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Inside this issue

This is a special issue containing 9 reports of SCOSTEP Visiting Scholars (SVSs) as "Highlight on Young Scientists."

Article 1:

Characterization of Coronal Mass Ejections with High Frequency type II Solar Radio Bursts

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Host Institute: NASA – GSFC, Greenbelt, MD, USA

Ange Cynthia Umuhire

Introduction

The SCOSTEP Visiting Scholar (SVS) program is a capacity building activity of SCOSTEP. The SVS program complements the current scientific program, PRESTO, and SCOSTEP's public outreach activities. One of its objective is to train graduate students in well-established solar terrestrial physics laboratories and institutions, for periods of between one and three months. I am one of 2019 SCOSTEP visiting scholar at National Aeronautics and Space Administration-Goddard Space Flight Center (NASA-GSFC).

Summary of results obtained during my visit at NASA-GSFC

Shocks appearing ahead of Coronal Mass Ejections (CMEs) in the solar

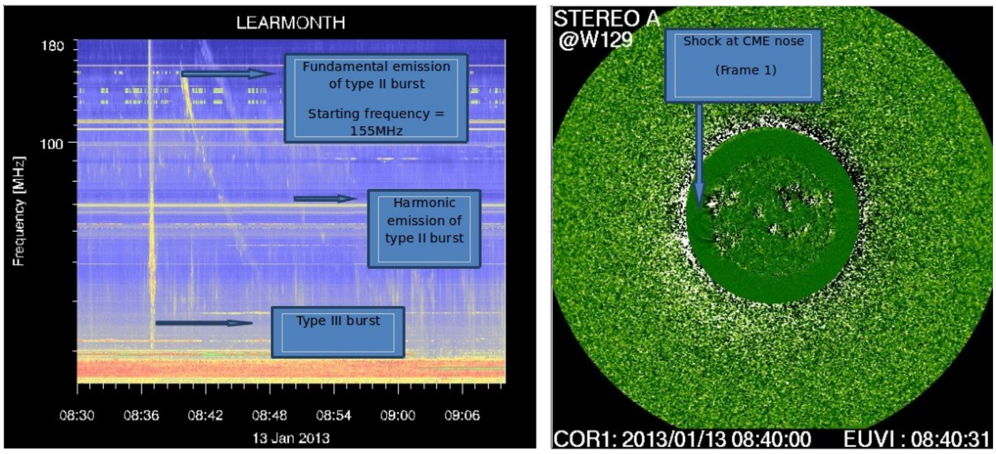

Figure 1. The left side is the 13 January 2013 type II burst observed by Learmonth solar radio spectrometer. As observed in figure 1(left), there is a fundamental harmonic structure of type II burst, which followed a type III burst. The starting frequency of the fundamental emission is 155 MHz. Figure 1 on the right shows the CME shock associated with the January 13, 2013 burst, it was observed two minutes after the appearance of type II.

corona accelerate electrons that produce Langmuir waves, which get converted into type II radio bursts by the plasma emission mechanism. The radio signals arrive at Earth in ~8 min and hence can serve as advance warning of incoming geoeffective CMEs. By using type II solar radio burst (SRB) physical parameters, it is possible to derive important physical information of the associated CMEs. Though recently there has been numerous analysis of CMEs from associated type II bursts, much of work considered SRBs emitted at lower frequencies and mainly detected by spaceborne spectrometers (i.e., WIND/WAVES).

This research project specifically focused on spatio-temporal characterization and analysis of CMEs using physical parameters of associated type II bursts emitted at higher frequency (greater than 150 MHz) and observed from various ground radio spectrographs. Figure 1 shows an example of high frequency type II burst with the associated CME (on the right of Figure 1). The January 13, 2013 type II burst started at 08:39:35 UT as it can be estimated from its dynamic spectrum, its starting frequency is 155MHz and the drift rate of -0.70 MHz/s. The associated CME was located at N19W22 near the solar disk with an energetic flare (M1.7) as observed on Figure 2. The CME shock was observed at 1.27Rs from the disk center. Figure 3 shows different CME frames named following the CME evolution in space and time. The estimated average CME speed was as high as 645.55 Km/s.

The study considered type II bursts which have clear fundamental-harmonic structures that occurred from 2010 until 2016 when CMEs could be observed by Solar Dynamic Observatory (SDO) which was launched in 2010. SDO observes CMEs very close to the Sun, so we can understand the very early stage of shock formation. In general CMEs and solar radio bursts data are available at the CDAW Data Center of NASA/GSFC. I studied the relationship between CME kinematics and radio burst properties using parameters such as starting frequency, CME radial distance and drift rate. The obtained results are significant and consistent with previous findings and soon will be communicated to a professional journal.

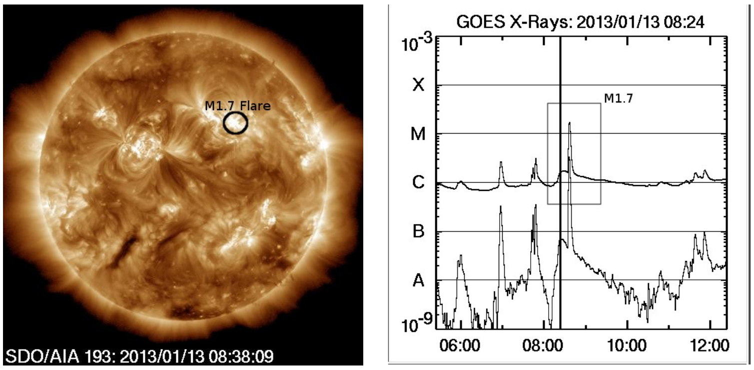

Figure 2. The left side shows the flare location associated with the January 13, 2013 CME as observed by Solar Dynamic Observatory on board Atmospheric Imaging Assembly (SDO/AIA). The right side illustrate the flare size (M1.7) as observed by Geostationary Operational Environmental Satellite (GOES).

