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* ISWI Newsletter - Vol. 15 No. 010 13 October 2023 *
* Editor: George Maeda, georgemaeda3[at]gmail.com *
* Archive of back issues: ISWI Website https://iswi-secretariat.org/
* Archive of all ISWI webinars: *
* https://www.youtube.com/playlist?list=PLaOqa4cngOGF3cKuj6Yz5kqG1BQ-Akkhr
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Dear ISWI Participants:

If you have any time-sensitive announcements for
our ISWI community, please send to me as quickly as
you can. It should be two months ahead of the event.
This newsletter aims to go out each month on the 15th.

It is published only once per month.

This month, the newsletter is issued two days early.

-- Editor.

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: (a video produced by SANSA)

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: "Aditya-L1: Solar & Heliospheric Observatory from India"
: By: K. Sankarasubramanian and Nandita Srivastava

[07] Northern Lights Are Seen Overnight in Parts of U.S.
: (from The New York Times)

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[01]----------

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A Celebration of the Life of Dr Lee-Anne McKinnell
https://www.youtube.com/watch?v=-XdV39BWMzM
South African National Space Agency (SANSA)

799 views Streamed live on Aug 24, 2023
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[02]----------

Hermanus Times -- an obituary on Dr Lee-Anne McKinnell
:   22 Aug 2023

Trailblazer in space science leaves a remarkable legacy
==========

The Space Weather Project was her crowning achievement, which produced a space-weather capability for the country in three years, on time and on budget. The launch of the 24/7 Space Weather Centre in November of last year was a highlight for her and the Sansa team. McKinnell was a space-weather advocate and custodian of the unique Sansa Hermanus facility, which she loved, and is now a national key point, thanks to her continued efforts to protect the site.

She served on numerous international committees and working groups, including as the Space Weather co-chair for the World Meteorological Organisation (WMO), ensuring Africa's interests were maintained in the field of space science and related technology. She also received a long list of awards for her contribution to the space-science field.

READ THE ENTIRE ARTICLE HERE:
https://www.news24.com/news24/community-newspaper/hermanustimes/trailblazer-in-space-science-leaves-a-remarkable-legacy-20230822

[03]----------

FROM:
Dra. María Graciela Molina
Associate Professor FACET -UNT
Researcher CONICET
Associated researcher INGV
Av. Independencia 1800, Tucumán - Argentina

TO: ISWI Newsletter
DATE: 13 Oct 2023

Dear ISWI colleagues,

We are pleased to announce the next ISWI Seminar of 2023 by Dr Hebe Cremades scheduled for October 25th at 3 PM Central European Time (9 AM EDT; 6:30 PM IST).

To register for the virtual seminar, please send an email to: iswisupport@bc.edu
Please include "ISWI Seminar Registration" in the subject line. There is a limit of 300 participants, so please register your interest as soon as possible. The MS Teams link will be sent to registered participants 2 days before the event.

Please remember that the seminars will be recorded. The playlist with the previous seminars, which will also include future sessions, can be accessed through the following link:
https://www.unoosa.org/oosa/en/ourwork/psa/bssi/iswi_webinars.html

Looking forward to meeting you in the next ISWI seminar!

With kind regards,

Graciela Molina
on behalf of the ISWI Seminar Committee

See this PDF:
ISWI webinar flyer for OCT 2023.pdf
001

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Title: Considerations on the morphology of coronal mass ejections

Speaker: Dr Hebe Cremades
         Mendoza Group for Heliophysics Studies
         (GEHMe, University of Mendoza) and CONICET
         Argentina

Abstract:
Coronal mass ejections (CMEs) are undoubtedly the most spectacular transient events that can be observed in the solar corona. Enabled by the fleet of solar- and heliospheric-dedicated spacecraft with the capability of detecting them remotely and/or in situ, CMEs and their interplanetary counterparts have been characterized with increasing detail throughout the years. Nevertheless, several aspects of CMEs remain elusive, including their three-dimensional magnetic configuration, mainly due to limitations inherent to remote-sensing and in situ observations. Still, they provide valuable pieces of information that have high potential to shed light in this respect. The study of CME morphology on the basis of remote-sensing observations is an approach to that end, since it holds a close relationship with the CME magnetic field configuration. Findings on CME morphology are key for the interpretation and modeling of in situ observations of these events at multiple spacecraft. In particular, the extent of CMEs, expansion rates along orthogonal directions, departures from the archetypical flux rope structure, and factors affecting the characterization of CME morphology will be addressed.

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[04]--

Hello, George,
It is that time of the year again:
the European Space Weather Week is casting its shadow...

It will take place in Toulouse, France, with hybrid access.
20-24 November 2023.

https://esww2023.org/

All the best,
Klaus Sievers; 20 Sept 2023

//
European Space Weather Week 2023

The ESWW2023 will be held in a fully HYBRID format.

Abstracts submitted before 29/06/23 have been evaluted
and authors notified: please contact us at esww2023[at]gmail.com
if you have not received your acceptance notification.

Abstracts submitted between 30/06/23 to 13/09/23 are
currently being evaluated by session conveners:
notifications will be sent week of 25th of September.

Please register online by 15th October (23:59CEST):

Registration
19th European Space-Weather Week

ESWW2023 will again adopt the central aim of bringing
together the diverse groups in Europe working on different
aspects of Space Weather and Space Climate: such as scientists,
engineers, satellite operators, power grid technicians,
communication and navigation specialists, people working
in aviation, space weather service providers, STEM practitioners.

The ESWW is highly interdisciplinary by nature and actively
promotes investigation of new technologies and approaches
e.g. machine learning in a space weather context.
ESWW also welcomes space weather end users. End users
constitute any group/organisation making use of space
weather data and services. Fields include but are not
limited to spacecraft operation, spacecraft design,
space and ground based telecoms and navigation services,
power distribution, pipeline operation, aviation safety,
railway operators, insurance companies, civil contingency
planning, and scientists.

Full details are here:
https://esww2023.org/

Extra information:

Aviation related activities at the ESWW
https://bit.ly/3ZxTx2U

It may interest some of you.

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[05]--

Dear All

Attached is the latest CALLISTO news-letter/status-report.
Please check the proposal which is the first section, we need not only
listeners but also presenters as well as funding!

