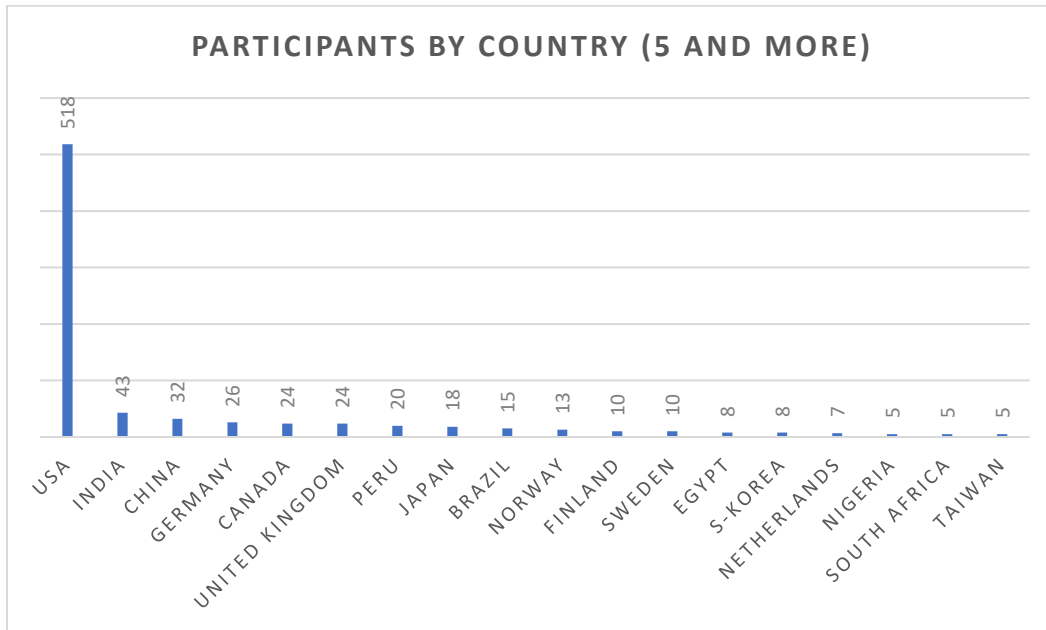# 2021 CEDAR workshop report

Participation

839 participants registered from 42 countries around the world. The chart below provides the countries and numbers from countries with 5 and more participants.

PARTICIPANTS BY COUNTRY (5 AND MORE)

Country	Participants
USA	518
INDIA	43
CHINA	32
GERMANY	26
CANADA	24
UNITED KINGDOM	24
PERU	20
JAPAN	18
BRAZIL	15
NORWAY	13
FINLAND	10
SWEDEN	10
EGYPT	8
S-KOREA	8
NETHERLANDS	7
NIGERIA	5
SOUTH AFRICA	5
TAIWAN	5

All countries with decreasing participant numbers are: USA, India, China, Germany, Canada, United Kingdom, Peru, Japan, Brazil, Norway, Finland, Sweden, Egypt, S-Korea, Netherlands, Nigeria, South Africa, Taiwan, Argentina, Poland, Puerto Rico, Russia, Turkey, Slovakia, Spain, France, Greece, Iran, Morocco, Singapore, Armenia, Australia, Belgium, Chile, Czech Republic, Ethiopia, Indonesia, Luxembourg, Pakistan, Ukraine, United Arab Emirates, Venezuela.

Especially noteworthy is the increased participance from Peru and from African states. There was no registration fee, but the workshop hours aligned with the US time zones.

