ADVANCING INCLUSION

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(All opinions expressed in this talk are my own and not necessarily those of NOIRLab.)

Recipe for an Astronomical Inclusion Revolution


Values


Norms


Traditions

✓ Recognition

✓ Informal Institutional Change

Formal Institutional Change

Incentives w/

Consequences & Rewards

Cultural Change

Harness Innovation through Research Inclusion

Formal Institutional Change

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

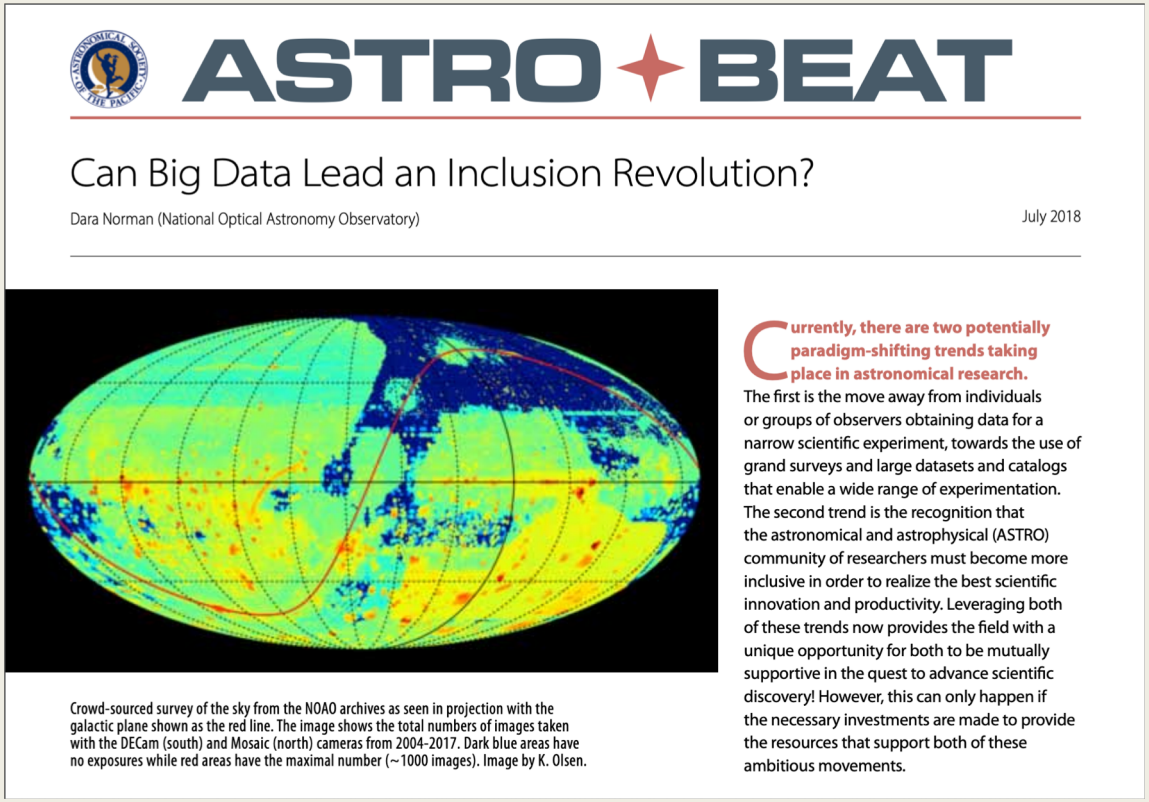
Research funding (e.g., grants) is currently not tied to metrics or progress on the inclusion of underrepresented and disenfranchised groups. "Broadening Participation" must be about **workforce and research participation**, not just public outreach and education.

Leadership

Discussions around 'inclusion in science' are challenging and often shunned. Need high level policy groups to engage in the discussion for there to be traction.

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?

Dara Norman (National Optical Astronomy Observatory) July 2018

Crowd-sourced survey of the sky from the NOAO archives as seen in projection with the galactic plane shown as the red line. The image shows the total numbers of images taken with the DECam (south) and Mosaic (north) cameras from 2004-2017. Dark blue areas have no exposures while red areas have the maximal number (~1000 images). Image by K. Olsen.