Current, as well as all old reports are available here:
https://www.e-callisto.org/StatusReports/statusreports.html

Best regards,
Christian Monstein
PI e-Callisto

See:
status_97V01.pdf
002

[06]----------

TITLE: Aditya-L1: Solar & Heliospheric Observatory from India

AUTHORS:
K. Sankarasubramanian[1] and
Nandita Srivastava[2]

[1] Principal Scientist - Aditya-L1 U R Rao Satellite Centre,
    Indian Space Research Organization, Bengaluru, India

[2] Senior Professor and National Coordinator,
    ISWI Udaipur Solar Observatory,
    Physical Research Laboratory, Udaipur, India

Aditya, Sanskrit name for the Sun, is an observatory class satellite from India which was launched on the 2nd September 2023 at 11:50 AM IST (06:20 UT) using the Polar Satellite Launch Vehicle (PSLV-C57). The satellite will be placed at the Sun-Earth Lagrangian point -1 (L1) to study the Sun and local environment at L1 with a suite of experiments using remote sensing as well as in-situ instruments. It would take about 126-days from the launch date for Aditya-L1 to reach the L1 point with a 16-day Earth orbiting phase and about 110-days of cruise phase. The Trans-Lagrangian Insertion (TLI) was carried out on 19th September early morning 02:00 AM IST (18th September 20:30 UT) In the month of January 2024, the L1 insertion is expected to be carried out for the mission to start its scientific observations to study the dynamic Sun and its influence at L1.

See the full article:
Aditya_l1_ISWI-12October2023-rev.pdf
003

[07]----------

FROM THE NEW YORK TIMES

"Northern Lights Are Seen Overnight in Parts of U.S."

Sightings of the aurora borealis were reported across the West and Midwest as space weather experts tracked a geomagnetic storm.

SEE:
Northern lights, the new york times.pdf
004

**********[End of this issue of the ISWI Newsletter]**********

ISWI Webinar Series

October 25th, 2023
3PM Central European Time
(9AM EDT; 6:30PM IST)

Considerations on the morphology of coronal mass ejections

Dr. Hebe Cremades

Mendoza Group for Heliophysics Studies (GEHMe, University of Mendoza) and CONICET Argentina

Coronal mass ejections (CMEs) are undoubtedly the most spectacular transient events that can be observed in the solar corona. Enabled by the fleet of solar- and heliospheric-dedicated spacecraft with the capability of detecting them remotely and/or in situ, CMEs and their interplanetary counterparts have been characterized with increasing detail throughout the years. Nevertheless, several aspects of CMEs remain elusive, including their three-dimensional magnetic configuration, mainly due to limitations inherent to remote-sensing and in situ observations. Still, they provide valuable pieces of information that have high potential to shed light in this respect. The study of CME morphology on the basis of remote-sensing observations is an approach to that end, since it holds a close relationship with the CME magnetic field configuration. Findings on CME morphology are key for the interpretation and modeling of in situ observations of these events at multiple spacecraft. In particular, the extent of CMEs, expansion rates along orthogonal directions, departures from the archetypical flux rope structure, and factors affecting the characterization of CME morphology will be addressed.

http://www.iswi-secretariat.org/ *Registration:* *iswisupport@bc.edu*

Please register, and then mark your calendar

CALLISTO status report/newsletter #97

Proposal:
CALLISTO Instrument Workshop
UN Vienna during February 5-9, 2024

Day 1/2 mainly hardware related

Time	Topic	Presenter
08:00-09:00	Registration at Gate 1, VIC	All
09:00-09:30	Opening and welcome, organisational remarks	Gopal?, Shafa?
09:30-10:00	CALLISTO and the e-Callisto network	Monstein
10:00-10:20	Coffee break	
10:20	**Session 1:**	
10:20-10:40	Antennas: LPDA, LWA, MWA, simple dipole, dish etc.	
10:40-11:00	Low noise amplifier gain, noise figure, protection	
11:00-11:20	Frontend electronics FEE replacement	
11:20-11:40	Calibration unit, calibration sources	
11:40-12:00	Spectrometer CALLISTO	
12:00-12:20	Spectrometer (progress in SDR)	Bussons?
12:20-12:40	Computer, controller Windows issues	
12:40-13:40	Lunch break	
13:40	**Session 2:**	
13:40-14:00	Power adapter issues, UPS	
14:00-14:20	Coaxial cables (loss, impedance, shielding…)	
14:20-14:40	Lightning protection	
14:40-15:00	TBD	
15:00-15:20	TBD	
15:20-15:40	Coffee break	
15:40	**Session 3:**	
15:40-16:00	Operating instrument	
16:00-16:20	Maintenance (Antenna, Spectrometer, PC)	
16:20-16:40	TBD	
16:40-17:00	Discussion	
17:00	Adjourn	

Day 2/2 mainly software related and data analysis

Time	Topic	Presenter
09:00	**Session 4:**	
09:00-09:20	Application software installation and configuration	
09:20-09:40	Generation of a frequency file	
09:40-10:00	Data upload via FTP and data download	
10:00-10:20	Generate daily light curve in real time for web-presentation	
10:20-10:40	Ethics in case of publications	
10:40-11:00	Coffee break	
11:00	Session 5:	
11:00-11:20	Plot FIT-file spectra in Python	
11:20-11:40	Plot light curve out of FIT-file in Python	
11:40-12:00	Plot spectral overview in Python	
12:00-12:20	Burst type and rfi-types, how to distinguish	
12:20-12:40	Estimate Y-factor of bursts and rfi	
12:40-13:40	Lunch break	
13:40	**Session 6:**	
13:40-14:00	Calibration issues, cross-calibration, pseudo-calibration	
14:00-14:20	Measure gain/loss/impedance matching with NanoVNA	
14:20-14:40	Intro to LINUX-versions	
14:40-15:00	Data archive and processes at FHNW in Switzerland	
15:00-15:20	TBD	
15:20-15:40	Coffee break	
15:40-16:00	Wrap–up Session and concluding Remarks	Shafa?
16:00	End workshop	All

We many times discussed the need for an instrument related workshop in addition to several scientific workshops which have been taken place in Ethiopia, Rwanda, India etc.
Our plan is a two-day workshop, instrument related in the date-range February 5-9, 2023.

Location: VIC in Vienna, together with an instrument exhibition in the rotunda of VIC
Funding: not clear yet, need to be discussed with people from UNOOSA and others.

