National Science Foundation Geospace Update for the Committee on Solar and Space Physics

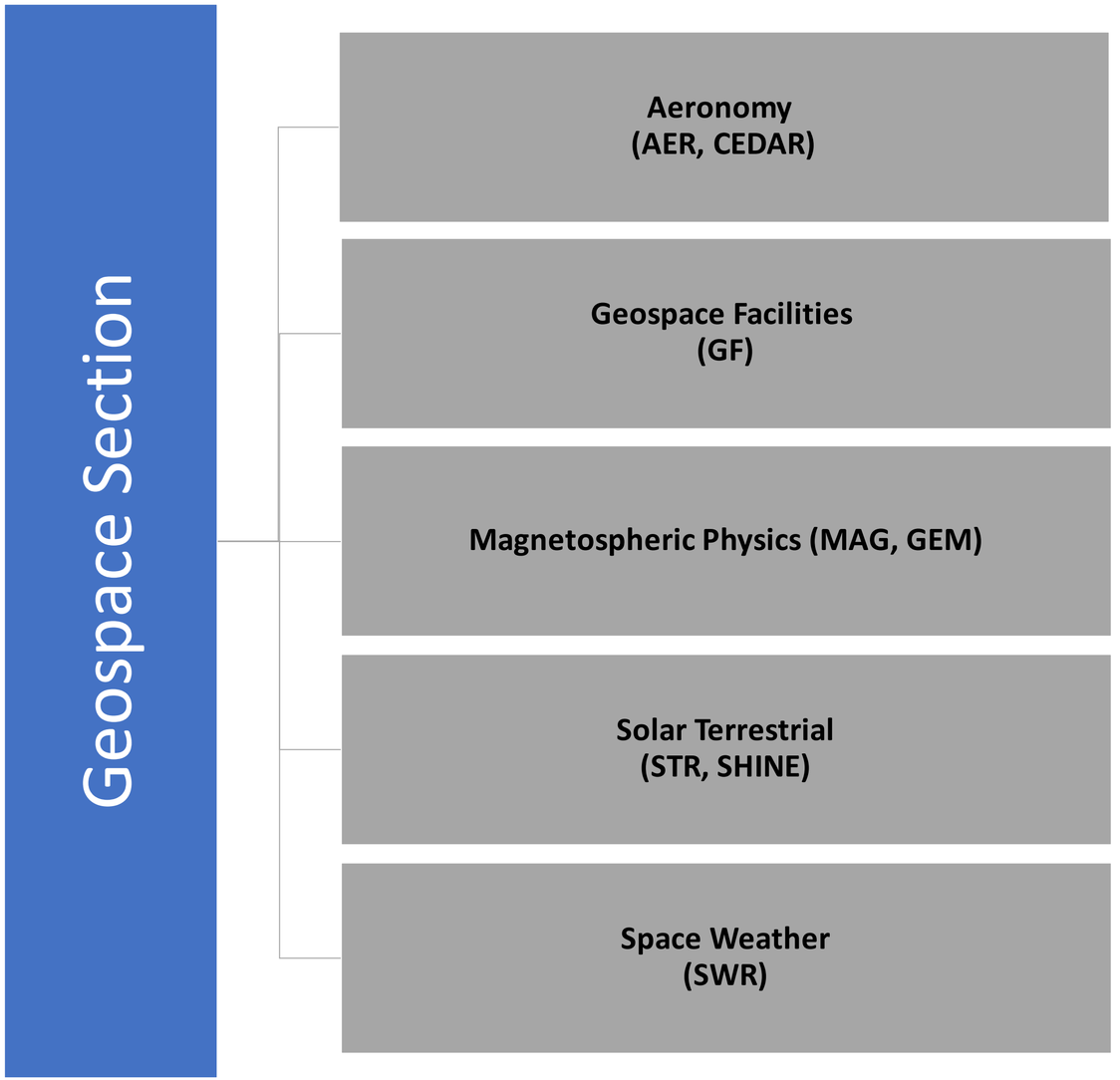
Dr. Lisa Winter

Division of Atmospheric and Geospace Sciences

Updates for NSF Geospace Sciences

- **Staffing Changes**
- **New Grand Challenges in Integrative Geospace Sciences**
- **New Geospace Facilities and updates at existing facilities**
- **Spectrum Innovation Initiative**
- **FY21 CAREER Awardees**
- **AGS DCL for Mid-Career Support**
- **Preparations for the Solar and Space Physics Decadal**

Division of Atmospheric and Geospace Sciences



Alan Liu (Acting Section Head)