Currently, there are two potentially paradigm-shifting trends taking place in astronomical research. The first is the move away from individuals or groups of observers obtaining data for a narrow scientific experiment, towards the use of grand surveys and large datasets and catalogs that enable a wide range of experimentation. The second trend is the recognition that the astronomical and astrophysical (ASTRO) community of researchers must become more inclusive in order to realize the best scientific innovation and productivity. Leveraging both of these trends now provides the field with a unique opportunity for both to be mutually supportive in the quest to advance scientific discovery! However, this can only happen if the necessary investments are made to provide the resources that support both of these ambitious movements.

Norman, 2018, ASP

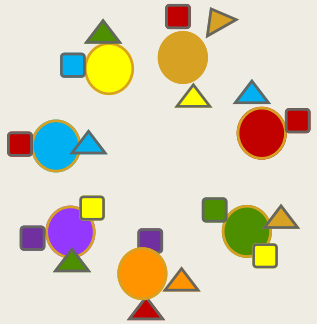
https://astrosociety.org/file_download/inline/12faca89-b5f4-4e59-aa62-ce7ad5add47c

Axes of Expertise and Diversity

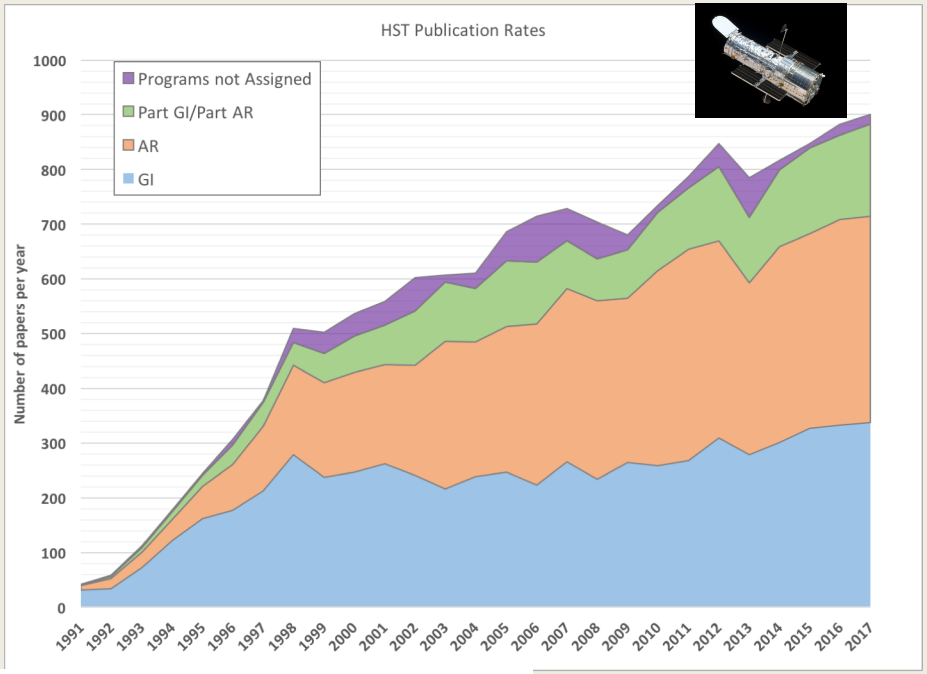
"I didn't know what I didn't know."

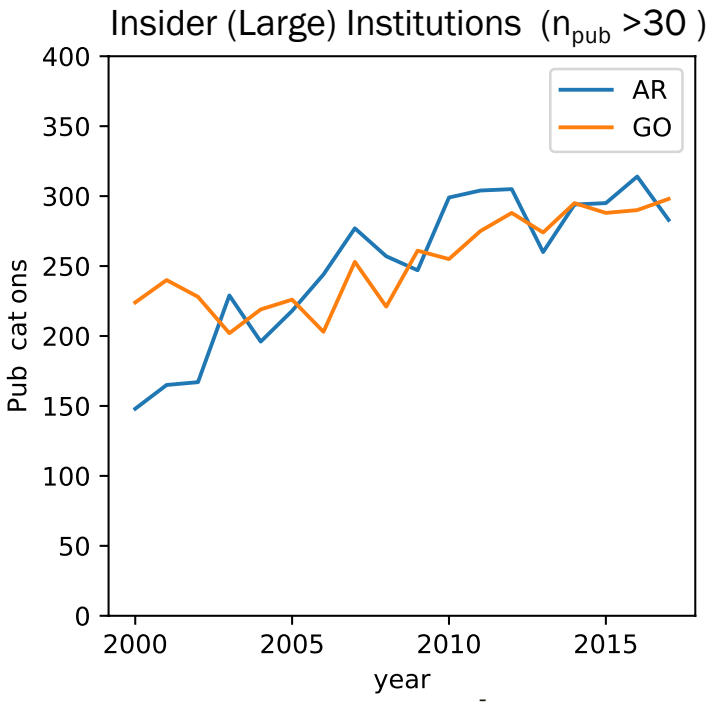
- Paula Stone Williams, a transgender woman