But one thing is clear, I cannot do everything myself as I'm 70 now and do hardly get younger ...
Need volunteers to give talks and presentations as suggested in the above very draft proposal.
There are still some TBDs for additional talks, please send in any idea you might be interested in.
If you are interested in such a workshop at all (in person or remote), please respond to:
monstein@irsol.ch

If you are interested to cover one or the other topic above (in person or remote), please respond to:
monstein@irsol.ch

Do NOT respond to the email-address of this news-letter,
Callisto@lists.phys.ethz.ch is a robot/computer and does not answer questions.

e-Callisto burst statistics August 2023

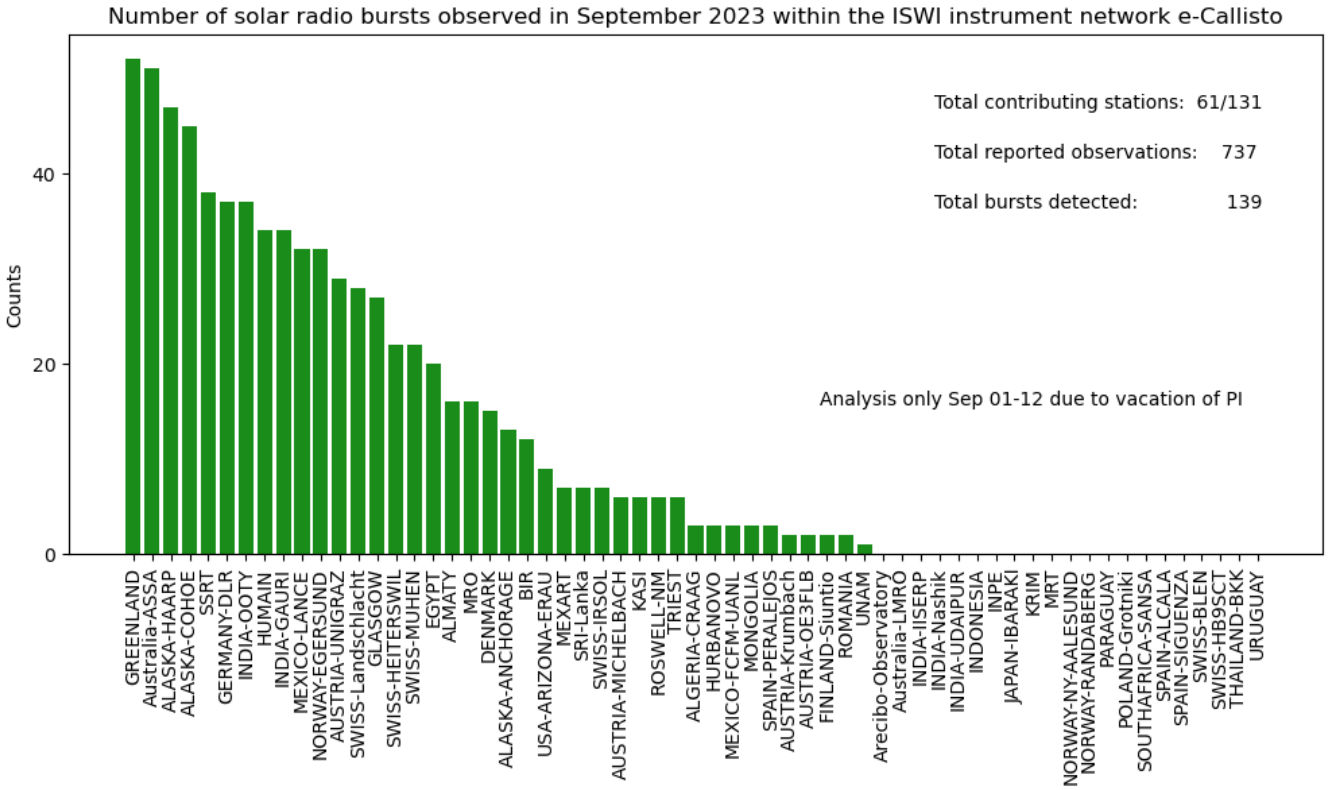

Fig. 7: Compilation of all visually detected bursts from all Callisto-stations which provide data to the e-Callisto network. There are clear 'winners' of the 'competition', GREENLAND, Australia-ASSA and ALASKA-HAARP. Due to vacation of the PI only part of the month was analysed, therefore only few bursts listed.
Still eagerly looking for an AI-solution to automatically generate a burst-list and to save many hours day by day to perform this rather boring job visually.

Papers:

@article{POHJOLAINEN2023,
title = {Separating the effects of earthside and far side solar events. A case study},
journal = {Advances in Space Research},

year = {2023},
issn = {0273-1177},
doi = {https://doi.org/10.1016/j.asr.2023.09.009},
url = {https://www.sciencedirect.com/science/article/pii/S0273117723007317},
author = {Silja Pohjolainen and Nasrin {Talebpour Shesvan} and Christian Monstein},
keywords = {Solar eruptions, Coronal mass ejections, Solar radio bursts},
abstract = {On 8 November 2013 a halo-type coronal mass ejection (CME) was observed, together with flares and type II radio bursts, but the association between the flares, radio bursts, and the CME was not clear. Our aim is to identify the origin of the CME and its direction of propagation, and to exclude features that were not connected to it. On the Earth-facing side, a GOES C5.7 class flare occurred close to the estimated CME launch time, followed by an X1.1 class flare. The latter flare was associated with an EUV wave and metric type II bursts. On the far side of the Sun, a filament eruption, EUV dimmings, and ejected CME loops were observed by imaging instruments onboard the Solar TErrestrial RElations Observatory (STEREO) spacecraft that were viewing the backside of the Sun. The STEREO radio instruments observed an interplanetary (IP) type II radio burst at decameter-hectometric wavelengths, which was not observed by the radio instrument onboard the Wind spacecraft located at L1 near Earth. We show that the halo CME originated from the eruption on the far side of the Sun, and that the IP type II burst was created by a shock wave ahead of the halo CME. The radio burst remained unobserved from the earthside, even at heliocentric source heights larger than 9 solar radii. During the CME propagation, the X-class flare eruption caused a small plasmoid ejection earthward, the material of which was superposed on the earlier CME structures observed in projection. The estimated heights of the metric type II burst match well with the EUV wave launched by the X-class flare. As this radio emission did not continue to lower frequencies, we conclude that the shock wave did not propagate any further. Either the shock driver died out, as a blast wave, or the driver speed no longer exceeded the local Alfven speed.}
}

CESRA NEWS

A possible new scenario for widespread solar energetic particle events
by Nina Dresing et al.
https://www.astro.gla.ac.uk/users/eduard/cesra/?p=3619

Morphology of solar type II bursts caused by shock propagation through turbulent and inhomogeneous coronal plasma
by A. Koval et al
https://www.astro.gla.ac.uk/users/eduard/cesra/?p=3638

AOB

- If you have some stuff to present to the Callisto community, please let me know

- IRSOL is meant as the new core-station of the e-Callisto network
- To avoid strange issues with Windows computers, disable disc caching. Otherwise configurations files might not be updated in Callisto with the latest information
- Another access to Callisto data here: https://vwo.nasa.gov/

- CALLISTO or Callisto denotes to the spectrometer itself while e-Callisto denotes to the worldwide network.

- General information and data access here: http://e-callisto.org/

- e-Callisto data are hosted at University of Applied Sciences, Institute for Data Science FHNW in Brugg/Windisch, Switzerland. Additionally, data are available at ESA site here: SSA Space Weather Portal (http://swe.ssa.esa.int/).