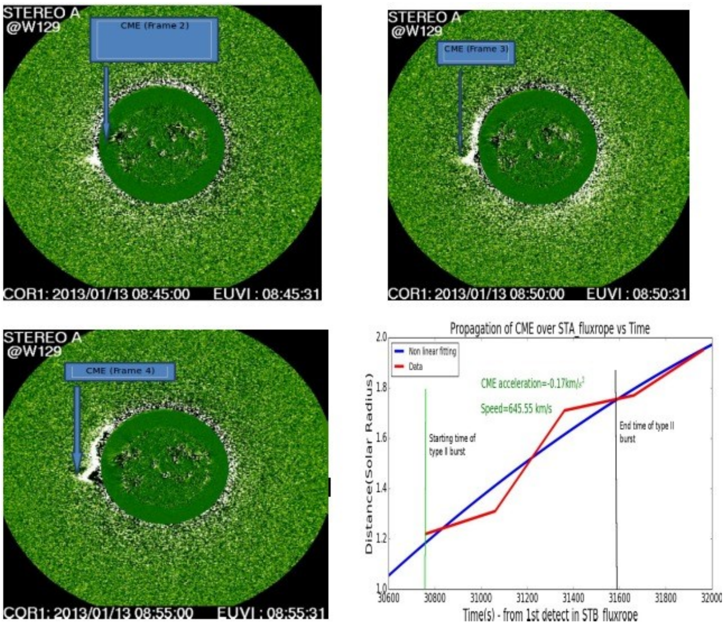

Figure 3. CME evolution in space and time is illustrated in terms of frames, the first frame shows the CME shock and the following frames (2 to 4) shows the CME evolution as observed by Solar Terrestrial Relation Observatory (STEREO). The average speed could be obtained by linearly fitting the height-time CME measurement (last plot of Figure 3). On the plot, the starting time of type II burst is shown. By fitting with the second order, the deceleration of -0.17 km/s2 was observed and this may due to drag forces in interplanetary medium.

Due to time limitations, the proposed project will be finalized from my home country. We are proposing to extend the work and analyze the interplanetary type II bursts in order to characterize the associated Interplanetary CMEs (ICMEs). Also, the variation of the magnetic field with respect to the CME heliocentric distances will be analyzed for band-splitting type II bursts. I would like to express my heartful thanks to the financial support provided by SCOSTEP and NASA-GSFC. I acknowledge Dr Nat Gopalswamy for helping me in data analysis and interpretation. I am grateful to all colleagues at NASA-GSFC, heliophysics science division for their comments and discussions which improved the quality of this work. I thank the Cathoric University of America physics department staff especially heliophysics science division.

Article 2:

My Experience as a SVS Program Recipient at ISEE

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Host Institute: Institute for Space-Earth Environmental Research (ISEE),
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Gilda González

I am a PhD student at National University of Tucuman—Argentina. My PhD focus on the analysis of short term variability of plasma bubbles (PBs) at low latitudes under different solar and geomagnetic conditions. The PBs are regions of very low plasma density and a high electric field. This electron density irregularities also cause scintillation of satellite signals and radar backscatter at HF and VHF bands. Thanks to the SVS program, I developed a research project at the Institute for Space-Earth Environmental Research (ISEE), Nagoya University, Japan under the guidance of Dr. Shiokawa. I used all-sky imagers to monitor plasma disturbances in the ionospheric F region, the 630-nm airglow intensity is proportional to the electron density at around 250 km altitude. I compared these observations with the S4 index that characterizes the scintillation activity. In my PhD work I use data from GNSS receivers, ionosondes, magnetometers and instruments on board spacecrafts, so this was the first time I used all-sky imagers. Also, I have the opportunity to visit the Shigaraki observatory and be part of the research group meetings where I could interact with researchers and students. My period at ISEE was very productive and I consider that the training I received helped me improve my research skills.

Figure 1. Picture of my presentation at the Division for Ionospheric and Magnetospheric Research seminar

Article 3:

Kinematics of Eruptive Prominences and Their Relation to the Arrival Time of CMEs at Earth

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Ritesh Patel

Coronal Mass Ejections (CMEs) are the main divers for space weather. The initial evolution of CMEs might have a significant impact on their propagation. We have probed the lower corona and estimated the kinematic properties of eruptive prominences. The kinematics have been derived using an automated algorithm based on Parabolic Hough Transform taking events from a prominence eruption catalog made with images taken by AIA 304 Å channel of SDO with 2 minutes cadence. Currently the algorithm finds events from the online catalog and tracks the eruptions by identifying their corresponding ridges in height-time (r-t) plots as shown in Figure 1 and derive their kinematics.

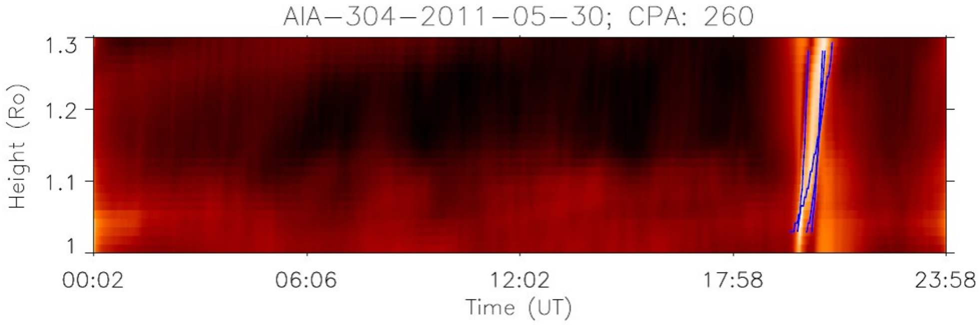
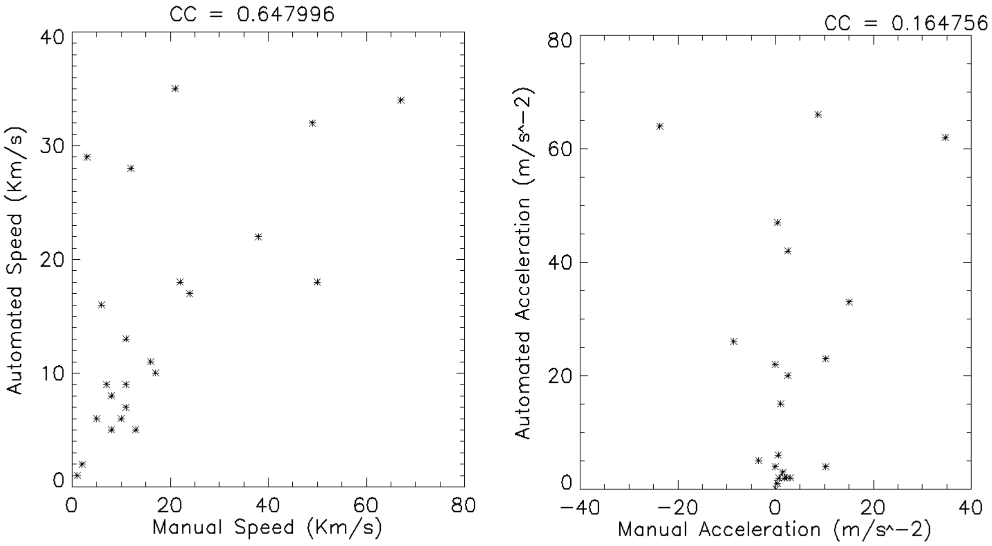


