



## Division of Atmospheric and Geospace Sciences





# Division of Atmospheric and Geospace Sciences

## Thanks for your service!



Former AGS Division Director  
Anjuli Bamzai



Former Section Head  
Michael Wiltberger



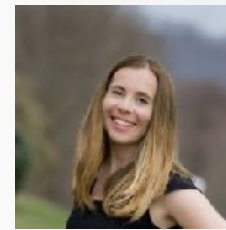
Former Acting Section  
Head and Acting Geospace  
Facilities PO  
Robb Moore

## Current Acting AGS DD



Candace Major

## Current Geospace Section



Acting Section Head/  
Magnetospheric  
Physics  
Lisa Winter



Aeronomy  
Alan Liu



Solar Terrestrial Research  
Ilia Roussev



Geospace Facilities  
Roman Makarevich



Expert  
John Meriwether



Space Weather  
Mangala Sharma

Thank you for making CEDAR a Success!

## **Especially to the organizing committee, CEDAR SC, and participants!**

- *Our Goal is for CEDAR to be a Welcoming and Inclusive Environment that promotes understanding of Coupling, Energetics, and Dynamics of Atmospheric Regions, provides learning and growth of early career scientists, and leads to new ideas and research directions.*
- *New NSF Requirements for conferences to promote a welcoming climate (PAPPG June 1 2020 update)*
- information on the **complaint submission and resolution process** must be included in the policy or code-of-conduct proposers disseminate to conference participants
- a plan for **recruitment of, and support for, speakers and other attendees**, that includes participation of **groups underrepresented** in science and engineering must be included
- a description of plans to identify **resources for childcare and other types of family care** at the conference site must be included



# Solar and Space Physics Decadal

## SSP Decadal

- AGS and AST are coordinating with NASA and NOAA on SOW

## To Define:

- The **SCIENCE** Priorities
- The **INFRASTRUCTURE** needed to achieve the science
- Support for the diverse range of the **PEOPLE** we want to be engaged in science



# NSF's Spectrum Innovation Initiative (SII)

- Established May 2020
- Four Pillars
  1. National Radio Dynamic Zone (NRDZ)
  2. **National Center for Wireless Spectrum Research (SII-Center)**
    - \$5M/year for 5 years/ involve academia, industry, and government
    - Major Activities
      - Spectrum related research
        - *Spectrum flexibility and agility*
        - *Near real-time spectrum awareness*
        - *Improved spectrum efficiency & effectiveness through secure & autonomous decision making*
      - Education, public outreach, and workforce development
      - Research coordination and collaboration, community engagement and knowledge transfer
  3. Spectrum Research Integrative Activities
  4. Education and Workforce Development

## Center Timeline

-Letters of Intent received  
-Full proposals due (4/30)  
-NSF merit review in May  
-Award expected Summer 2021

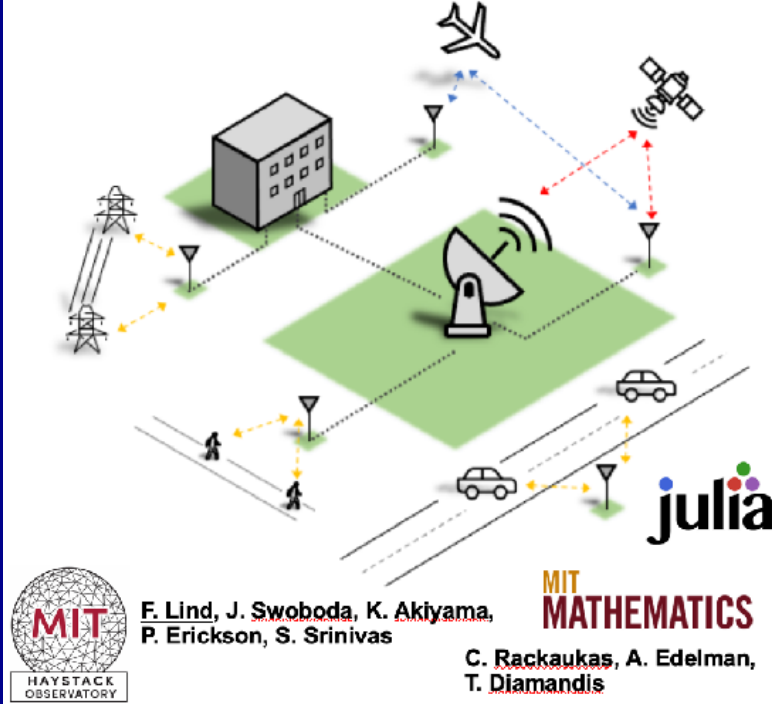
## **NSF-NTIA-FCC Memorandum of Agreement (February 1, 2021)**