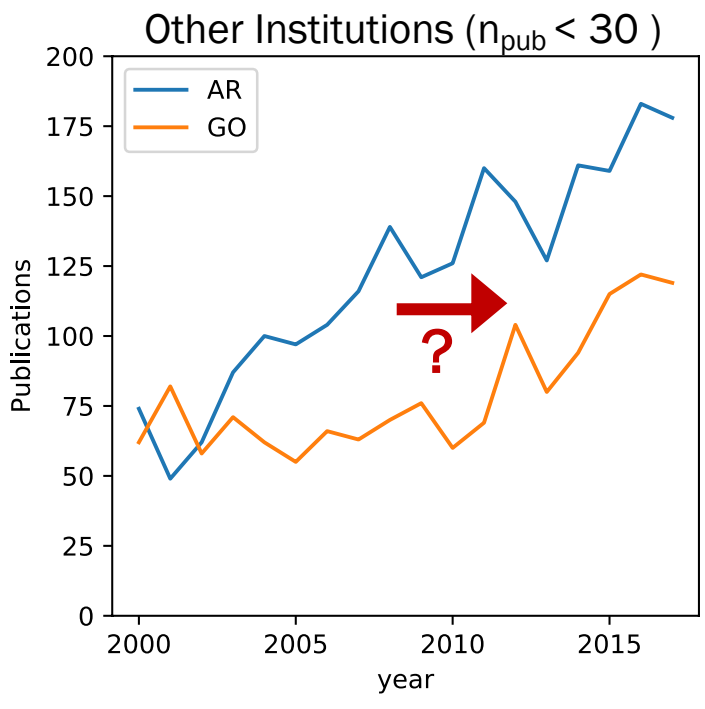
- Scientific expertise
- Technical expertise
- Project affiliation and non-affiliation
- Personal experience in science
  - Institutional affiliation
  - Career phase and work status
  - Personal identity