- In case you (as the responsible person for operating and maintenance of Callisto) are leaving the institute or, if you are retiring, please send me name and email address of the successor.

Please do **NOT** respond to the email-address of the list-server where you have got this document from, it is a computer/robot. This computer will not give you any useful answer…
Respond instead directly to me at: cmonstein(at)swissonline.ch or monstein(at)irsol.ch

If you do not want to receive this newsletter, please send me an email and I will take your address out of the database. On the other hand, if you think someone else might be interested in this kind of info, please let me know his/her email-address to be added to the database.

Christian Monstein
Istituto ricerche solari Aldo e Cele Daccò (IRSOL), Faculty of Informatics,
Università della Svizzera italiana (USI), CH-6605 Locarno, Switzerland.
Email: monstein(at)irsol.ch

Aditya-L1: Solar & Heliospheric Observatory from India

K. Sankarasubramanian[1] and Nandita Srivastava[2]

[1]Principal Scientist - Aditya-L1
U R Rao Satellite Centre, Indian Space Research Organization, Bengaluru, India

[2]Senior Professor and National Coordinator, ISWI
Udaipur Solar Observatory, Physical Research Laboratory, Udaipur, India

Aditya, Sanskrit name for the Sun, is an observatory class satellite from India which was launched on the 2nd September 2023 at 11:50 AM IST (06:20 UT) using the Polar Satellite Launch Vehicle (PSLV-C57). The satellite will be placed at the Sun-Earth Lagrangian point -1 (L1) to study the Sun and local environment at L1 with a suite of experiments using remote sensing as well as in-situ instruments. It would take about 126-days from the launch date for Aditya-L1 to reach the L1 point with a 16-day Earth orbiting phase and about 110-days of cruise phase. The Trans-Lagrangian Insertion (TLI) was carried out on 19th September early morning 02:00 AM IST (18th September 20:30 UT) In the month of January 2024, the L1 insertion is expected to be carried out for the mission to start its scientific observations to study the dynamic Sun and its influence at L1.

Figure 1: (left) Trans-Lagrangian L1 Insertion (TLI) carried out on 19th September early morning IST for Aditya-L1 spacecraft for cruising to L1 and (right) PSLC-C57 with Aditya-L1 satellite standing majestically the night before the launch date (Courtesy: ISRO).

Science Objectives of the Mission:

The primary science objective of the mission is to understand the solar dynamics especially the chromospheric and coronal dynamics of the Sun which are the major sources of interplanetary weather (or the space weather). To accomplish this, Aditya-L1 carries four remote sensing and three in-situ experiments. The remote sensing experiments include: (i) **V**isible **E**mission **L**ine **C**oronagraph (**VELC**), (ii) **S**olar **U**ltra-violet **I**maging **T**elescope (**SUIT**), (iii) **So**lar **L**ow-**E**nergy **X**-ray

Spectrometer (SoLEXS), and (iv) High Energy L1 Orbiting Spectrometer (HEL1OS). Along with the remote sensing payloads, there are three in-situ experiments to measure the in-situ plasma, particles, and magnetic field dynamics. The in-situ experiments are: (i) Plasma Analyser Package for Aditya-L1 (PAPA), (ii) Aditya Solarwind Particle EXperiment (ASPEX), and (iii) MAGnetometer (MAG).

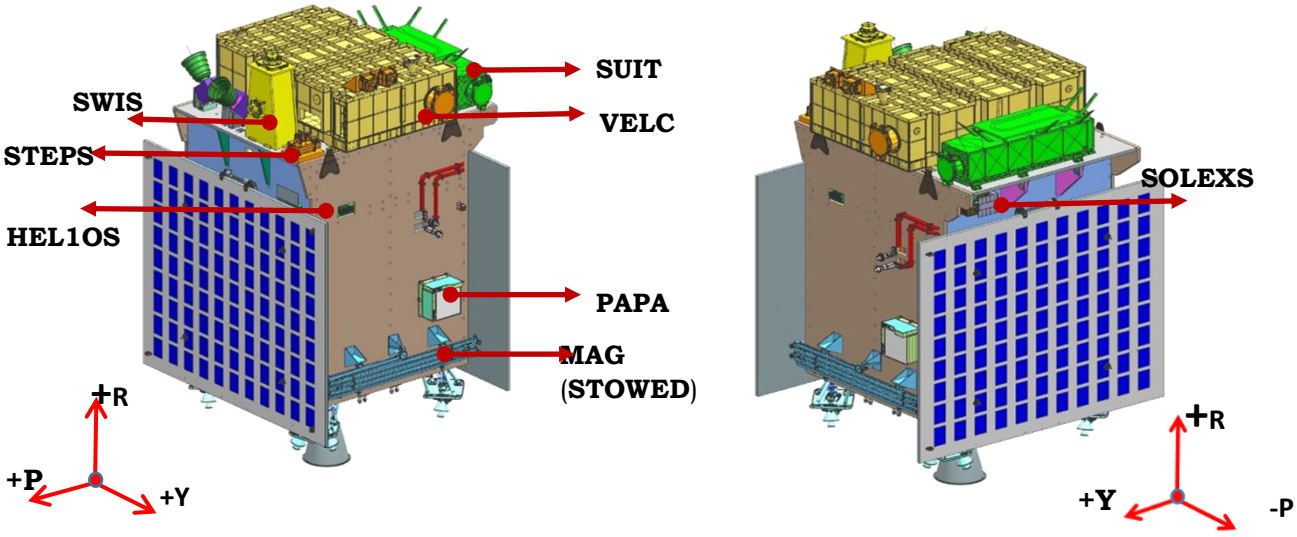

Figure 2: Stowed view of Aditya-L1 spacecraft. The primary and large volume payload in yellow colour on the top deck is VELC and SUIT is next to it and marked in green colour. Optical axis direction is in the +Y (+Yaw) axis. SoLEXS can be seen below SUIT and mounted in the -P (-Pitch) panel. HEL1OS is mounted inside the intermediate deck (Below VELC and SUIT panel) and its collimator is projecting outside. The in-situ payloads (PAPA, ASPEX consisting of SWIS and STEPS packages, and MAG) are also marked in the figure. PAPA and stowed MAG are on the +Y (+Yaw) panel while SWIS and STEPS of ASPEX are mounted on the top deck towards the +P (+Pitch) side of VELC (Courtesy: ISRO).