*Intended to ensure that FCC and NTIA staff can provide their subject matter expertise to help ensure that SII investments in spectrum research, infrastructure, and workforce development **are in alignment with U.S. spectrum regulatory and policy objectives, principles, and strategies.***



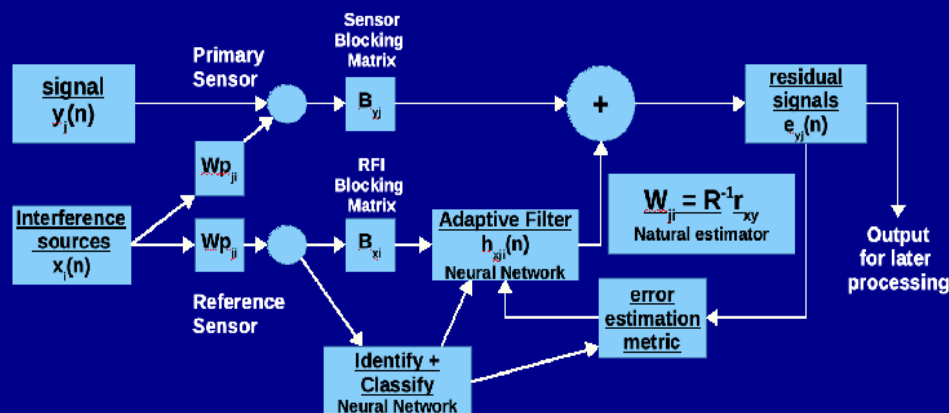
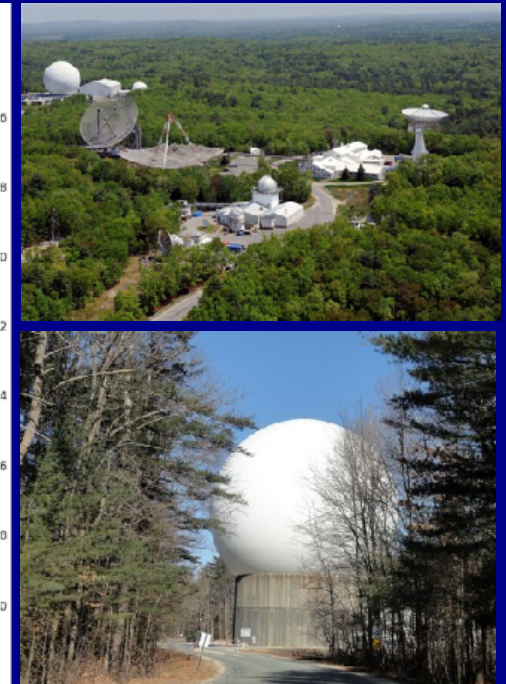
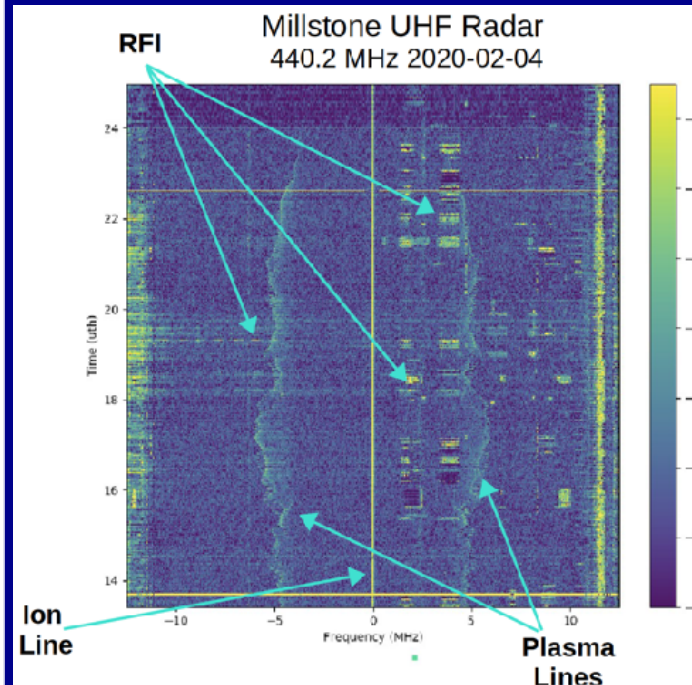
# Radio Frequency Interference Mitigation for Spectrum Coexistence