Scientific Resource Access and The Evolution of Insider Status







Josh Peek, et al., 2019

Diversity, **Equity** and Inclusion

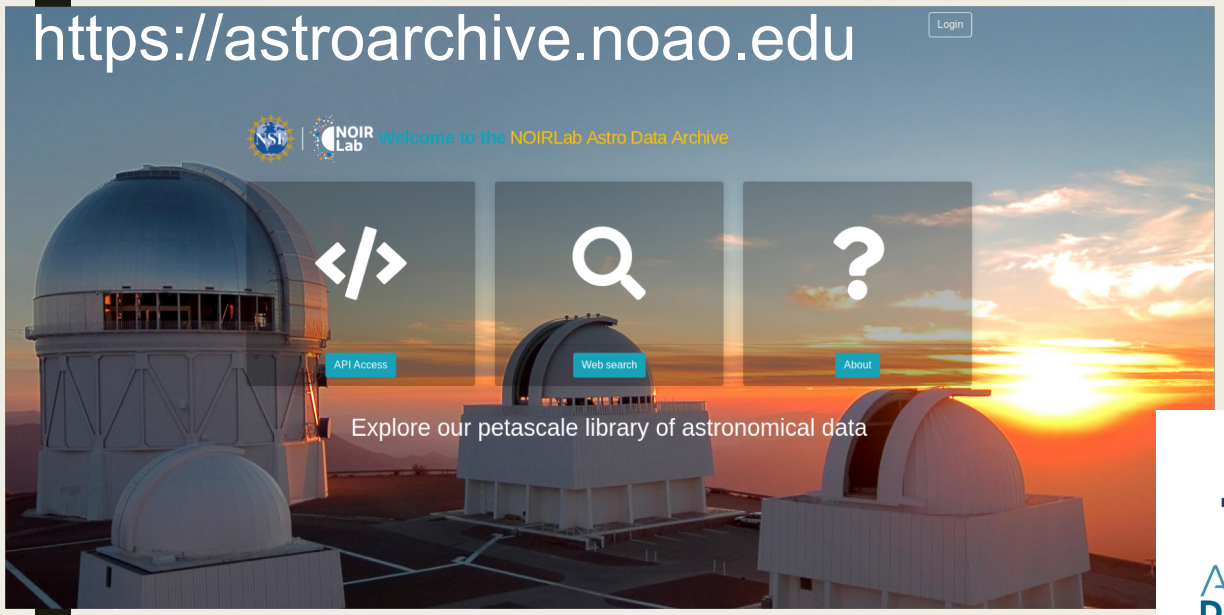
Equity ≠ Equality

The quality of being fair;
To provide all with the support they need to reach and exceed goals;

*T*he state of being equal.

The focus is on outcomes.

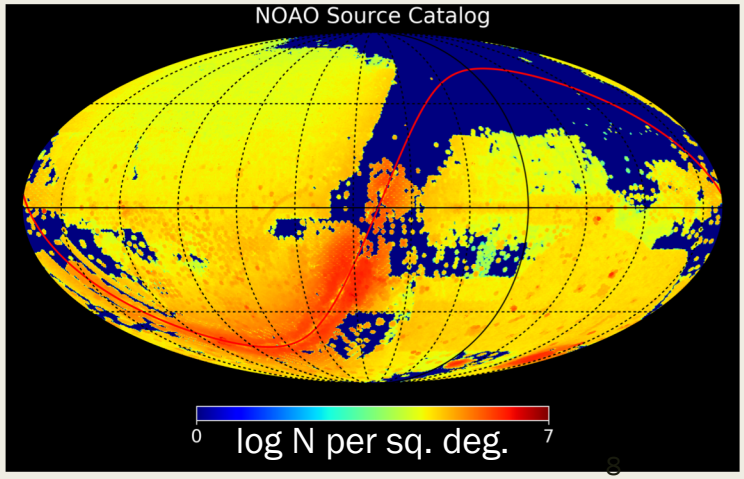
Funding for Scientific Resource Access



https://antares.noirlab.edu

https://datalab.noao.edu/

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



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

Proposer

Reviewer

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
- **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

Policies for the Allocation of Observing Time

- Opportunities for scientific networking and collaboration building

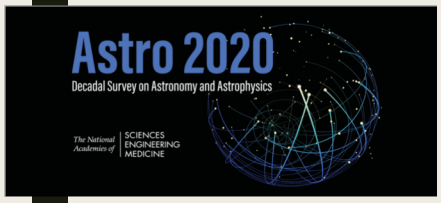
- Technical infrastructure that enables participation

ASTRO DATALAB

ANTARES

- Provide science platform/tools training

We must be deliberate about HOW we embrace and practice Diversity, **Equity** and Inclusion to advance cultural change in Astronomy and Astrophysics.

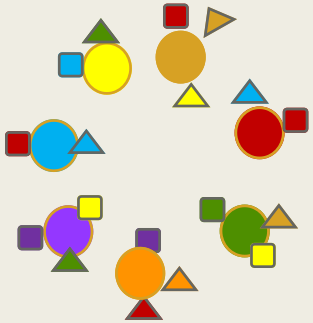


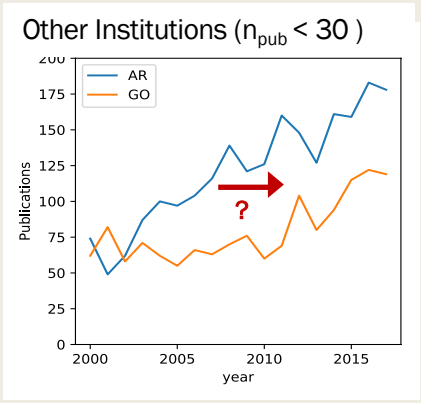
Values

Norms

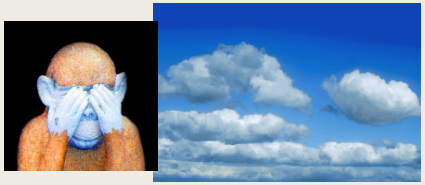
Traditions

- ACCESS IS CRUCIAL





- POLICIES REVIEWED



- RESEARCH INCLUSION VALUED AS SCIENTIFIC MERIT

Backup slides

We need leadership from leaders

Need high level policy groups to engage in the discussion for there to be traction (e.g., insist on funding for inclusive programs and meetings, access and resources for the broadest community).