There was an almost even distribution between students, early career, mid-career and senior scientists among the participants. The non-scientist increased compared to last year to 5% (in 2020 it was 3%).
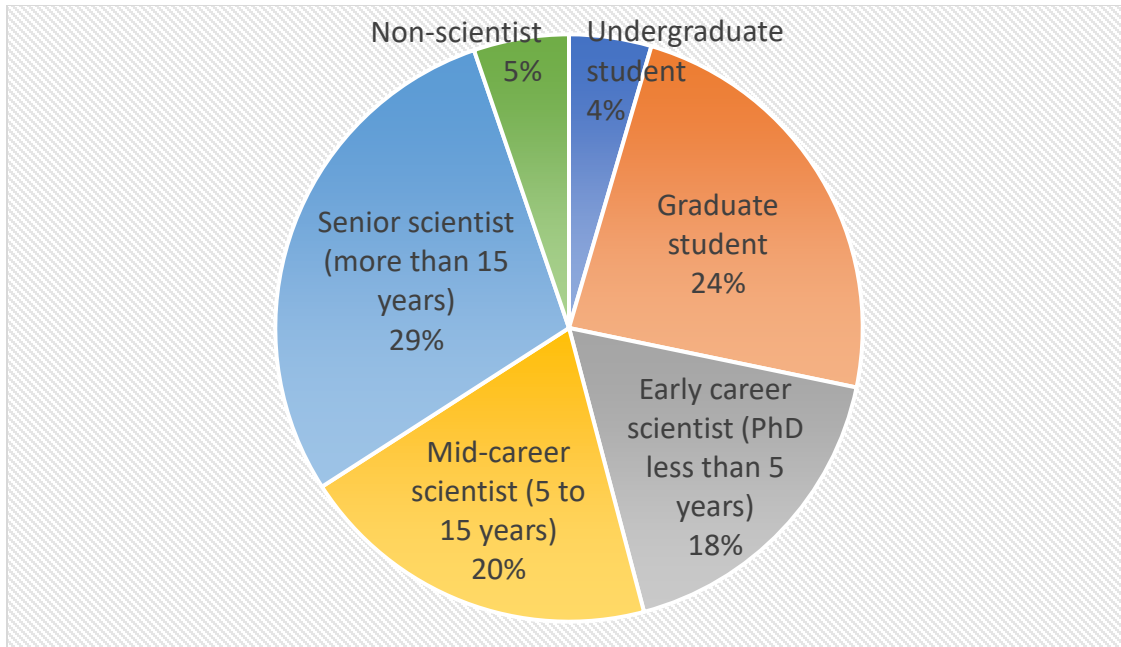
From the 38 undergraduates 6 came from Peru, and altogether 11 undergraduates out of 38 were international (29%). There was even a large international participation for graduate students. 105 out of the 199 graduate students came from international institutions (53%) and from 26 countries. The numbers of international participants decrease a bit for early career scientist (45% or 67/148), and stronger decrease for mid-career 37% (63 out of 168), and 25% for senior scientist (60 out of 242). Of the 44 self-identified participants as non-scientist 15 came from international institutions including T-Minus Engineering Netherlands, Nammo Raufoss AS Norway, QinetiQ UK; and from the US from National Academy of Sciences, Blue Origin, Virgin Galactic, Computational Physics Inc., Irvington High School, Reeve Engineers.

The 518 US participants came from approximately 120 different institutions among them 57 universities and colleges.

Diversity, Inclusion, Equity at CEDAR

The CEDAR Diversity, Inclusions and Equity task force, a group formed in 2020 after the last CEDAR workshop, developed a list of tasks to measure diversity and inclusiveness and improve the CEDAR workshop experience for all. Optional questions were added to the registration about race and gender identity.

Some brief justification was given in the registration "In support of CEDAR's Diversity, Equity and Inclusion efforts, please consider answering the following OPTIONAL questions regarding your race/ethnicity and sex/gender. We are collecting (and subsequently disposing of) this information to tabulate aggregate baseline demographic data about the CEDAR community. Answers to the first two questions will help us gauge CEDAR diversity. Answers to the last question will help us evaluate meeting needs when we return to in-person meetings."