## Adaptive Radio Frequency Interference Cancellation for Radio Science Observatories



## NSF SWIFT Program

(Spectrum and Wireless Innovation enabled by Future Technologies)



Mathematical approaches to RFI mitigation  
 Enable efficient and scalable RFI cancellation  
 Geospace and Astronomy Sensors  
 Open source implementations in Julia  
 Demonstrate using MIT Supercloud AI HPC



# Aeronomy Update

Alan Liu

NSF AGS Aeronomy Director

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# Outline

- Aeronomy Award Activities and Budget
- Geospace Facilities Status Update
- Funding Opportunities





# Aeronomy Awards

FY20 \$11.4M

- 2 CAREER awards
- 5 CEDAR projects (7 proposals)
- 8 Aeronomy projects (11 proposals)
- 2 Workshops
- Co-funded DASI, MRI, SWR, PDM, REU, etc.

FY21 ~\$7M so far

- 3 CAREER awards
- 4 CEDAR projects (7 proposals)
- 4 Aeronomy projects (8 proposals)
- 1 EAGER, 1 RAPID, 1 Workshop
- Co-funded with STP, PDM
- More awards pending

Mortgage rates: ~34% in FY19, ~20% in FY20, ~17% in FY21



# Aeronomy Budget





# Aeronomy Awards

- Collaborative Research: Establishing an Iron Resonance Wind-Temperature Lidar at HAARP for Active Studies of Polar Aeronomy  
R. Collins (UAF), B. Williams (GATS), V. Harid, W. Scales
- Characterization of Meteoroids and Meteors Through Simulations and Remote Sensing Using High-Power Large-Aperture Radars  
S. Close (Stanford Univ)
- Collaborative Proposal: Effects of Thermospheric Winds on Equatorial Spread-F  
P. Dandenault (JHU/APL), J. Noto (CPI)
- Studies of atmospheric processes using imaging science techniques  
M. Mendillo (Boston Univ)



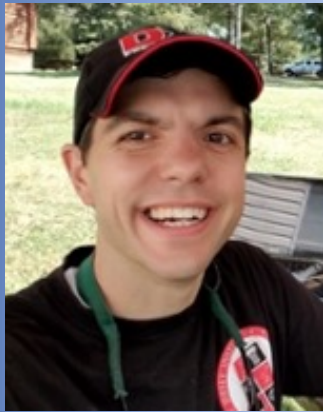
# CEDAR Awards

- Collaborative Research: CEDAR--Upper Atmospheric Hydrogen Variability on Timescales from Dusk-Dawn to Multidecadal  
S. Nossal (U Wisconsin), L. Qian (NCAR), E. Mierkiewicz (ERAU)
- CEDAR: Modification of ionosphere by LEMP: Dependence on lightning type, stroke order, and other factors  
V. Rakov (UF)
- Collaborative Research: CEDAR: A Whole-Atmospheric Perspective on Connections between Intra-Seasonal Variations in the Troposphere and Thermosphere  
F. Gasperini (ASTRA), A. Maute (NCAR)
- CEDAR: The Coupled OH Meinel and O<sub>2</sub> Atmospheric Band Nightglow Emissions  
K. Kalogerakis (SRI)





