at the path's midpoint. Fig. 2 demonstrates a strong correlation of the resulting superposition (top) and the GOES' original X-ray flux (bottom). With a resolution of 1 second GIFDS is able to operate complementary to the well-established GOES system.

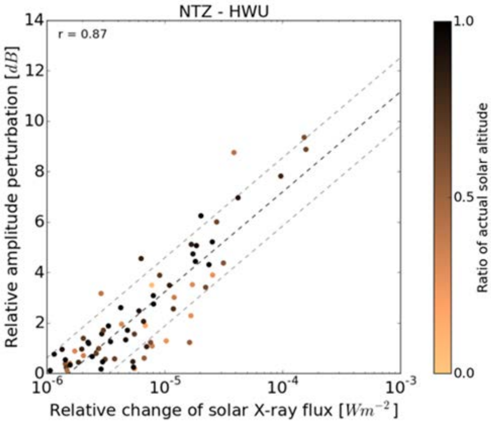

Figure 1: Relative VLF amplitude perturbations over the relative X-ray flux change of solar flares derived from the VLF path between HWU (France: 20.9 kHz) to Neustrelitz.

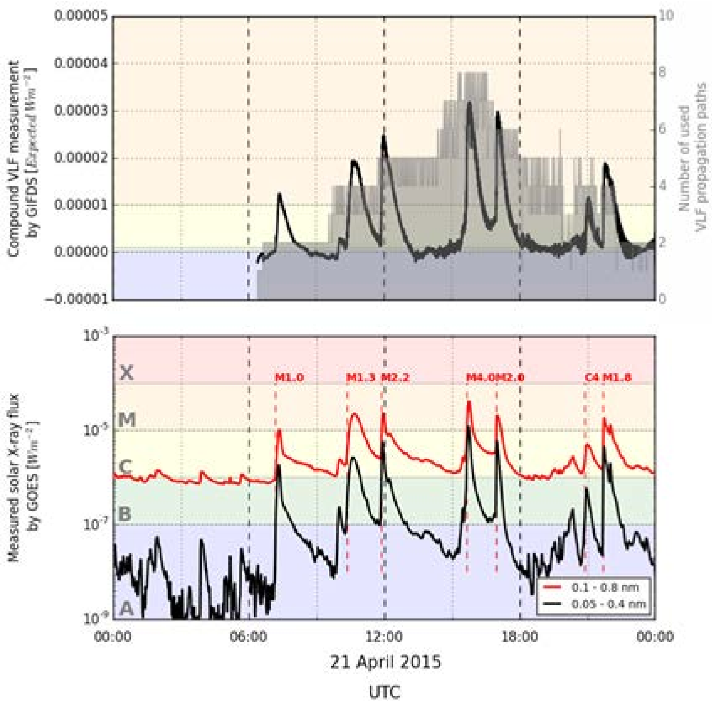

Figure 2: Compound VLF measurement and the corresponding solar X-ray flux measured by GOES.

Reference:
[1] D. Wenzel, N. Jakowski, J. Berdermann, C. Mayer, C. Valladares, and B. Heber (2016), Global ionosphericflare detection system (GIFDS). J. Atm. Sol.-Terr. Phys., 138-139, 233-242, doi: http://dx.doi.org/10.1016/j.jastp.2015.12.011.

Project SPeCIMEN

Highlight on Young Scientists

Highlight on Young Scientists 3:

Langmuir and beam-mode waves upstream of the planetary bow shock

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David Pisa

In front of planetary magnetospheres the solar wind flow slows down and forms a collisionless bow shock. Solar wind electrons accelerated at the shock front are reflected back into the solar wind forming electron beams. In regions containing these electron beams, foreshocks, Langmuir and beam-mode waves are typically observed (Fig. 1). In a relatively narrow region behind the leading magnetic field line tangent to the bow shock, Langmuir waves are most intense and observed as narrow band emissions with single peak spectra at a frequency close to the electron plasma frequency [1, 2]. Deeper downstream, waves are often more complex showing a wide frequency spread with upshifted or downshifted emissions.

In our recent research, we focus on wave and particle analysis upstream of the terrestrial bow shock as observed by the Cluster 2 spacecraft in years from 2004 to 2010. Using an automated method, we have identified almost 7 x 10^5 spectra with intense wave emissions. Close to the upstream boundary of the foreshock, the emissions are the most intense and at a frequency very close or above the plasma frequency. Deeper downstream, the wave intensity is decreasing and the peak frequency is shifting below the local electron plasma frequency.