Figure 1. The ridge corresponding to prominence eruption is identified by the algorithm and overplotted in blue.



(a)

(b)

Figure 2. Comparison of eruptions kinematics obtained by the automated algorithm and those by manual tracking. (a) Average speed derived by the automated algorithm correlates with the manual values having correlation coefficient of 0.64, (b) Average acceleration measured by the automated algorithm has weak correlation of 16% with the manual values.

Our algorithm is able to identify these eruptions correctly and derive their properties including onset time. Their kinematics properties are compared with values estimated by manual tracking. The average speed derived by manual and automated process has a high correlation of 64%, whereas the average acceleration had a lower value of 16% as shown in Figure 2.

Currently, the algorithm shows better acceleration values for slow eruptions than for relatively faster ones. Once the algorithm is optimized for both slow and fast eruptions, it can be implemented to all eruptions listed in the SDO catalogue.

Article 4:

New Contributions to the Study of VLF Radio Wave Perturbations Measured at High Latitudes

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Host Institute: Institute for Space-Earth Environmental Research (ISEE),
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Edith L. Macotela

The Earth-ionosphere system behaves as a waveguide for the propagation of very low frequency (VLF) radio waves. If in this system the electrical conductivity of its boundaries is disturbed, so is the propagation of VLF waves, which is observed as phase and amplitude variations of VLF waves with respect to their quiescent levels. There is a diversity of physical phenomena able to significantly alter the conductivity of the upper boundary. These phenomena can have their origin at the Earth (e.g., lightning), in the solar system (e.g., solar flares) or even much farther away (e.g., galactic gamma-ray bursts). The aim of this study is to analyze short- and long-term VLF variations measured in Northern Finland and their associations to different phenomena. The main results are:

(i) The minimum energy a solar flare should have in order to produce ionospheric disturbances, interpreted using the minimum X-ray fluence, depends on the solar cycle (Figure 1a). This energy is understood as the ionospheric sensitivity and for daytime conditions its value lies in the range (1–12)×10^{-7} J/m^2 [1].

(ii) The semiannual oscillation that appears in VLF measurements was determined to be related to geomagnetic activity variations. At the same time, it was found that the 27-day solar rotation oscillation is dominant during the declining phase of the solar cycle (Figure 1b) [2].