VELC:

The primary science objective of the Visible Emission Line Coronagraph (VELC) is to observe the inner solar corona in order to understand the CME initiation, its dynamics, coronal high-temperature plasma and its magnetic field dynamics. To carry out these observations, VELC has four channels that can be operated simultaneously. While one channel images the inner solar corona (1.08 Rsun to 3.0 Rsun unvignetted field) every minute, the other three channels observe the forbidden emission lines (530.3 nm, 789.2 nm, and 1074.7 nm) formed in the solar corona due to its high temperature. The spectroscopic channel cover a field-of-view of 1.08 Rsun to 1.5 Rsun (unvignetted FOV). The combination of simultaneous imaging and spectroscopic observations provides the advantage of studying the coronal dynamics and deriving its properties - like temperature, thermal and non-thermal velocity along the line-of-sight. The near IR channel at 1074.7 nm can also be operated in spectro-polarimetric mode to observe coronal magnetic fields above active regions. This would be the first time in space that coronal magnetic field measurements would be carried out using VELC.

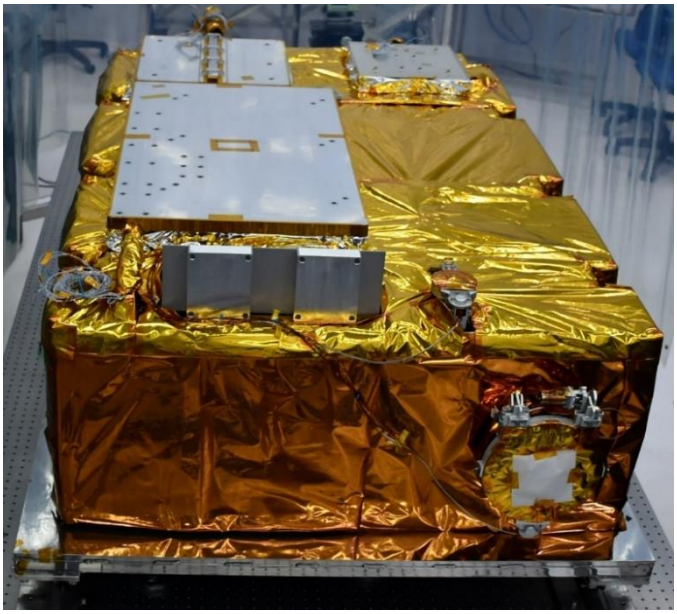

Figure 3: Flight model of the VELC payload at the MGK Menon Laboratory situated in Bengaluru before delivering to the satellite team (Courtesy: Indian Institute of Astrophysics).

The imaging channel of VELC would provide high spatial (2.5arcsec per pixel) and temporal (~1min) resolution data and hence enabling understanding of the initiation and dynamics of CMEs close to the Sun. This will also fill the gap in coronal observations caused by the unfortunate failure of LASCO-C1 onboard SOHO.

VELC payload was led by Indian Institute of Astrophysics (IIA) in close collaboration with ISRO laboratories. VELC is designed as internally occulted coronagraph to observe the inner corona.

SUIT:

Solar Ultra-violet Imaging Telescope (SUIT) images the solar atmosphere in multiple wavelength bands in the near Ultra-violet region. While VELC images the solar corona from 1.08 Rsun (unvignetted inner field), SUIT images the full disk with a FOV up to 1.6 Rsun. Both the chromosphere and photosphere are imaged by SUIT near-simultaneously to study the solar atmospheric dynamics using narrow as well as broadband filters. The source regions of the solar flares and CMEs will be observed/monitored by SUIT. For the first time, a full disk NUV imager would provide the observations of irradiance variation which will allow to identify the source regions of the irradiance variabilities in NUV band.

SUIT is configured to provide full disk observations of the Sun in the near ultraviolet wavelength range of 200-400 nm in 11 wavelength passbands. The filters are a combination of medium and narrow bandwidth at appropriate wavelengths such that to provide near-simultaneous observations of the Sun from the photosphere, chromosphere, and lower transition region.

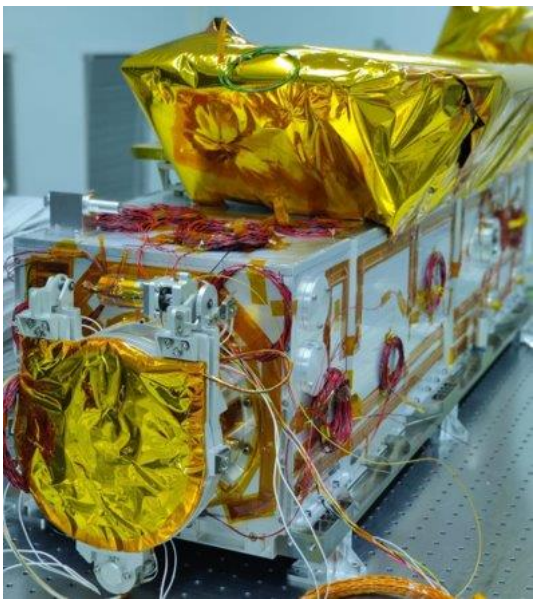

Figure 4: Flight model of the SUIT payload at the cleanroom at U R Rao Satellite Centre before delivering to the satellite team (Courtesy: Inter University Centre for Astronomy and Astrophysics IUCAA).

SoLEXS and HEL1OS:

Solar Low-energy X-ray Spectrometer (SoLEXS) and High Energy L1 Orbiting Spectrometer (HEL1OS) are sun-as-a-star spectrometers to study solar flares in the energy range of 1 to 150 keV. SoLEXS having an energy resolution (<250eV at 6keV) better than RHESSI and also 1keV low energy threshold, would prove to be an ideal instrument to study abundance variations during solar flares and also study the reconnection physics along with coronal plasma diagnostics. SoLEXS & HEL1OS in combination with VELC and SUIT can comprehensively address the CME-flare relation and flare related filament eruptions.

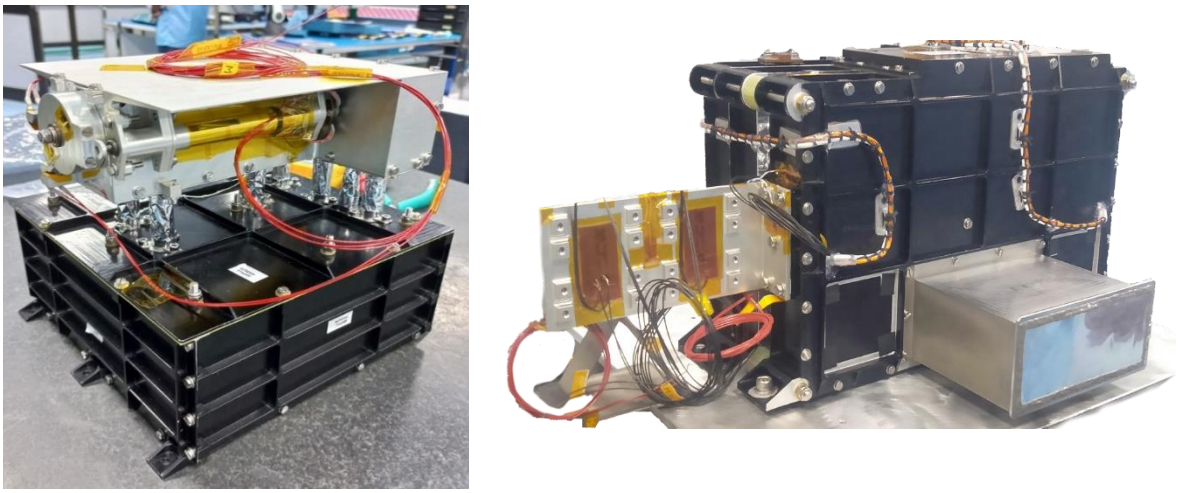

Figure 5: Flight model of the SoLEXS (left) and HEL1OS (right) payload at the UR Rao Satellite Centre before delivering to the satellite team (Courtesy: URSC).