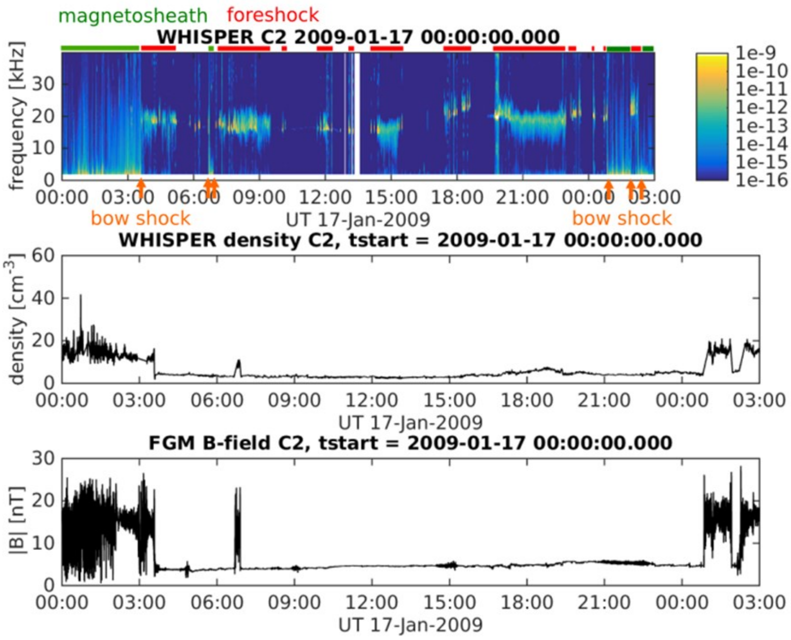

Figure 1: Example of CLUSTER 2 measurements in the vicinity of the terrestrial bow shock on 17 January 2009. (Top) Time-frequency spectrogram of one electric component observed by the WHISPER instrument. Orange arrows show bow shock crossings. Magnetosheath and foreshock visits are labeled by green and red bars, respectively. (Middle) The local electron density obtained from the WHISPER measurements. (Bottom) The total magnetic field calculated from the Fluxgate magnetometer.

References:

[1] Píša, D., G. B. Hospodarsky, W. S. Kurth, O. Santolík, J. Souček, D. A. Gurnett, A. Masters, and M. E. Hill (2015), Statistics of Langmuir wave amplitudes observed inside Saturn's foreshock by the Cassini spacecraft, J. Geophys. Res. Space Physics, 120, doi:10.1002/2014JA020560.
[2] Píša, D., O. Santolík, G. B. Hospodarsky, W. S. Kurth, D. A. Gurnett, and J. Souček (2016), Spatial distribution of Langmuir waves observed upstream of Saturn’s bow shock by Cassini, J. Geophys. Res. Space Physics, 121, doi:10.1002/2016JA022912.

Meeting Report

Project ISEST

Meeting Report 1:

IAU Symposium 327: Fine Scale Structure and Dynamics of the Solar Atmosphere, Cartagena de Indias, Colombia, 9-14 October 2016

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National Astronomical Observatory - National University of Colombia, Colombia
IAUS327 organizer

Santiago Vargas Dominguez

IAU Symposium 327 entitled Fine Structure and Dynamics of the Solar Atmosphere was the first IAU symposium held in Colombia and took place immediate after the XV Latin American Regional IAU Meeting (LARIM, 2-7 October 2016) and the First Workshop on Astronomy Beyond the Common Senses for Accessibility and Inclusion (8 October 2016). The venue was the University of Cartagena located within the walled city of Cartagena de Indias.

The main scientific goal of this symposium was to discuss recent results on the processes shaping the structure of the solar atmosphere and driving plasma eruptions and explosive events.

This symposium brought together researchers, in both theory and observation. A total of 76 scientists and students (27 female / 49 male) from 19 countries participated in IAUS327. The VarSITI program was a co-sponsor of the symposium and partially supported the participation of students.

Figure 1. Group photo of participants.