Roman Makarevich

Lisa Winter

(Ilia Roussev -> UC Berkeley)

Mangala Sharma

RECRUITING FOR:

SECTION HEAD

GEOSPACE DATA IPA POSITION

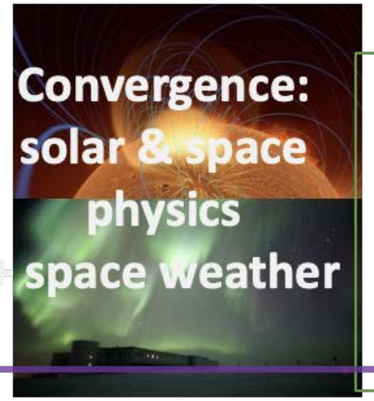
FY21 Budget ~ $60M

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

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”

- Deadline 8/23/21
- Anticipated total funding $7.5M; max $900k for small teams (6 or fewer members) and $2.5M for large teams over 3-4 years
- Contact: IntegrativeGeospace@nsf.gov

www.nsf.gov/pubs/2021/nsf21577/nsf21577.htm



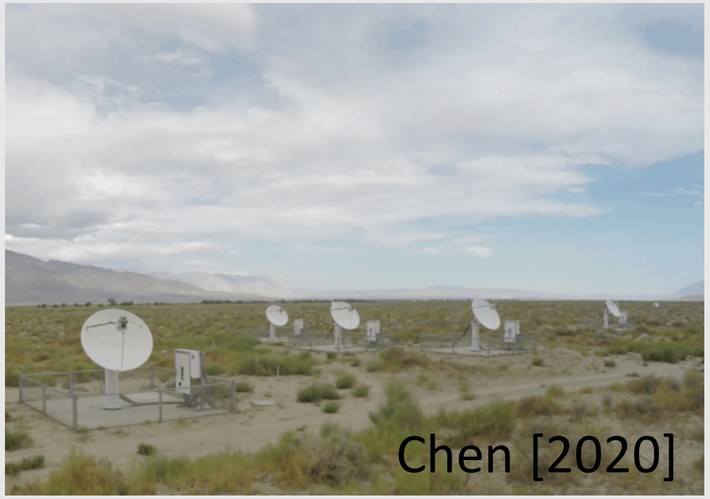
Collaboration: observers, theorists, modelers, experimenters, instrument builders, software developers, STEM educators, policy experts

Partnerships: research-intensive and minority-serving institutions; commercial sector; SWx end users

Geospace Facilities Program

Expanded Owens Valley Solar Array

New 3-year award
Class 2 geospace facility
Sept 2021 – August 2023
PI: Dale Gary
Spectral imaging of solar activity
3D measurements of solar magnetic fields



Subauroral Geophysical Observatory

New 5-year award
Class 2 geospace facility
Apr 2021 – Mar 2025
PI: Robert McCoy
200 hours of baseline
HF heating operations per year