SoLEXS & HEL1OS were developed by the UR Rao Satellite Centre of ISRO in Bangalore.

ASPEX:

Aditya Solar Wind Particle Experiment (ASPEX) will observe the solar wind. ASPEX will also study the energetic particles during eruptive events on the Sun. It is configured using two packages: Solar Wind Ion Spectrometer (SWIS) and Supra-thermal & Energetic Particle Spectrometer (STEPS). SWIS and STEPS (with multiple packages mounted at different directions) instruments would address the variations of low energy (100eV to 20keV) solar wind ions (primarily H+ and He++) along (species differentiated) and across (species integrated) the ecliptic plane. Variations in the alpha to proton ratio during passage of transient events like CMEs at L1. The energy range of ASPEX would also allow us to study the origin of supra-thermal particles in the solar wind and characterize SEPs and its particle acceleration processes.

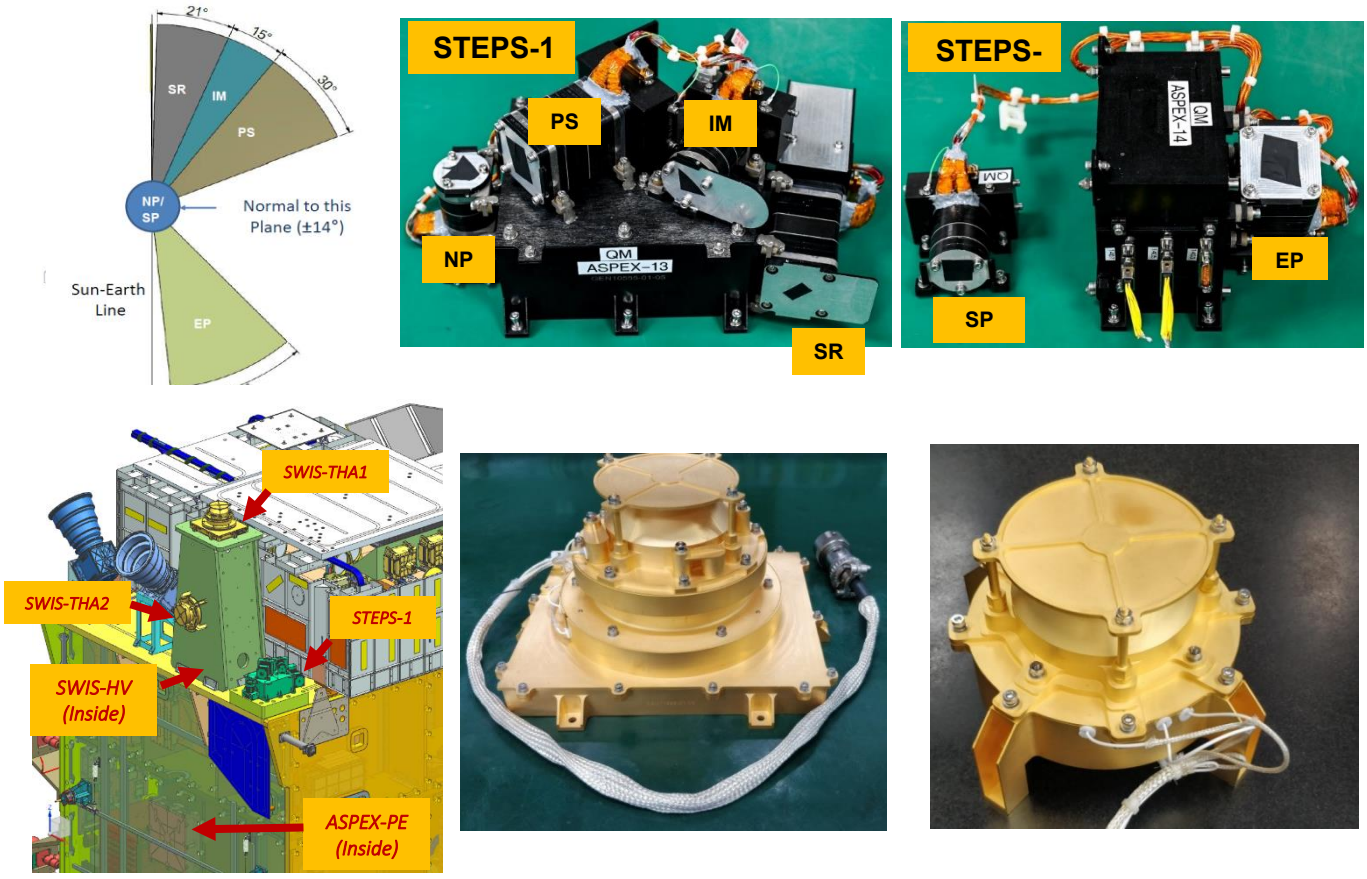

Figure 6: Flight model of the ASPEX – STEPS. (Top row) indicating different packages mounted at different orientations to observe particles from different directions. SWIS (bottom row), two packages along the ecliptic and across the ecliptic plane (Courtesy: PRL).

ASPEX was developed by the Physical Research Laboratory (PRL), Ahmedabad in close collaboration with the Space Application Centre (SAC) of ISRO.

PAPA:

Particle Analyser Package for Aditya (PAPA) will observe the electron as well as ion population at the L1 point. The primary science objective of PAPA is to study the composition of the solar wind in order to understand its origin. Apart from that, its capability to observe them along and across ecliptic plane will allow to study its anisotropy in and across the ecliptic plane and so study the origin of pickup ions. Towards this aim, PAPA will provide continuous measurement of the solar wind and interplanetary electron distribution functions in the energy range 0.01 to 3 keV along and across the ecliptic plane. PAPA payload consists of two units Solar Wind Ion Composition Analyser (SWICAR) and Solar Wind Electron Energy Probe (SWEEP).