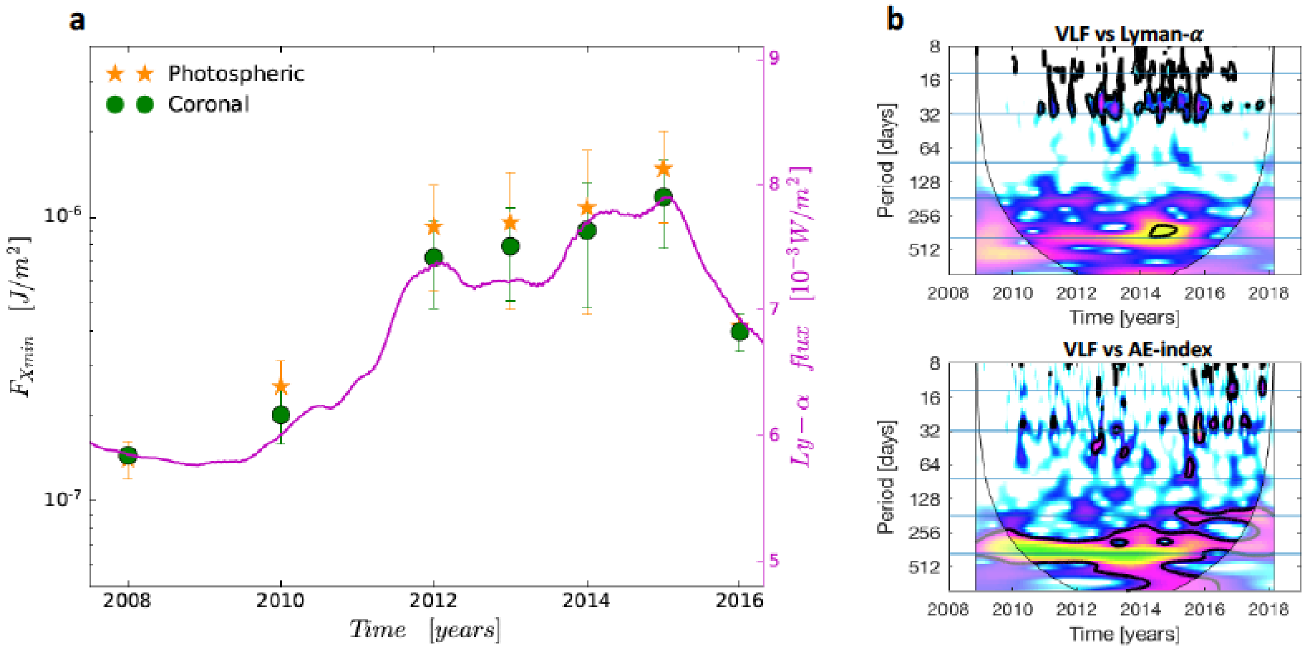

Figure 1. (a) Average values of the minimum fluence, with their respective error bars, for every year of analysis since December 2007 till January 2016. Minimum fluence values obtained by the coronal set of abundances are represented by green filled circles and those obtained by the photospheric set of abundances are illustrated by orange stars. The photospheric values were multiplied by a factor of 0.75. The error bars are 1.3 standard deviations of the minimum fluence values for every period of analysis. The magenta line is the 16-months smoothed time variation of the Ly-α flux used as a proxy of Solar Cycle 24. (b) Cross-wavelet distribution for the daytime VLF propagation data and solar Ly-α flux (upper panel) and *AE* index (lower panel). The black curve is the cone of influence and the black contours indicate 95% confidence level. The contours colors indicate the high (red) and no (white) significant common powers-of-two wavelet transform.

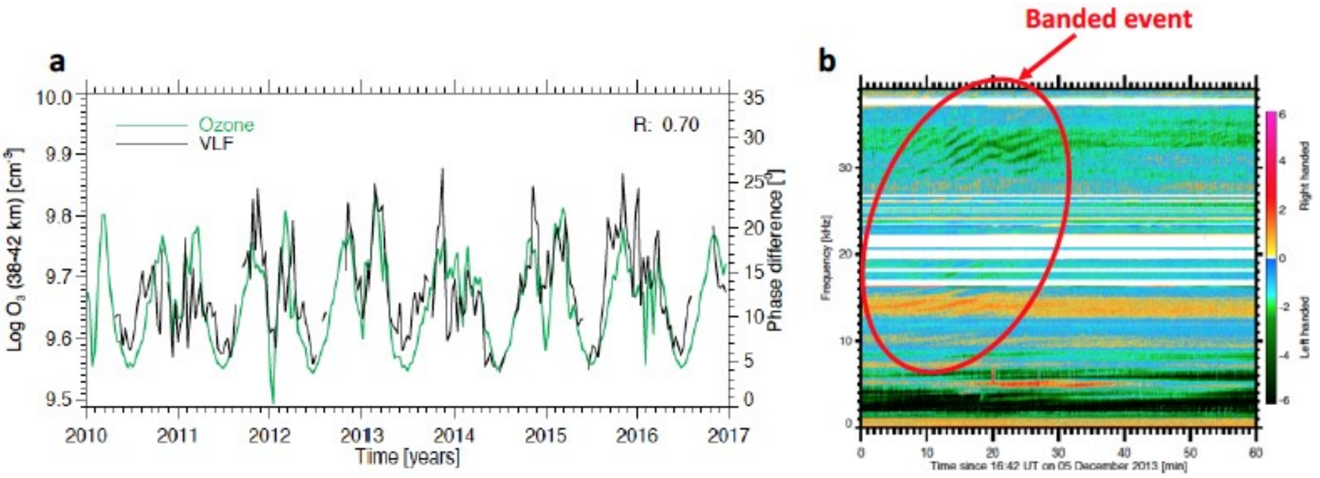

Figure 2. (a) 10-day averages of the amplitude phase perturbation variability (black curve) contrasted with the atmospheric ozone number density (green curve) at 38–42 km. R is the correlation coefficient. (b) Example of banded emission (within the red ellipse) observed at Kannuslehto. One-hour frequency-time spectrogram of right-handed (reddish colors) and left-handed (greenish colors) polarization ratio. Measurements on 05 December 2013 since 16:42 UT.

(iii) The main characteristics of the observed VLF sunrise phase perturbation are derived from the shadowing of short wavelength solar UV radiation due to stratospheric ozone absorption when the Sun rises (Figure 2a) [3].

(iv) Broadband VLF emissions with banded structure were observed in the frequency range 16–39 kHz (Figure 2b), which are frequencies not usually used for the study of whistler mode VLF emissions coming from the magnetosphere [4]. Searching for an explanation, two different hypotheses were put forward. First, they might be due to plasma instabilities in the magnetosphere, as in the case of structured auroral hiss [5]. Second, they could be formed in the Earth-ionosphere waveguide, as in the case of long-distance propagation of lightning generated VLF emissions [6,7].

The mentioned results can provide useful constraints on the long-term and short-term variability in coupled ion-neutral atmospheric models, thereby adding to our understanding of the response of the chemistry, dynamics and electrodynamics of the Earth's ionosphere to solar and atmospheric forcing.

With the motivation to look for VLF banded structures using other ground-based receiver data, I applied for the SVS program to a research visit at the Institute for Space-Earth Environmental Research (ISEE), Nagoya University, Japan. Results of the visit are twofold: my research and data analysis skills were improved, and VLF emissions with banded structure are now being observed at other auroral and sub-auroral regions.

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Article 5:

Overview of My Research Under SVS Program - 2019

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Megha Pandya

It is my honor and privilege to give a word about my research and lifetime opportunity that I was given under 2019 SCOSTEP visiting scholar (SVS) program. During my Ph.D tenure, I was selected to get training under the Deputy Mission Scientist of Van Allen Probes Mission - Dr. Shrikanth Kanekal at NASA-GSFC, USA and I sincerely thank him for taking interest in my research proposal and hosting me for this program. I specially thank my Ph.D research supervisor (Prof. B. Veenadhari), SCOSTEP's Past President (Dr. Nat Gopalswamy) and entire SCOSTEP's committee for providing this opportunity.

Currently, I am working as a Research Associate at IIG on "Study of the radiation belt electron flux response to the changing solar wind and interplanetary conditions". During this visit, I was trained to expand my technical and scientific skills to achieve the proposed research plan along with active scientific discussions with the students and other eminent scientists. The purpose of the internship was to investigate of IP shock response to the radiation belt electrons using Van Allen Probes data during declining phase of the solar cycle 24. For this, Pitch angle resolved dataset are utilized for characterizing electron flux response as shown in Figure below. Crucial observations of electron PADs were compared at different energies during IP shock to understand the extent of energization and attribution of its physical mechanism. Some results are obtained and some more analysis is under process. The manuscript will be ready in couple of months.