1. *What race(s) and/or ethnicities do you identify with? A. White (Hispanic, Latinx or Spanish) B. White (Not Hispanic, Latinx or Spanish) C. Non-white Hispanic, Latinx or Spanish D. Black or African American E. Desi F. Asian G. Middle Eastern H. American Indian or Alaska Native I. Native Hawaiian or Pacific Islander J. African K. Prefer not to answer L. Other...*
   595 participants provided voluntary feedback. They self-identified as following: 77 White (Hispanic, Latinx or Spanish), 326 White (Not Hispanic, Latinx or Spanish), 25 Non-white Hispanic, Latinx or Spanish, 12 Black or African American, 27 Desi, 210 Asian, 22 Middle Eastern, 3 American Indian or Alaska Native, 1 Native Hawaiian or Pacific Islander, 21 African. Note that multiple races/ethnicities could be identified.
   Out of 373 participants from US institutions who self-identified with a race/ethnicity: 50 White (Hispanic, Latinx or Spanish), 261 White (Not Hispanic, Latinx or Spanish), 9 Non-white Hispanic, Latinx or Spanish, 5 Black or African American, 16 Desi, 116 Asian, 9 Middle Eastern, 2 American Indian or Alaska Native, 1 Native Hawaiian or Pacific Islander, 1 African. Note that multiple races/ethnicities could be identified.

2. *Which gender do you most identify with? Male (he, his, him); Female (she, her, hers); Prefer not to answer; Non-binary (they, them).*

   From the 731 participants (among them 459 US participants) who answered the question, 5 identified as non-binary (they/them) and 1 as genderqueer (she/her and they/them) with all expect one from a US institution. 237 identified with female pronouns, and 486 with male pronouns, while 110 did not answer or preferred not to answer. Approximately 66% of the participants who choose to provide an answer identifies as male, and 32% as female.

3. *Do you identify as part of the LGBTQ+ community? Yes; No; Prefer not to answer; It's complicated/not sure.*

   From the 656 participants (327 participants from US) who provided feedback, 604 do not identify as part of the LGBTG+ community, and 18 said "It's complicated/not sure" (4 from the US), and 34 identify as part of the LGBTG+ community (18 from the US, or 5% of US participants who provided feedback). All career levels identify with the LGBTG+ community (2 undergrads., 10 graduates, 8 early-career, 4 mid- career, 8 senior scientists, 2 nonscientists).

Based on the task force suggestions and feedback from previous CEDAR workshop the Code of Conduct link and rules of the meeting were displayed at the beginning of each plenary session.

In addition, the pronoun option was enabled on slack, and we asked about special needs to fully participate in the workshop (nobody specified special needs for meeting participation).

The CSSC with input for the DEI task force decided to include a DEI focused talk by Dr. Brandon Jones (NSF-GEO/OAD) about "Education and diversity programs at NSF".

The DEI task force and CEDAR community members organized a DEI focused workshop (http://cedarweb.vsp.ucar.edu/wiki/index.php/2021_Workshop:CEDAR_DEI) with two speakers: Dr. Melissa Burt (Assistant Dean for Diversity and Inclusion Walter Scott, Jr. College of Engineering, Colorado State University), Prof. Matthew Kaplan (Intergeneration Programs and Aging, Dept. of

Agricultural Economics, Sociology, and Education, The Pennsylvania State University), and Dr. Brandon Jones from NSF-GEO/OAD joined the speakers for a panel discussion.

Workshop

The student workshop on Sunday (9:00-16:00 Mountain time) was organized by the student representatives Komal Kumari and Meghan LeMay. Based on feedback from last year, the students decided to have lightening type of talks, which were pre-recorded, and speakers were available after a set of talks to answer questions. The focus was on providing an overview of "Instrumentation and techniques" and "Back to the Basics". The students also organized a "trivia" game via Wonder.me to close the student day. During the week, a panel with scientist was organized via Zoom breakout rooms, and a "Lunch with a Scientist" event also via Zoom breakout rooms. On 4 days, participants had the opportunity to socialize via wonder.me. In general, around 5-10 people were present.

