

## Diversity, Equity and Inclusion in Space Sciences – A Sustainable The Big Picture

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### NASA SMD's strategic plan

Science Mission Directorate Core Values  
**LEADERSHIP EXCELLENCE INTEGRITY TEAMWORK SAFETY INCLUSION**

"SMD is committed to fostering an inclusive environment of belonging where diversity of thought, backgrounds and perspectives are welcomed and celebrated. SMD recognizes that success is only achieved through full participation of inclusive and diverse teams, belonging and contributing as organizations and individuals. We are dedicated to creating a multi-pronged approach that brings systemic and lasting change in this area by fostering inclusion, diversity, equity and accessibility across all elements of our work through dedicated activities and sustained engagement."

### Recipe for an Astronomical Inclusion Revolution

- ✓ Recognition
- ✓ Informal Institutional Change
- Formal Institutional Change
  - Incentives w/ Consequences & Rewards
- Cultural Change

Harness Innovation through Research Inclusion

### Formal Institutional Change

- Leadership** Discussions around 'inclusion in science' are challenging and often shunned. Need high level policy advisory groups and funding agencies to engage in the discussion for there to be traction.
- Access** Science leadership and policy making activities (e.g., committee membership and input to committees) often come from too narrow a group of scientists. Narrow groups often underestimate barriers to inclusion that stymie good ideas.
- Policies** Policies and procedures need to be regularly monitored and re-assessed for intended effectiveness. We need to address the proper problems and concerns.
- Incentives** Research funding (e.g., grants) is currently not tied to metrics or progress on the inclusion of underrepresented and disenfranchised groups. "Broadening Participation" must be about workforce and research participation, not just public outreach and education.

### Access is Crucial

- Advisory Access - Access to decision making on issues of science direction
- Scientific Resource Access - The availability of resources to support scientific research

**ASTRO+BEAT**  
Can Big Data Lead an Inclusion Revolution?

Norman, 2018, ASP  
<https://astrosociety.org/files/download/inline/127fa889-h5f4-4e59-aa62-ce7ad5add47c>

### Axes of Expertise and Diversity

"I didn't know what I didn't know."  
- Paula Stone Williams, a transgender woman

- Scientific expertise
- Technical expertise
- Project affiliation and non-affiliation
- Personal experience in science
- Institutional affiliation
- Career phase and work status
- Personal identity

### Axes of Expertise and Diversity

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**RSIG Advisory institutional affiliations:**

**The Roman Science Interest Group** provides broad-based community input to the Roman project and NASA headquarters. Its primary purpose is to assist NASA in ensuring that the interests of the scientific community are served by the Roman Space Telescope project in planning for and executing Roman development and operations.

- Michigan State University
- University of Washington
- University of California, Berkeley
- Space Telescope Science Institute
- Columbia University / Flatiron Institute
- University of California, Los Angeles
- University of Wisconsin, Madison
- Rutgers University
- Princeton University
- \*Nat. Optical-Infrared Astronomy Research Laboratory
- NASA Exoplanet Science Institute / Caltech
- Cornell University
- Dartmouth College
- Las Cumbres Observatory
- Caltech
- (Observers)
- Princeton University / Flatiron Institute
- University of San Francisco
- Space Telescope Science Institute
- IPAC

### Scientific Resource Access and The Evolution of Insider Status

Insider (Large) Institutions (n<sub>pub</sub> > 30)

Other institutions (n<sub>pub</sub> < 30)

AR, IO, AO

Josh Peek, et al., 2019

### Diversity, Equity and Inclusion

**Equity ≠ Equality**

The quality of being fair; To provide all with the support they need to reach and exceed goals;  
**The focus is on outcomes.**

The state of being equal.

### Funding for Scientific Resource Access

<https://astroarchive.noao.edu>

ANTARES <https://antares.noirlab.edu>

ASTRO DATALAB <https://datalab.noao.edu/>

Function	Method
Sky exploration	Image discovery tool; Catalog queries tool
Authentication	Web interface; datab command; Python astClient, DL interface
Catalog query	Web interface; datab command line (CLI); Python astClient, DL interface; TOPCAT
Image query	Simple Image Access (SIA) service
Query result storage	myCDS Virtual storage space
File transfer	datab command, Virtual storage space
Analysis	Jupyter notebook server

log N per sq. deg.

### Policies that support DEI

#### Open Skies

PUBLIC TELESCOPE FACILITIES ARE EQUALLY OPEN TO EVERYONE REGARDLESS OF ACCESS TO PRIVATE FACILITIES

- Pros:** Anyone with a good idea can apply for merit based time
- Cons:** Institutions with private (large) telescope access have advantage
- Mitigation:** Focus on implementation and regular assessment, revision

#### Dual Anonymous Review

ANONYMIZED PROPOSALS REVIEWED BY ANONYMOUS PANEL MEMBERS.

- Pros:** Better focus on the science of the proposal
- Cons:** Can conflict with other science mission priorities (e.g. broad access)
- Mitigation:** Focus on implementation and regular assessment, revision

### RESEARCH INCLUSION

**Valued as part of how we assess scientific merit**

- Policies and procedures that support mutually beneficial partnerships
- Opportunities for scientific networking and collaboration building
- Technical infrastructure that enables participation
- Provide science platform/tools training

OPEN COLLABORATION

Science in the 2020s

LA SIENA SCHOOL FOR DATA SCIENCE Applied Tools for Data Science

### We must be deliberate about HOW we embrace and practice Diversity, Equity and Inclusion to advance cultural change in Space Science.

- ACCESS IS CRUCIAL**
- POLICIES REVIEWED**
- RESEARCH INCLUSION VALUED AS SCIENTIFIC MERIT**

Other Institutions (N=66 < 30)

### Questions