# Faculty Early Career Development Program (CAREER) 2021



Frissell, Nathaniel



Aeronomy



Jaynes, Allison



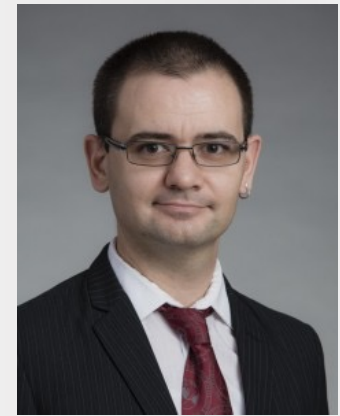
Magnetospheric  
Physics



Marshall, Robert



Aeronomy



Rioussset, Jeremy



Aeronomy



# Geospace Facilities Update

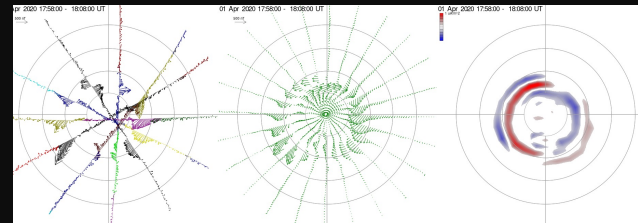
## AMISR

- New increment awarded
- PFISR operation continues
- Repair of SGM at RBO
- MGM work at RBO starts in August, install in fall



## AMPERE-III

- Data acquired continuously from NEXT
- Calibration of NEXT data, 5x greater sensitivity
- NEXT product in beta to be released
- Block 1 data gap is filled



## HAARP

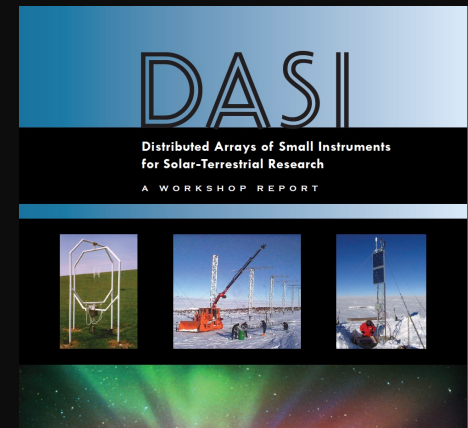
- New 5-year award
- Subauroral geophysical observatory as Class 2 geospace facility
- Apr 2021 – Mar 2025
- PI: Robert McCoy
- 200 hours of baseline HAARP operations per year
- Supporting instruments



UAF GI

## DASI

Six projects funded in FY19  
\$8M funding  
3-year projects starting in  
2019 (3) and 2020 (3)  
Instrument arrays in the US  
and South America





# Geospace Facilities Update

## Sondrestrom Research Facility

- 2019: NSF decision to decommission SRF
- 2019-2020: Equipment transfer, contractor selection
- 2021: Phase I: Site characterization  
Demolition planning
- 2022: Phase II: Demolition



## Arecibo Observatory

- Nov 2020: 2<sup>nd</sup> cable failure
- Dec 2020: Platform collapse
- Damage:
  - ISR: 35% reflector panels
  - HF: 4/6 dipoles
  - Lidar and optics: Minimal
- Cleanup underway
- Nature paper on ionospheric effects of lightning and flares