The CEDAR workshop hours were from 8:00 to 15:00 Mountain time and on Tuesday, Wednesday and Thursday, the posters were presented between 15:30-17:00 MT. The individual workshop sessions were 2 hours long and 9 blocks were provided for the 36 individual workshops. Due to the virtual format the topic of the individual workshops was more distributed over the whole week, while at in-person meetings the clustering tends to be more favored by participants. As virtual meeting software Zoom was used and for the plenary sessions Q&A were facilitated via Sli.do. Participants can anonymously ask question via Sli.do and in general there are more questions than during in-person meetings.

Tuesday plenary time was reserved for agency updates by NSF represented by Alan Liu and Lisa Winter, AFOSR by Julie Moses, and NASA by John McCormack. The CEDAR community appreciates the opportunity to ask questions and learn about upcoming directions and opportunities. Alan Liu (NSF) also provided office hours on three days which were in high demand. Shasha Zou (U. Michigan) reported about the "Heliophysics 2050 workshop" and "Decadal Survey Prep" workshop to plan for the decadal survey was organized as well.

The **CEDAR prize lecture** was selected in 2020 but given this year by Dr. Marty Mlynczak (NASA) about "Energy Balance and Long-Term Change in the Upper Mesosphere and Lower Thermosphere". The presentation was very well received and provided a great overview of the broad topic and the challenges. It will be a very useful resource for the community. The **CEDAR Distinguished Lecture** was also selected in 2020 and postponed to 2021. Prof. Bob Schunk (USU) talked about "Modeling, Specifying and Forecasting Space Weather" providing a great overview of different model developments and the future of ensemble modeling forecast.

The CSSC solicited 4 early career science highlights and 4 science highlights.

33 individual workshop were proposed and three are Grand Challenge workshop which are 4 hrs long (full list of workshops http://cedarweb.vsp.ucar.edu/wiki/index.php?title=Special:CedarWorkshopList&yr=2021. There were

always 4 workshops in parallel to accommodate the number of workshops. Workshops were held via zoom and the conveners decided on the format. In general, the plenary sessions were attended by ~250-300 people via zoom. Workshops had between 30 to 150 participants- mostly around 75-100 people attended.

Poster session

The poster session was virtual and use VirtualPoster.org as a software. The posters will be on display for 1 year (https://app.virtualpostersession.org/e/8111959a93125eecdaae2ff1c1690b4d). Participants uploaded a pdf and were assigned to one of the three poster days on which they were encouraged to provide a chat option during the assigned poster hours of 3:30-5:00 PM MT. In addition, participants could upload a video presentation of their poster.

Future virtual poster sessions should make sure that the poster-website does clearly indicate what day a poster was showing and indicate the abbreviation, as well as if the poster is a student poster or not. 22% (7) of participants respondents (32) who had a poster reported that nobody visited the poster. Around 50% (17) had 1-3 visits. 25% (9) had 4 and more visits. For future virtual poster sessions, a poster discussion session could be considered by topic.

Poster session in numbers:

130 posters were shown (2019: 162 posters, 2018: 151 posters; 2017: 153 posters; 2016: 171 posters), which is less than in the 4 previous years and probably related to the virtual format. 66 posters were in the student poster prize competition (86 in 2019). 49 (or 38%) of all posters were from non-students, which is like the 2019 number (47 posters). 68 graduate students and 12 undergraduate students presented a poster. 14 graduate and 1 undergraduate student did not participate in the poster competition (12 USA, 1 Singapore, 1 Peru, 1 Argentina).

Overall, the is a **significant increase in international participation in the posters** and **an increase of undergraduates**. From the 49 non-student posters 19 (39%) were presented by international participants (1 Argentina, 2 Canada, 1 China, 1 Egypt, 4 Germany, 1 India, 1 Norway, 6 Peru, 1 Slovakia, 1 Thailand). From the 66 students in competition 30% (20/66) were international students (4 Germany, 3 China, 4 Peru, 2 Brazil, 1 Singapore, 2 Slovakia, 1 Belgium, 2 India, 1 Taiwan).