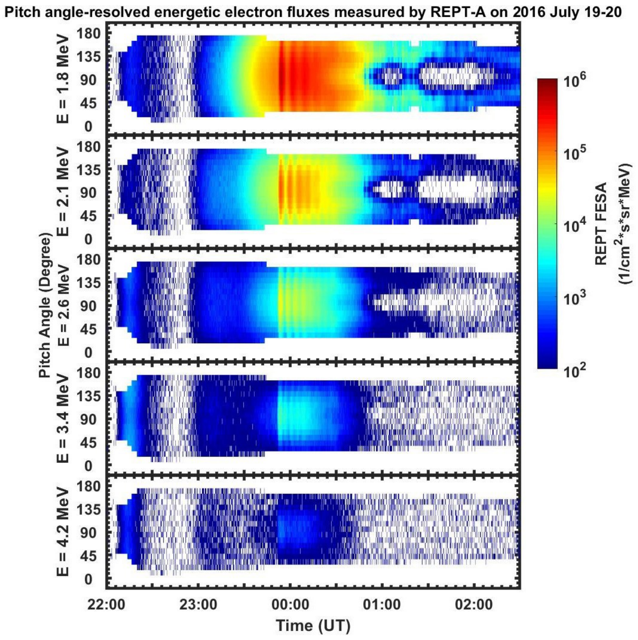

Figure 1. Multiple drift echo observations of electron Pitch angle distribution at different energies during 2016 July 19-20, using Van Allen Probes-A observations.

Article 6:

Stellar Atmospheres in Solar like Stars at Millimeter and Sub-millimeter Wavelengths

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Jean-Pierre Raulin


Luis A. Zapata

The atmosphere of the Solar-like stars is composed of the photosphere, chromosphere, transition zone, and corona. The chromosphere is the layer where the temperature goes from 4000 K to 8000 K and is studied at ultraviolet, visible, infrared, millimeter and (sub)-millimeter wavelengths (Wedemeyer et al. 2016).

The first chromospheric models were obtained thanks to the ultraviolet observations (Vernazza et al. 1981; Avrett & Loeser 2008). However, recent observations made with the Solar Submillimeter Telescope (SST) and the Atacama Large Millimeter / Submillimeter Array (ALMA) have shown that the chromosphere has lower temperatures than expected by ultraviolet models (Linsky 2017).

We have developed the KINICH-PAKAL (Tapia-Vázquez, & De la Luz 2020) code that use the Levenberg-Marquard algorithm as a nonlinear fit method, PAKAL-MPI as a chromospheric model of the solar atmosphere, and observations at wavelengths ranging from infrared to millimeter to generate a more accurate model of the chromospheres of the solar-type stars.

KINICH-PAKAL has allowed us to study in detail how the physical conditions of the atmosphere change as a function of its effective temperature.

Developing these models is necessary for debris disk studies (White et al. 2018), study the conditions under which flares are formed (MacGregor et al.2018) and the possible physical mechanisms of flux variations in the stars (Liseau 2019).

Figure 1. A photo of the professor Jean-Pierre Raulin and me at Mackenzie University in São Paulo, Brazil.

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Article 7:

Simultaneous Observations of the Electron Density in the Ionosphere and Magnetosphere

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Host Institute: Institute for Space-Earth Environmental Research (ISEE),
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Ram Singh

I am one of the luckiest among many that got the chance to visit Institute for Space-Earth Environmental Research (ISEE) Nagoya University Japan, under the 2019 SCOSTEP visiting scholar (SVS) program. First, I want to express my sincere gratitude to the SCOSTEP committee to organize such a wonderful scientific (SCOSTEP visiting scholar (SVS)) program for young researchers. I sincerely thank Prof K. Shiokawa for accepting my application for this program. He is a great professor, instructor, and able to clearly explain complex topics and nuances. I also spacially thank my Ph.D research supervisor Prof. S. Sripathi who recommened me for this program. During this visit, I got the opportunity to speak about my research work and got opinions about it from many experts in ISEE. Since the area is not exactly the same, but they helped me with a different insight, suggested few points in my research that are interesting from their viewpoints.

Figure 1. A group photo during SCOSTEP visiting scholar (SVS) program visit at Institute for Space-Earth Environmental Research (ISEE) Nagoya University, Japan (November, 2019).