Jicamarca Radio Observatory

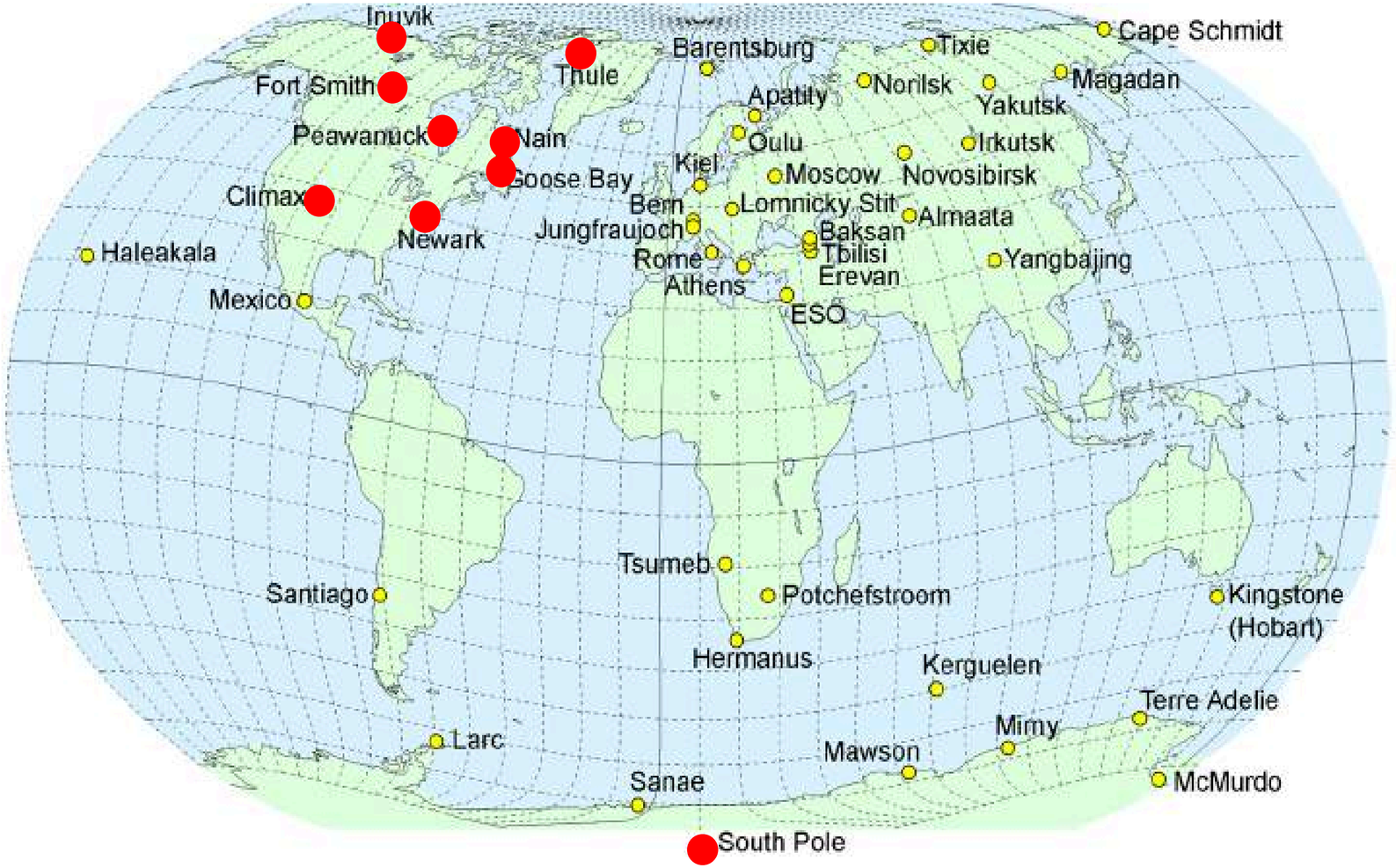
High-power operations restarted in Sept 2020
Repaired AMISR-14
Experiments in support of COSMIC2, ICON, GOLD
Significant results on high altitude (>1500 km) equatorial echoes

Millstone Hill Observatory

New award to upgrade and extend lifetime of radar
Sept 2021 – Aug 2022
PI: Frank Lind
Double sensitivity
Applications for Es, SAPS, SED and solar eclipse studies

The Simpson Neutron Monitor Network

- New 3-year award
  - University of New Hampshire (PI: Jim Ryan)
  - University of Wisconsin-River Falls (PI: Surujhdeo Seunarine
  - University of Delaware (PI: John Clem)
- Funded by the Solar-Terrestrial Research and Space Weather Programs
- Observations of particle showers from >1-GV cosmic rays (messengers of solar activity, e.g. CMEs and solar storms)



Stations Funded by this award

NSF's Spectrum Innovation Initiative (SII)

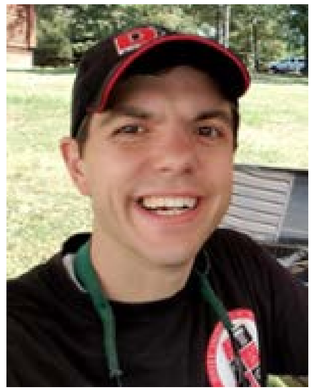
- Established May 2020
- Four Pillars
  1. National Radio Dynamic Zone (NRDZ)
  2. **National Center for Wireless Spectrum Research (SII-Center)**
     - $5M/year for 5 years/ involve academia, industry, and government
     - Major Activities
       - Spectrum related research
         - *Spectrum flexibility 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

$30M SII Center Award

-Laneman (lead PI)
- Will address issues for the geospace community including satellite uplink/downlink and interference with geospace measurements