## Jicamarca Radio Observatory

- High-power operations restarted in Sept 2020
- Repairing AMISR-14
- Experiments in support of COSMIC2, ICON, GOLD
- Significant results on high altitude ( $>1500$  km) equatorial echoes



## Millstone Hill Observatory

- Significant Covid impacts
- May 2021 weather event damage fixed
- 372 hours last 12 months
- 1250 hours next 12 months
- Significant results on SAPS, SSW, Eclipse TEC effects, TEC modeling







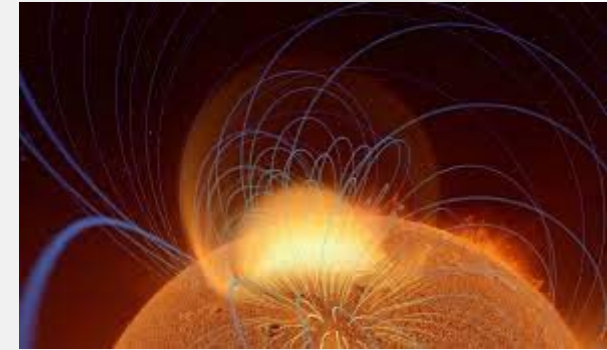
# Grand Challenges in Integrative Geospace Sciences: Advancing National Space Weather Expertise and Research toward Societal Resilience (ANSWERS)

NSF 21-577

**Focus: deep and transformative understanding of the dynamic, integrated Sun-Earth system and the solar and terrestrial drivers of space weather and their effects “from Sun to mud”**

- Opportunities for collaborations among solar and geospace observers, theorists, modelers, software developers, laboratory experimenters, STEM educators, SWx policy experts
- Meaningful educational opportunities
- Partnerships between research-intensive and minority-serving institutions encouraged
- **Deadline 8/23/21**; budget caps of \$900k for small teams and \$2.5M for large teams

Contact: [IntegrativeGeospace@nsf.gov](mailto:IntegrativeGeospace@nsf.gov)







# Atmospheric and Geospace Sciences Opportunities for Mid-Career

(~10-20 Yrs. after highest degree)

(DCL NSF 21-018)

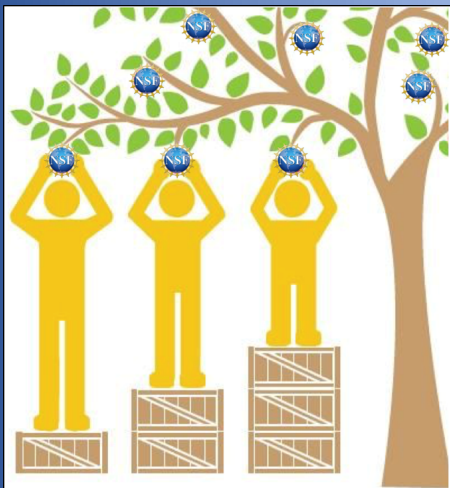


Support meritorious research & promote equity/access that sustains a diverse community of mid-career scientists

- Juggling research/teaching, services, life → "leaky pipeline" of talent
- Disproportionately affects underrepresented groups

Encourage investigators meeting one or more of the following criteria:

- No prior or recent NSF funding
- On soft-money support
- At primarily undergraduate institutions, community colleges, or minority serving institutions
- From underrepresented groups in AGS disciplines





# AGS Postdoctoral Research Fellowships (AGS-PRF)



- The AGS-PRF program supports highly qualified early career investigators independent research efforts
- Solicitation Information
  - Provides two years of support
    - \$94K in year 1 and \$96K in year 2
  - Award made directly to PI, but need to identify a host institution
  - Graduate student or less than 2 years since PhD to apply
  - No deadlines



# Please Volunteer for Reviewing Proposals!



- The heart and soul of the NSF proposal review process is the participation of experts like you
- Please, agree to contribute as ad-hoc and panel reviewers
- New solicitations and cross directorate activities are increasing the demand for reviewers
- Thanks to all who have already stepped up!