Bulletin of the AAS, 51(7).

Tying Research Funding to Progress on Inclusion

https://baas.aas.org/pub/2020n7i014

Managing groups and organizations proposing to administer projects for agencies should be asked to demonstrate competency with respect to diversity and inclusion metrics.

Providing a Timely Review of Input Demographics to Advisory Committees

https://baas.aas.org/pub/2020n7i024

We recommend that advisory committees that collect community input, (e.g., the Decadal Survey review committee), also collect, compile and review input demographic data before finalizing reports, (e.g., the final 2020 Decadal Survey Report).

Recognizing and Supporting the Growing Importance of a Tech Savvy Astronomy and Astrophysics Workforce

https://baas.aas.org/pub/2020n7i018

To ensure a workforce capable of taking advantage of the computational resources and the large volumes of data coming in the next decade, we must identify and support ways to make software development training widely accessible to community members, regardless of affiliation or career level.

Astro Big Data and the Inclusion Revolution

https://astrosociety.org/file_download/inline/12faca89-b5f4-4e59-aa62-ce7ad5add47c

The goal of inclusion will not be reached without a sustained, committed backing of the full big data enterprise. It is crucial that the scientific community recognize that investments made in pursuit of inclusion, by way of big data, are the way we advance the field of astronomy and astrophysics into the next century and beyond.

The Anecdote

Big Astronomy Project

Cutting Edge Technology

Great Science

New Areas of Science

Innovative Methods

Community Collaboration

Education

Public Outreach

Broadening Participation

- Pipeline Building
- Professors at HBCUs
- And their Students
- Partnered with Big Astronomy Project Staff
- Modelled on a successful program

The Anecdote

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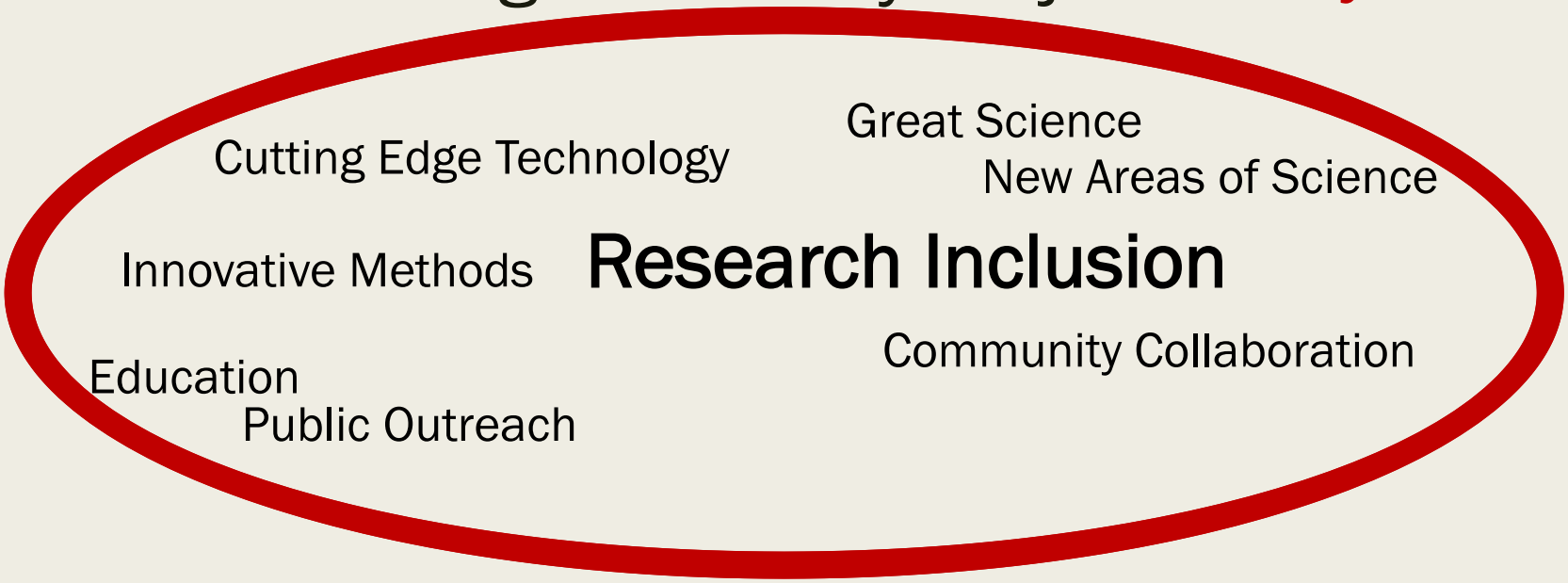
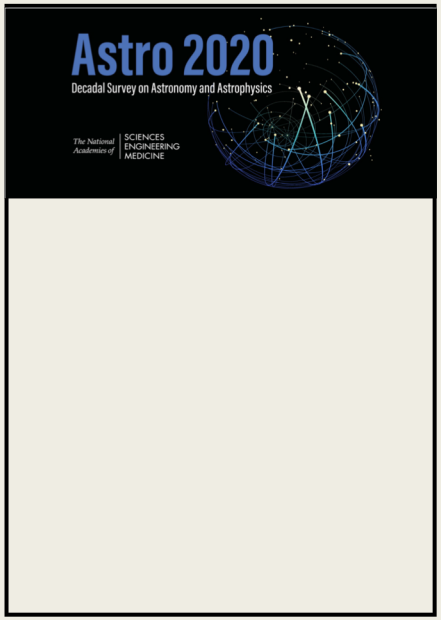
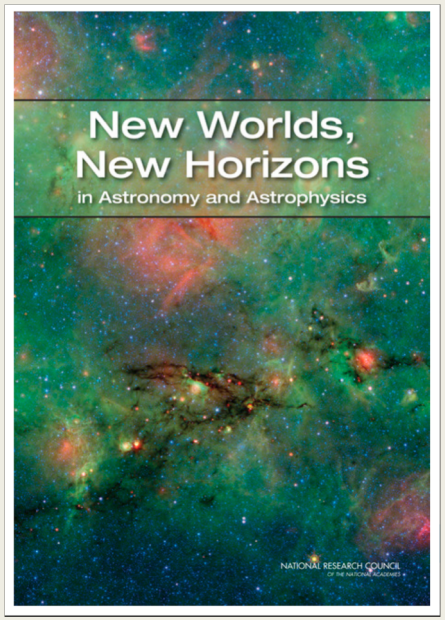
The Anecdote