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.***

Faculty Early Career Development Program (CAREER) 2021



Nathaniel Frissell

THE UNIVERSITY OF SCRANTON
A JESUIT UNIVERSITY

Aeronomy

Allison Jaynes

THE UNIVERSITY OF IOWA

Magnetospheric Physics

Robert Marshall

University of Colorado Boulder

Aeronomy

Jeremy Riousset

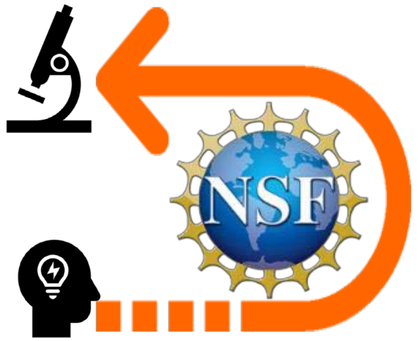
FLORIDA TECH
FLORIDA'S STEM UNIVERSITY

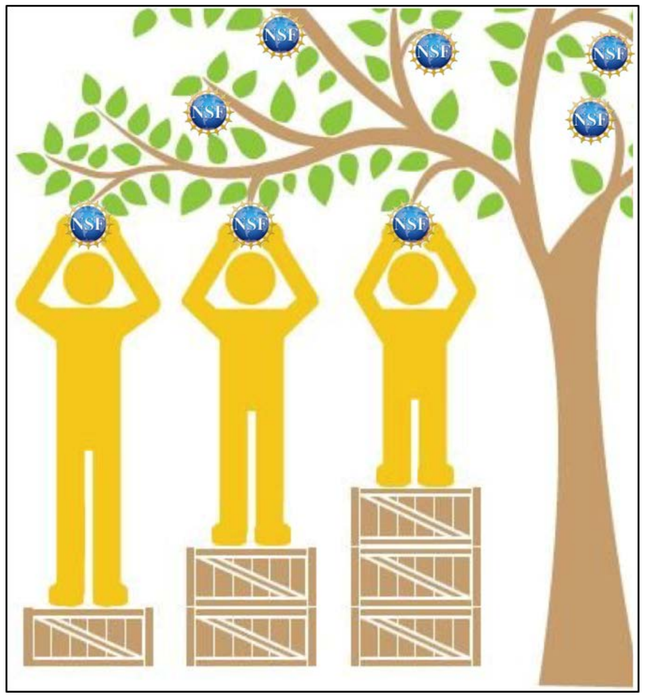
Aeronomy

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 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

Solar and Space Physics Decadal

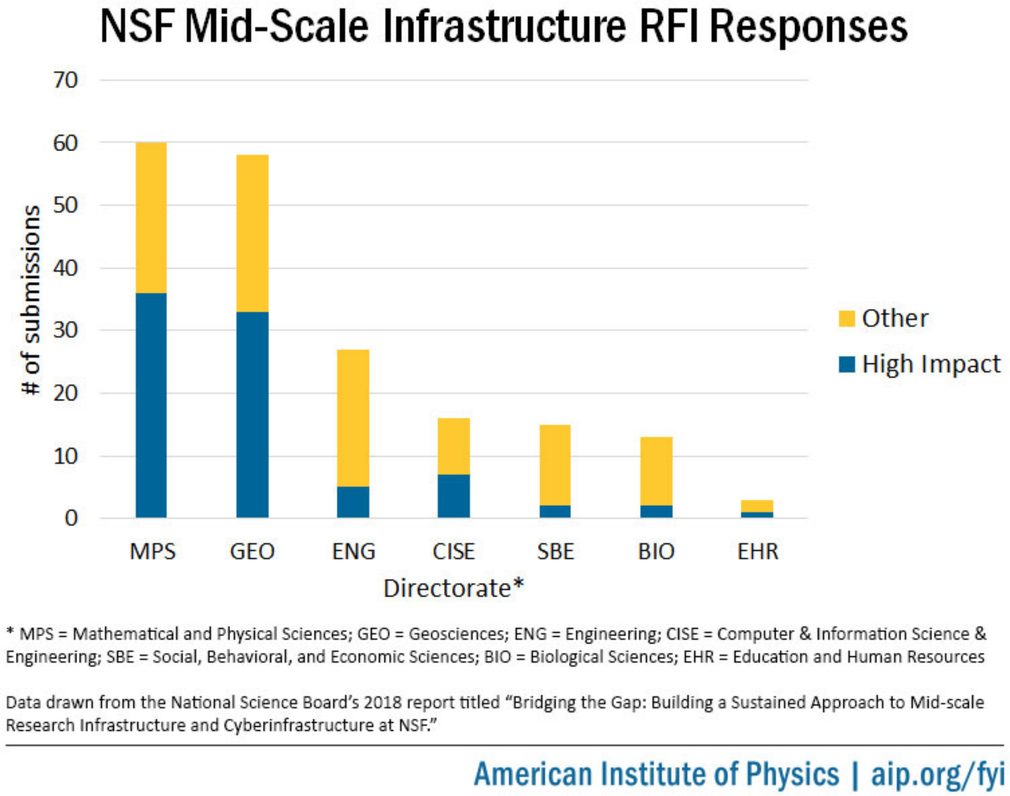
We are working with our Agency partners at NASA and NOAA as well as participating NSF Programs from:

- Division of Atmospheric and Geospace Sciences
- Division of Astronomical Sciences
- Division of Physics
- Office of Polar Programs

NSF Decadal Priorities 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

Research Infrastructure



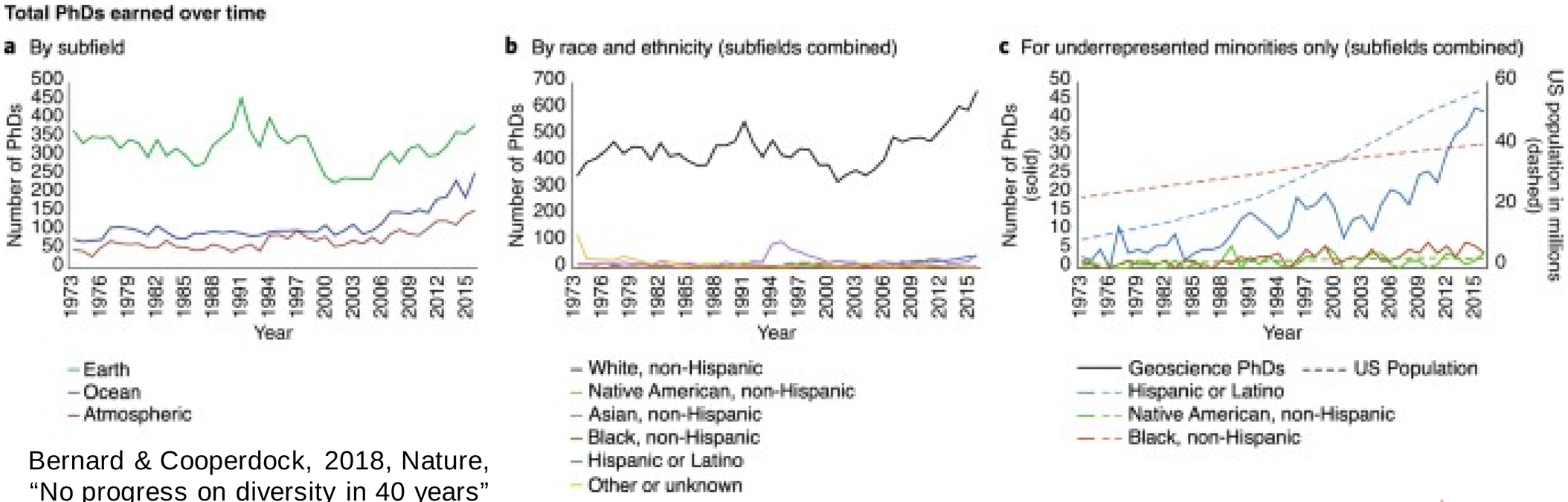
- Defining the Next Generation Ground-based Facilities
- NSF Mid-Scale Research Infrastructure
  - Mid-Scale RI 1: $6-20M
  - Mid-Scale RI 2: $20-100M

Research Infrastructure

- NSF Federally Funded Research Centers: National Solar Observatory, High Altitude Observatory (NCAR)
- Geospace Facilities
  - AMISR, Arecibo, Mill Stone Hill, AMPERE, SuperDARN, …
  - Neutron Monitoring Network, Expanded Owens Valley Solar Array, HAARP
  - What's Next?
- CubeSats
- Special Solicitations: Distributed Array of Small Instruments
- Instrumentation Projects and Support
  - Magnetometers + SuperMag
  - CCMC

Support for the Community of Researchers

- Early-career scientists
- Belonging, Accessibility, Diversity, Justice, Equity, and Inclusion (Be A JEDI)
- **Broader Impacts**
- Where are we and how can we be better?



Bernard & Cooperdock, 2018, Nature, "No progress on diversity in 40 years"

Supporting the Geospace Community

- Existing On-going programs: REUs, GRFP, AGS PRF, CAREER
- Science workshops with student focus: GEM, CEDAR, SHINE
- Special Solicitations: Faculty Development in the Space Sciences, Mid-Career DCL

NSF's Diversity and Inclusion Mission Statement:

To recruit, retain, and develop a diverse, high-performing workforce that draws from all segments of society and values fairness, diversity and inclusion to promote the progress of science.