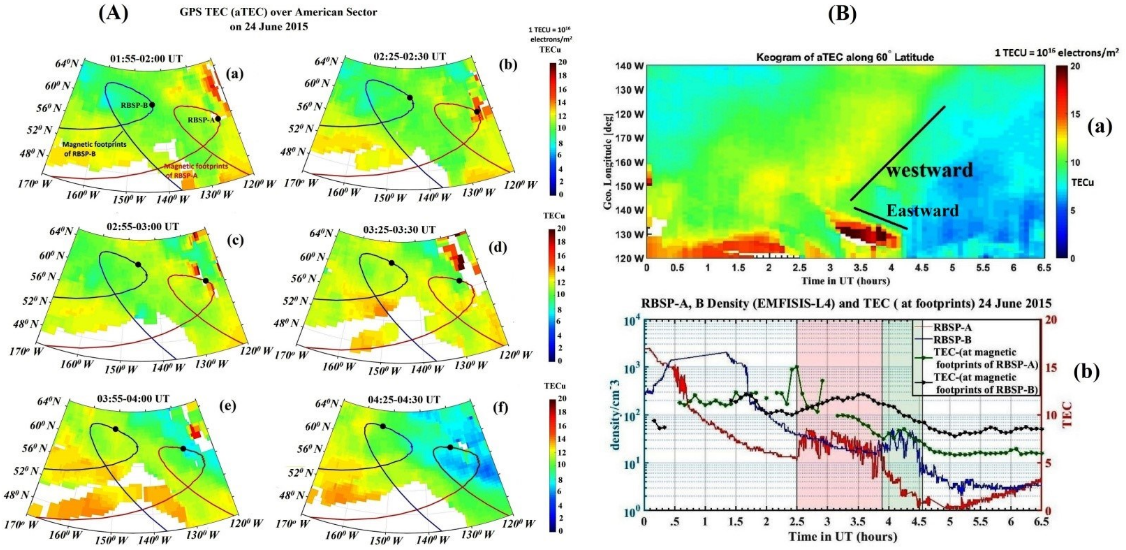

Figure 1. (A) shows the snapshots of GPS TEC between ~02:00-04:30 UT (~0.5 hr intervals) over the North American Sector on the 24th June 2015. The blue and red curves show magnetic footprints of RBSP-A and B (~300 km). Theelectron density enhancement and longitudinal (westward) propagation depicts in figure A (a-c). The keogram of absolute TEC (aTEC) along the 60olatitude shows westward and eastward propagation of the electron density in the ionosphere (in the figure-B (a)). The bottom panel of the figure-B (b) shows, electron density variations obtained from the RBSP-A (red) and RBSP-B (blue). The green and black color curvesshow electron density variationat the magnetic footprints of RBSP-A and B in the ionosphere at ~300 km.

Currently, I am working at the Indian Institute of geomagnetism Mumbai, in India as Research Associate. My Ph.D. research topic is "Coupling of the solar-driven prolonged and transient processes to the equatorial and low latitude ionosphere". During the SVS program, I worked on the simultaneous observations of electron density in the ionosphere (~300 km) and magnetosphere (~4.5 RE) using the GPS Total Electron Content (TEC) and Radiation Belt Storm Probes (RBSP) satellite-A and-B data. To calculate the magnetic footprints of the satellites, we used Tsyganenko model (TSO4). The work mainly focused on the following points. (1) The observations of Storm Enhanced Density (SED) event. (2) Longitudinal propagation of solar terminator structure observed by RBSP-A and B satellites, and electron density enhancement before the sunset terminator, and (3) Whether, at the same time, Gravity waves or traveling ionospheric disturbances (TIDs) effects can be seen in the ionosphere and magnetosphere.

Article 8:

Study of geomagnetic storm-induced ionospheric changes in D-region using very low frequency (VLF) radio signal

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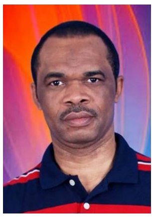
Host Institute: Centro de Radio Astronomia e Astrofísica Mackenzie (CRAAM), São Paulo, Brazil



Victor U. J. Nwankwo

My SVS work at CRAAM relates to the investigation of geomagnetic storm-induced ionosphere changes in the D-region over four signal propagation paths (PPs) of very low frequency (VLF) radio waves covering parts of Europe and Brazil. Our preliminary results showed significant reduction in the amplitude of VLF signal following geomagnetic storm. Fig. 1 shows one of the four storm cases analyzed. We observed a significant reduction in the daytime signal amplitude (DTMA) in all the propagation paths (PP1, PP2, PP3 and PP4) by 3.04 dB, 0.21 dB, 2.01 dB and 2.10 dB, respectively following a storm. The mean signal amplitude before sunrise (MBSR) also showed reduction in 2 of the 4 PPs, while the mean signal amplitude after sunset (MASS) showed reduction in 3 of 4 PPs. The outcome was quite similar in all the four storm cases analyzed. These results were consistent with some earlier reports (e.g., [1, 2]). We also observed the occurrence of anomalous signal in NAA signal received at ROI station in Brazil following geomagnetic storm. In fig 2 we show the anomalous signal observed in NAA-ROI PP during geomagnetic storms on 17 September, and 25 October 2011. This is the first time such anomaly was noticed in the received data analyzed at CRAAM.

The SVS program provided me a stimulating environment and opportunity to work with Prof. J.-P. Raulin and Prof. Emilia Correia. It also offered me the opportunity to meet and interact with other young scientists, scholars and faculty members at CRAAM (and other institutions in São Paulo), and exchanged views on a variety of related scientific themes. The SVS program broadened my expertise and experience (despite the short duration) and enhanced my capabilities to contribute to teaching and research. It also provided a platform to open discussions on possible scientific cooperation and collaboration between my host institution and my home university, which eventually culminated to signing of MoU between Universidade Presbiteriana Mackenzie, São Paulo (Brazil) and Anchor University, Lagos (Nigeria), for future collaborations.

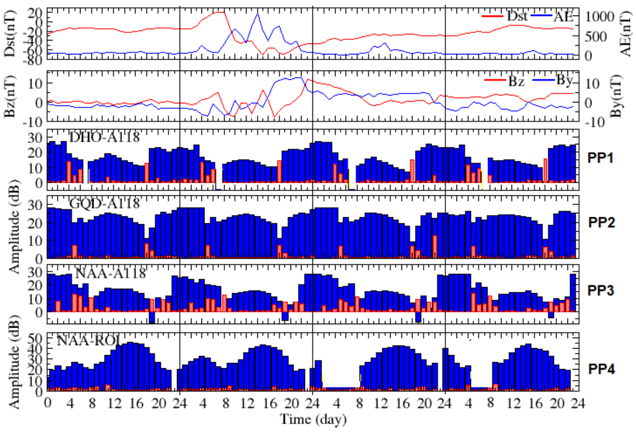


Figure 1. Variations in Dst, AE, By and Bz, and VLF amplitude (hourly mean) for DHO-A118, GQD-A118, NAA-A118 and NAA-ROI propagation paths during 16-19 Sept. 2011. The blue bar is the signal amplitude and the red bar is the hourly mean deviation (σ) in amplitude.