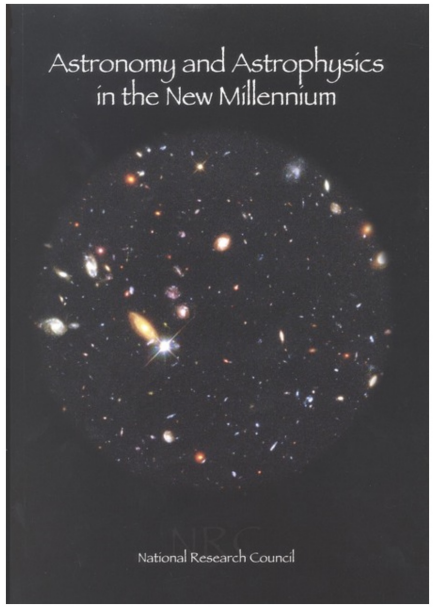
Big Astronomy Project +10 years

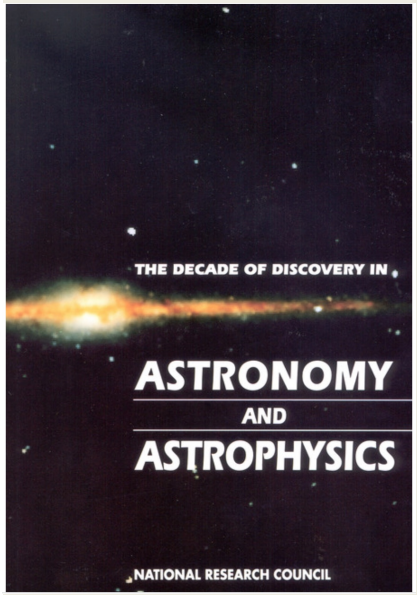


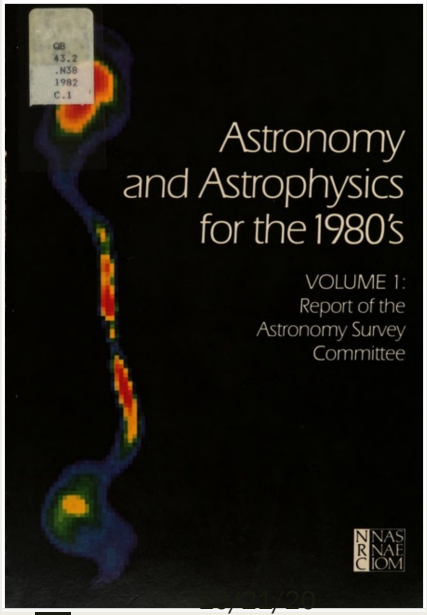
Valued as part of how we assess scientific merit