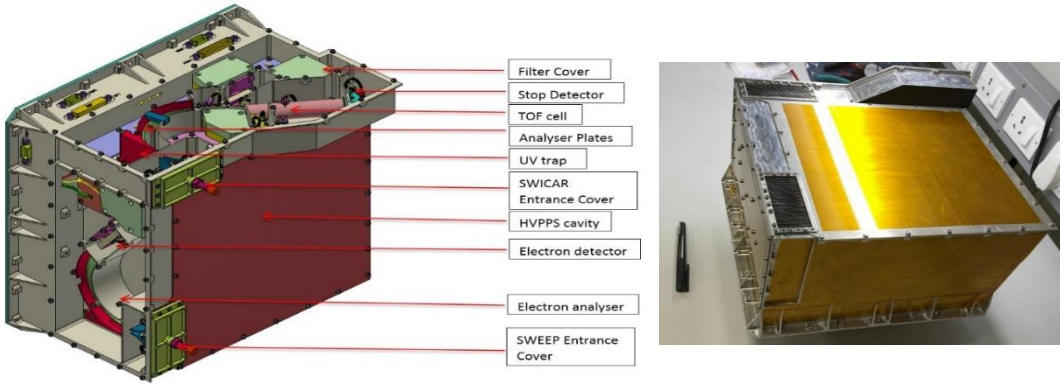

Figure 7: Flight model of the PAPA which consist of SWEEP (Solar Wind Electron Energy Probe) and SWICAR (Solar Wind Ion Composition Analyser). (Courtesy: SPL/VSSC).

PAPA was developed by Space Physics Laboratory (SPL) of Vikram Sarabhai Space Centre (VSSC) of ISRO at Thiruvananthapuram.

MAG:

Along with the particle measurements, magnetic field at L1 point is measured by the MAGnetometer (MAG) payload onboard Aditya-L1 using two tri-axial Flux Gate Magnetometers mounted in a deployable boom at 3m and 6m away from the spacecraft in deployed configuration. The primary science goals of MAG are to study the variation of the local magnetic field at L1 due to transient phenomena from the Sun, for example when a CME flux rope passes through L1 and to study the Bz component at L1 which would provide a better estimate of the geo-effectiveness of the disturbances passing through L1 towards Earth.

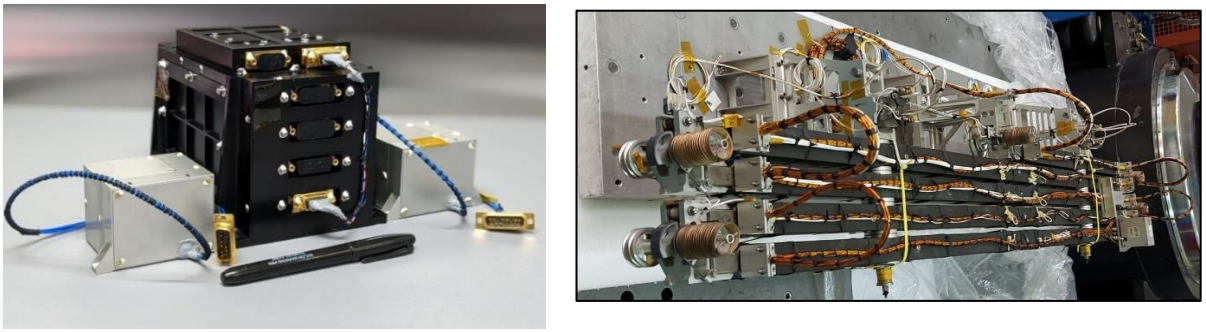

Figure 8: Flight model of the MAG (left). MAG mounted on the boom in folded condition (right). (Courtesy: LEOS/URSC and SPL/VSSC).

MAG was developed by Laboratory for Electro-optics Systems (LEOS) of URSC/ISRO, Bengaluru in close collaboration with Space Physics Laboratory (SPL) of VSSC at Thiruvananthapuram.

In-situ instruments in addition to their own science, would provide inputs to space weather modeling tools.

Uniqueness of Aditya-L1:

Aditya-L1 is unique as compared to other missions flown or being flown in the near future. In this aspect, combining observations from Aditya-L1 with other missions would provide additional science benefits which is not feasible with an individual mission alone. The uniqueness of Aditya-L1 includes:

- CME dynamics close to the disk (1.08 Rsun unvignetted inner field) providing information in the acceleration regime which is not observed consistently earlier.
- Coronal magnetic field and topology of active regions on the Sun
- Spatially resolved solar disk observations in the near UV providing information on the radiation output from different features on the Sun
- On-board intelligence to detect CMEs and Flares for optimized observations and data volume
- All flares are observed without any eclipse or sensitivity change (or low energy cut-off).
- Solar wind electrons, protons, and alpha particles fluxes with direction information
- Specific identified flags and count information through telemetry for early information on the space weather events

Summary:

With carefully chosen payloads for Aditya-L1, the mission would provide unique data sets to study the solar dynamics and its effect on the heliosphere. Aditya-L1 has begun its journey to reach Sun-Earth Lagrangian L1 point to continuously study the solar dynamics and the local environment which would help in understanding the space weather and its physics. STEPS package in ASPEX payload was switched ON to study the Earth's magnetospheric pass during the Earth- bound orbits (whenever the satellite is above 50000 km or above 8 times the radius of Earth to avoid Van Allen belts) to study the magnetopause regions during the Earth orbit. STEPS is kept ON during the cruise phase to continuously monitor the particle environment. Other payloads on-board Aditya-L1 would be switched ON when the conditions permit during the cruise phase to ensure the health of the instrument and also the calibrations enroute. Aditya-L1 is expected to reach L1 orbit during the month of January 2024 and the payload verification (PV) phase is expected to commence once inserted in the orbit. All the payloads would start providing the science data as soon as the PV phase is over.

Aditya-L1 mission promises to provide relevant data which would allow solar and heliophysicists to explore and unravel answers to many long-standing questions about the Sun and its impact in the inter-planetary medium and also in the solar system planets especially Earth.

Dr. K. Sankarasubramanian obtained his PhD in Physics from the Indian Institute of Astrophysics with Bangalore University. He was with National Solar Observatory, USA for his post-doctoral research for about 6-years before joining the Indian Space Research Organization (ISRO) at Bangalore. His research areas of interest are Solar Magnetic field, Optics, and Instrumentation. He has more than ten years of expertise in optical, NIR, UV, and X-ray instrumentation for ground- as well as space-based observatories. He has contributed to AstroSat, Chandrayaan-1 and Chandrayaan-2 missions of ISRO in different capacities. Currently, he is heading the Space Astronomy Group (SAG) at U R Rao Satellite Centre, Bengaluru. SAG is involved in conceptualising, building, testing, integrating, and research for science payloads. SAG has recently delivered five payloads out of which four are already in space on-board Aditya-L1 and Chandrayaan-3. The next payload would be on the XPoSat (X-ray polarimetry satellite) mission. Dr. Sankarasubramanian is also playing a major role in Aditya-L1 as the Principal Scientist of the mission along with being the Principal Investigator for one of the payloads on-board Aditya-L1. He has more than hundred research papers in the national as well as international journals. He is also a member of the International Astronomical Union, Astronomical Society of India, and Optical Society of India.