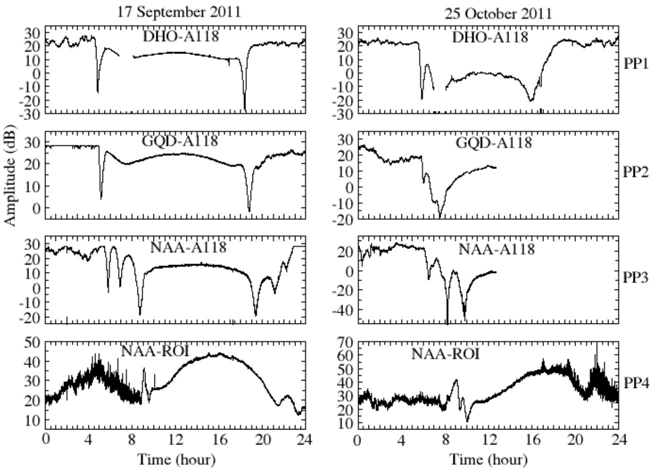


Figure 2. VLF signal anomaly observed in NAA-ROI propagation path during geomagnetic storms of 17 Sept. and 25 Oct. 2011.

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Article 9:

Multi-viewpoint and Multi-wavelength Study of a Jet Like CME

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Solar active phenomena can be divided into two categories namely: Large scale activities (solar filaments, solar flares, coronal mass ejections (CMEs)) and small scale activities (solar jets/surges, ellerman bombs, microflares, spicules) (Wang et al., 2016, Liu et al., 2019). The large scale activities affect our space weather directly. However, there are cases where the small scale events can also be associated with CMEs and affect our space weather. One of the important small scale solar activities is solar jet. Solar jets are defined as the collimated plasma ejections emitted in different temperatures in the low solar atmosphere and reaching high altitudes into the corona. They are observed in the wide range of electromagnetic spectra such as: H-alpha (Roy 1973; Schmieder et al. 1988; Uddin et al. 2012), Ca II H (Shibata et al. 2007), Extreme Ultraviolet (EUV) (Alexander & Fletcher 1999; Guo et al. 2013, Joshi et al. 2017) and soft X-ray (Shibata et al. 1992; Sterling et al. 2015). From the the morphological description, solar jets are divided into two categories: 'standard' and 'blowout' jets (Moore et al. 2010). Standard jets have a narrow spire with a relative dim base, whereas the blowout jets reveal an initial phase quite similar to standard jets, but with a bright base. Blowout jets are afterwards followed by a violent flux rope eruption and then consequent broadening of the spire (Sterling et al. 2010; Liu et al. 2011). Later on this violent flux rope eruption can be observed as CMEs (Liu et al. 2015, Raouafi et al. 2016; Zuccarello et al., 2017, Chandra et al., 2017). The observations show that jets can be topologically complex and may contribute to the heating of the solar corona and the acceleration of the solar wind (Zhelyazkov et al. 2019).

Recently, we studied a CME associated solar jet event on April 28, 2013. To study the event from the multiview point we used the EUV and coronal white-light data from Solar Dynamics Observatory (SDO, Pesnell et al. (2012)), Solar TErrestial RElations Observatory (STEREO, Howard et al. (2008)), and SOlar and Heliospheric Observatory (SOHO, Brueckner et al. (1995)). Our study on the kinematics and spatial evolution of the jet guided us that the jet was clearly associated with the narrow CME.

The jet erupted from the active region NOAA 11731 in the association with a C1.5 class flare towards the northern direction. After reaching some height, the jet deflected from the initial direction and revolved around the north-east direction. For the real propagation direction we analysed SDO/AIA and STEREO/EUVI data and found that the jet escaped from the surface with a real propagation speed of 200 km/s. The leading edge of the jet in SDO/AIA and STEREO-B/EUVI 304 channel at 21:56 UT is shown in Figure 1. The CME looked like a giant jet with an angular width of 25 degrees in the solar corona as viewed from STEREO-B and SOHO.

Then we applied the ice-cream cone model, which is a simplified form of the Graduated Cylindrical Shell (GCS, Thernisien et al. (2006)) model, to examine the direction and velocity of the CME as shown in Figure 2. Its propagation speed was found to be 450 km/s.

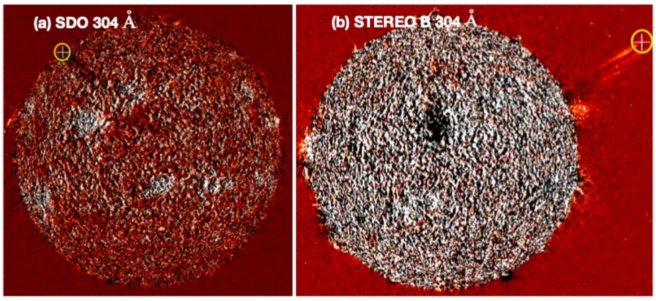

Figure 1. The leading edge of the jet in SDO/AIA 304 Å (a) and in STEREO B EUV 304 Å (b) at 21:56 UT presented as the yellow circle.

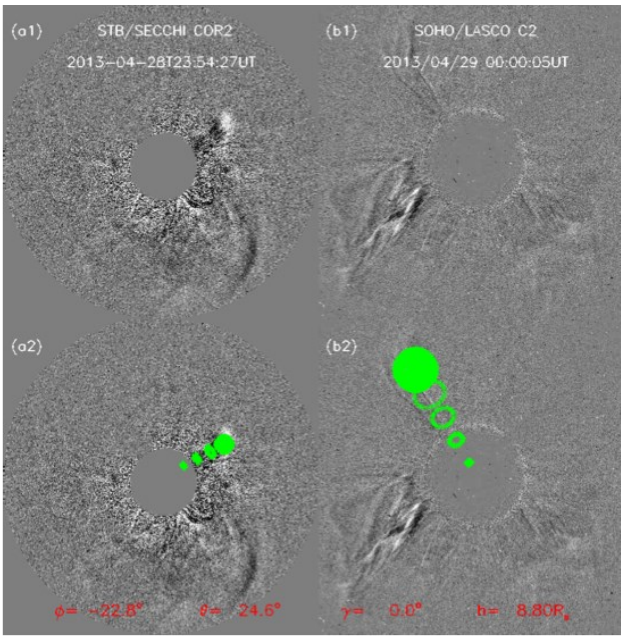

Figure 2. The The GCS modelling of the narrow CME in STEREO-B COR2 (first column), and SOHO/ LASCO C2 (last column).