13 undergraduates presented a poster with 12 in the poster competition. 6 of the undergraduates were from institutions outside the US (50%) which shows a strong increase in undergraduate posters (6 in 20219) especially international ones. The number of posters in competition declined (66 in 2021, 86 in 2019) especially considering that in previous years the student posters were mainly from students at US institutions which were just 46 US students in 2021 among them 6 undergraduates. This indicates a decline in graduate students from the US which could be connected to being virtual and that presenting a poster is not tied to applying for travel funds.

The CSSC formed a poster judging subcommittee which organized the poster judging on each of the three days and selected a 1st, 2nd prize for graduate students and up to 1 honorable mention for an undergraduate student.

- 1st place (1st day) **Lance Davis** (University of New Hampshire) Title: Probing the Density Profile of the Thermosphere Using Loss Cone Measurements
- 1st place (2nd day) **Reza Janalizadeh** (Penn State University) Title: Revisiting the associative detachment reaction of nitrogen molecules with the anion of atomic oxygen in the context of gas discharges
- 1st place (3rd day) **Clayton Cantrall** (University of Colorado, Boulder) Title: Deriving column-integrated thermospheric temperature with the N2 Lyman-Birge-Hopfield (2,0) band
- 2nd place (1st day) **Katherine Davidson** (University of Alabama, Huntsville) Title: Investigating Ionosphere-Thermosphere Coupling in the Nightside Auroral Oval
- 2nd place (2nd day) **Jack Wang** (University of Colorado, Boulder) Title: Numerical study to uncover the driving mechanisms of the migrating diurnal tide day-to-day variability
- 2nd place (3rd day) **Harikrishnan Charuvil Asokan** (Leibniz-Institute of Atmospheric Physics, Rostock University, Kühlungsborn, Germany) Title: Validation of multistatic meteor radar analysis using realistic mesospheric dynamics from UA-ICON model: Reliability of gradients and vertical velocities
- Honorable mention undergraduate (2nd day) **Jhassmin Aricoché** (Radio Observatorio de Jicamarca, Instituto Geofísico del Perú, Lima, Perú) Title: Modeling ionograms with deep neural networks: Application to foF2 forecasting
- Honorable mention undergraduate (3rd day) **Alanah Cardenas-O'Toole** (University of Michigan) Title: Statistical and event analysis of phase and amplitude scintillations associated with polar cap patches

Thanks to the chief judges Julio Urbina (chair), Asti Bhatt, Liying Qian, Jesn Oberheide, Jonathan Snively and the 20 volunteer judges.

CEDAR YouTube channel

The student workshop as well as all plenary sessions were live streamed to newly created CEDAR YouTube channel (https://www.youtube.com/channel/UCfascNbjjAhd03vRTISVVXA). The YouTube channel will host all recordings of the CEDAR workshops. 65 people subscribed to the YouTube channel as of early July 2021.

During the week of the CEDAR workshop approximately 10-15 people always watched the student workshop or plenary session on YouTube.

The videos so far got between 130 to 500 views; however, the length of the viewing time is not provided.

Live streaming makes the workshop accessible to a large audience and provides the option to view on large TV screens.

Transition away from wiki websites

The CEDAR wiki will be transitioning to Drupal websites. This year's workshop used a mix of wiki and Drupal webpages. The individual workshop submission and websites were on the wiki while the registration, poster abstract submission and meeting information was via Drupal websites. By next year's workshop the all the wiki functionality should be replaced, and a new CEDAR website created.

CEDAR Science slack channel

Similar to last year a slack channel for the 2021 meeting was created. In addition, some workshops create a slack channel and used the one from last year. Overall, slack usage was not as heavy as in 2021. 560 messages (1,933 in 2020) were send during the CEDAR workshop and 26% were in public channels, and 5% in private channels and the majority (69%) were direct messages (67% direct messages in 2020). 15 files were uploaded to slack. The pronoun option was enabled in slack.

Slack will remain in place during the year.

Survey results

A survey to participants and session conveners was send out and results will be compiled end of July 2021 (deadline 23 July for submitting feedback)