The New York Times https://www.nytimes.com/2023/09/19/us/northern-lights-map-tonight.html

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Northern Lights Are Seen Overnight in Parts of U.S.

Sightings of the aurora borealis were reported across the West and Midwest as space weather experts tracked a geomagnetic storm.

By Mike Ives

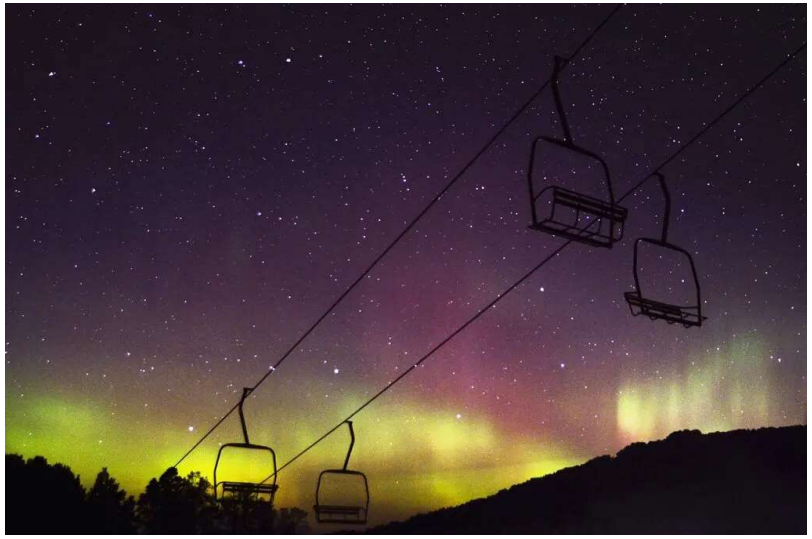
Sept. 19, 2023 Updated 8:24 a.m. ET

People from Montana to Missouri reported sightings of the aurora borealis overnight, and forecasters said the phenomenon also known as the northern lights would be visible over parts of the West and Midwest until about dawn on Tuesday.

The northern lights get their name for lighting up the sky at higher latitudes. On Monday night, the phenomenon stained the night sky with green and purple blotches in some parts of the United States, and red or purple pillars or curtains in others.

“Most of the time when the northern lights occur, it is just kind of a green glow on the northern horizon,” said Grant Hicks, a meteorologist at the National Weather Service office in Glasgow, Mont., where the staff was posting images of the northern lights overnight.

“Once you get to see the pillars and the curtains, and they start dancing and moving around, that can be more fun to watch,” Mr. Hicks said, speaking by phone early Tuesday morning.



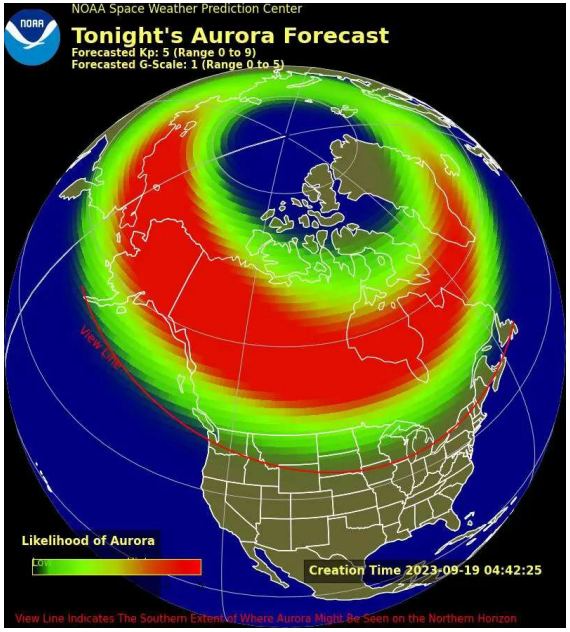
The lights seen in Northern Michigan early Tuesday. Drew Kochanny/Petoskey News-Review/USA Today Network

Sometimes the northern lights are only visible with the help of a camera. But Tyler Schlitt, a part-time photographer who lives near St. Louis, said by phone that they were already “highly visible” to the naked eye in part of eastern Missouri on Monday night.

“Some people will mistake it as clouds or something,” Mr. Schlitt, 32, said from a field near the city of Elsberry, Mo. “But if you have a good aurora show, you’ll likely see the aurora.”

There were many other reports overnight of aurora sightings by photographers and social media users and across the American West and Midwest, as well as in parts of Canada and Britain.

The Space Weather Prediction Center, which is part of the National Oceanic and Atmospheric Administration, had said earlier that a “moderate” geomagnetic storm was expected in the northern United States late Monday into Tuesday. It said in a fresh warning early Tuesday morning that “strong” geomagnetic activity was occurring, meaning that the northern lights “may be seen as low as Pennsylvania to Iowa to Oregon.”



The aurora borealis forecast for Monday night. NOAA

Space weather experts believe the geomagnetic storm was probably caused by an eruption on the sun late last week that produced a “coronal mass ejection,” the technical term for a large expulsion of plasma and magnetic field.

Space weather experts measure geomagnetic disturbances on a five-tier scale that forecasts minor, moderate, strong, severe and extreme effects on power grids, satellites and other things. The higher the level, the farther south the northern lights tend to be visible. In a severe or extreme disturbance, they can be seen as far south as Florida, said William Murtagh, the program coordinator at the Space Weather Prediction Center.

Mr. Murtagh said in an email after 2 a.m. Eastern time on Tuesday that while the worst of the latest disturbance was probably over, it could possibly continue producing aurora visible to the naked eye over some northern states.

A project manager at the center, Lt. Bryan R. Brasher, said that “unsettled to active levels of geomagnetic activity” would probably linger into Wednesday. But he said it was unlikely that the aurora would be visible as far south on Tuesday night as it had been late Monday.

The northern lights illuminating the night sky above Crosby, N.D.
Instagram@Adam.Buss.14, via Reuters

Mr. Schlitt, the photographer in Missouri, said by phone around 11 p.m. on Monday that the red pillars he saw earlier in the evening had since faded. He had a 90-minute drive home and an early workday ahead, he said, so he planned to pack up soon — unless the colors on his camera screen were to suddenly intensify.

“If I see a whole bunch, I will stay out a little bit later,” he said.

Mike Ives is a reporter for The Times based in Seoul, covering breaking news around the world. More about Mike Ives