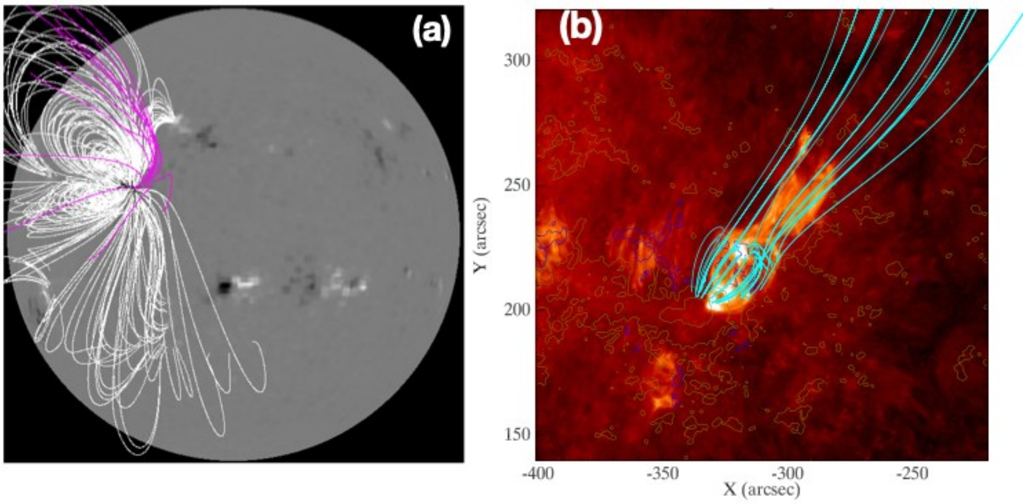

Figure 3. The global (a) and local (b) extrapolation at the jet base. Panel (a): PFSS extrapolation at the active region Closed and open magnetic field lines are shown with the white and pink lines. The open (pink) field lines are exactly in the same way as of the jet propagation direction. Panel (b): The open (cyan) magnetic lines are showing the path of the jet in the northward direction overlaid on the AIA 304 Å.

We further applied the Potential Field Source Surface (PFSS) model to investigate the global magnetic topology near the jet source region (see Figure 3a) and applied the Fourier transformation method (Alissandrakis 1981) for the coronal extrapolation from the line of sight magnetogram to reveal the details in the jet base (see Figure 3b). It was found that the open field lines (Figure 3 (a)) coincide well with the moving direction of the jet and the jet base just next to the open field lines is covered with the closed loops.

This study of a narrow CME caused by the jet gives a worth evidence that some small scale ejections (jets) from the solar disk are able to escape and reach the solar corona as a CME, suggesting the tight connection between the small scale activities and large scale eruptions. In this direction, we are looking forward to find the clear in situ measurements from the newly launched Parker Solar Probe.

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Upcoming meetings related to SCOSTEP

Conference	Date	Location	Contact Information
EGU General Assembly 2020	May 4-8, 2020	Online	https://www.egu2020.eu/
European Meteorological Society (EMS) session on "The interconnection between the Sun, space weather, and the upper and middle atmosphere"	Sep. 7-11, 2020	Bratislava, Slovakia	https://www.ems2020.eu/home.html
International Colloquium on Equatorial and Low-Latitute Ionosphere	Sep. 14-19, 2020	Ota, Nigeria	https://carnasrda.com/icelli
AGU Fall Meeting 2020	Dec. 7-11, 2020	San Francisco, CA, USA	https://www.agu.org/fall-meeting
COSPAR 2021	Jan. 28-Feb.4, 2021	Sydney, Australia	https://www.cospar2020.org/
EGU General Assembly 2021	Apr. 25-30, 2021	Vienna, Austria	https://www.egu.eu/
8th International HEPPA-SOLARIS 2020 Meeting	Jun. 8-10, 2021	Bergen, Norway	https://heppasolaris2020.w.uib.no/
IAMAS	Jul. 18-23, 2021	Busan, Korea	http://baco-21.org/2021/english/main/index_en.asp
AOGS 2021	Aug. 1-6, 2021	Singapore	http://www.asiaoceania.org/society/index.asp
IAU 2021 General Assembly	Aug. 16-27, 2021	Busan, Korea	http://www.iauga2021.org/
IAGA 2021	Aug. 22-27, 2021	Hyderabad, India	http://www.iaga-iaspei-india2021.in/
URSI General Assembly and Scientific Symposium (GASS2021)	In late August and early September, 2021	Rome, Italy	https://www.ursi2020.org/
AGU Fall Meeting 2021	Dec. 13-17, 2021	New Orleans, LA, USA	https://www.agu.org/fall-meeting
SCOSTEP's 15th Quadrennial Solar-Terrestrial Physics Symposium (STP-15)	Feb. 21-25, 2022	Alibag, India	
EGU General Assembly 2022	Apr. 3-8, 2022	Vienna, Austria	https://www.egu.eu/
COSPAR 2022	Jul. 16-24, 2022	Athens, Greece	http://www.cosparathens2022.org/
AOGS 2022	Aug. 14-19, 2022	Melbourne, Australia	http://www.asiaoceania.org/society/index.asp
AGU Fall Meeting 2022	Dec. 12-16, 2022	Chicago, IL, USA	https://www.agu.org/fall-meeting
IUGG 2023	In July, 2023	Berlin, Germany	http://www.iugg.org/
AGU Fall Meeting 2023	Dec. 11-15, 2023	San Francisco, CA, USA	https://www.agu.org/fall-meeting

The purpose of the The purpose of the SCOSTEP/PRESTO newsletter is to promote communication among scientists related to solar-terrestrial physics and the SCOSTEP's PRESTO program.

The editors would like to ask you to submit the following articles to the SCOSTEP/PRESTO 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.
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   On workshop/conference/ symposium report related to SCOSTEP/PRESTO
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 SCOSTEP/PRESTO
4. Announcement— Each announcement has a maximum of 200 words length.
   Announcements of campaign, workshop, etc.
5. Meeting schedule

Category 3 (Highlights on young scientists) helps both young scientists and SCOSTEP/PRESTO 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.

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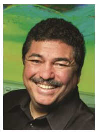

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