Project ROSMIC

Meeting Report 2:

ISEE Workshop on Ionospheric plasma bubble seeding and development, 29 November-02 December 2016

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National Institute for Space Research, Brazil

Hisao Takahashi

During the period from November 29 to December 02, 2016, "Workshop on Ionospheric plasma bubble seeding and development" has been held at Institute for Space and Earth Environment Research (ISEE), Nagoya University, Nagoya, Japan. It was supported by ISEE program of "Project for Solar-Terrestrial Environment Prediction(PSTEP)". The main purpose of the meeting was to review today´s scientific understanding in the Equatorial plasma bubbles (EPBs) and to seek next steps. 23 participants from 8 countries joined the meeting and discussed in the topics of observation and interpretation, new measurements and simulation models. Through the round table discussions participants pointed out importance of a coordinated ionospheric observation along the geomagnetic equator and also modelling of plasma bubbles using more realistic global atmospheric model. The workshop program and abstracts are available at http://stdb2.stelab.nagoya-u.ac.jp/2016_bubble_ws/. Special edition of the Journal of Progress on Earth and Planetary Science(SPEPS/PESP) is open for submission of papers. All of the scientists working on the topic mentioned above are welcome, and the website to get information of submission is: http://progearthplanetsci.org/index.html

Figure 1. Group photo of participants.

Upcoming meetings related to VarSITI

Conference	Date	Location	Contact Information
Data Analysis Workshop on Coronal and Interplanetary Shocks: Data Analysis from SOHO, Wind, and e-CALLISTO Data	Feb. 19-25, 2017	Mekelle, Ethiopia	http://www.mu.edu.et/cncs/index.php/2/220-international-data-analysis-workshop-on-coronal-mass-ejections-ad-solar-radio-bursts-coronal-and-interplanetary-shocks
The 10 years of operation of High resolution Neutron Monitor Database-NMDB	Mar. 20-23, 2017	Athens, Greece	http://cosray.phys.uoa.gr/index.php/workshops2/10-years-nmdb
EGU General Assembly	Apr. 23-28, 2017	Vienna, Austria	http://www.egu2017.eu/
2017 International Conference on Space Science and Communication	May 3-5, 2017	Kuala Lumpur, Malaysia	http://www.ukm.my/iconspace/
JPGU-AGU Joint Meeting 2017	May 20-25, 2017	Makuhari, Japan	http://www.jpgu.org/
the Ninth Workshop "Solar Influences on the Magnetosphere, Ionosphere and Atmosphere"	May 30-June 3, 2017	Sunny beach, Bulgaria	http://ws-sozopol.stil.bas.bg/
Advanced Concepts in Solar-Terrestrial Coupling in the Context of Space Weather A Concepts and Tools School for Students during the VarSITI 2017 General Symposium	July 9-14, 2017	Irkutsk, Russia	http://en.iszf.irk.ru/Space_weather_summer_school_2017
2nd VarSITI General Symposium	July 10-15, 2017	Irkutsk, Russia	http://varsiti2017.iszf.irk.ru
IAU Symposium 335 “Space Weather of the Heliosphere: Processes and Forecasts”	July 17-21, 2017	Devon, UK	http://www.exeter.ac.uk/iaus335
AOGS 14th Annual Meeting	Aug. 6-11, 2017	Singapore	http://www.asiaoceania.org
URSI General Assembly and Scientific Symposium	Aug. 19-26, 2017	Montreal, Canada	http://www.ursi2017.org
IAPSO-IAMAS-IAGA Joint Assembly	Aug. 27-Sep. 1,2017	Cape Town, South Africa	http://www.iapso-jamas-iaga2017.com
Consistency of the Solar Radius: outstanding unsolved points (ISSI Forum)	1st semester of 2017	Switzerland	
13th International Workshop on Layered Phenomena in the Mesopause Region (LPMR)	Sept. 18-22, 2017	Kühlungsborn, Germany	https://www.iap-kborn.de/1/current-issues/events/lpmr/
International Study of Earth-affecting Solar Transients (ISEST/MiniMax24) Workshop in 2017	Sep. 18 – 22, 2017	Jeju Island, Korea	
AGU Chapman Conference, “Particle Dynamics in the Earth's Radiation Belts”	Sept. 25-29, 2017	Biarritz, France	
SCOSTEP 14th Quadrennial Solar-Terrestrial Physics Symposium	July 9-13, 2018	Vancouver, Canada	http://www.yorku.ca/scostep/

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. Megumi Nakamura (nakamura.megumi_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 "nakamura.megumi_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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