Astro 2020
Decadal Survey on Astronomy and Astrophysics
The National Academies of SCIENCES ENGINEERING MEDICINE


New Worlds, New Horizons
in Astronomy and Astrophysics
NATIONAL RESEARCH COUNCIL


Astronomy and Astrophysics in the New Millennium
National Research Council


THE DECADE OF DISCOVERY IN
ASTRONOMY
AND
ASTROPHYSICS
NATIONAL RESEARCH COUNCIL


Astronomy and Astrophysics for the 1980's
VOLUME 1:
Report of the
Astronomy Survey
Committee
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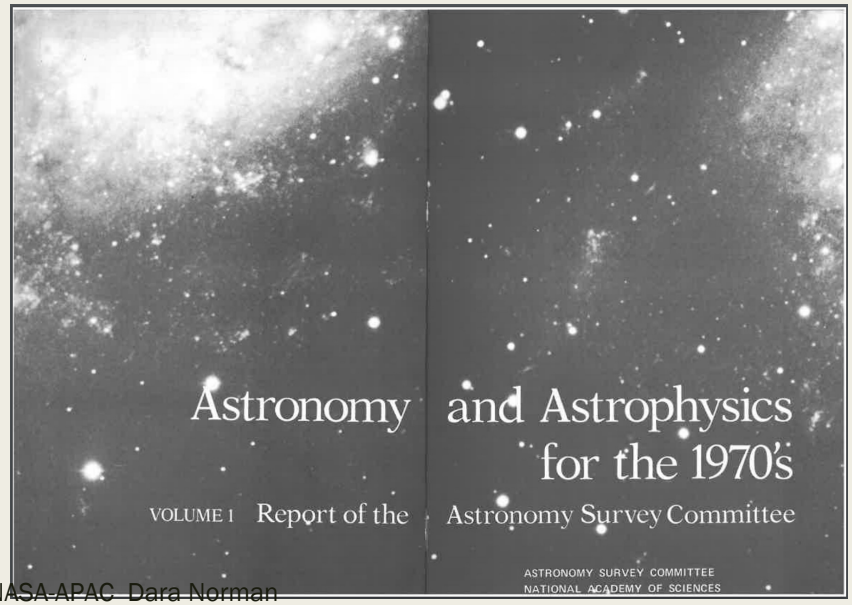
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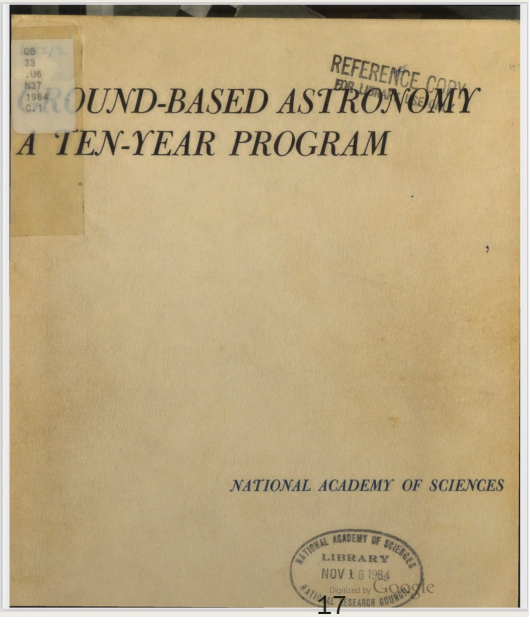
NATIONAL ACADEMY OF SCIENCES


REFERENCE COPY
GROUND-BASED ASTRONOMY
A TEN-YEAR PROGRAM
NATIONAL ACADEMY OF SCIENCES
NATIONAL ACADEMY OF SCIENCES
LIBRARY
NOV 16 1964

History: First Decadal Survey in 1964

Sections about the astro-professional workforce, its development and how to modify workforce demographics

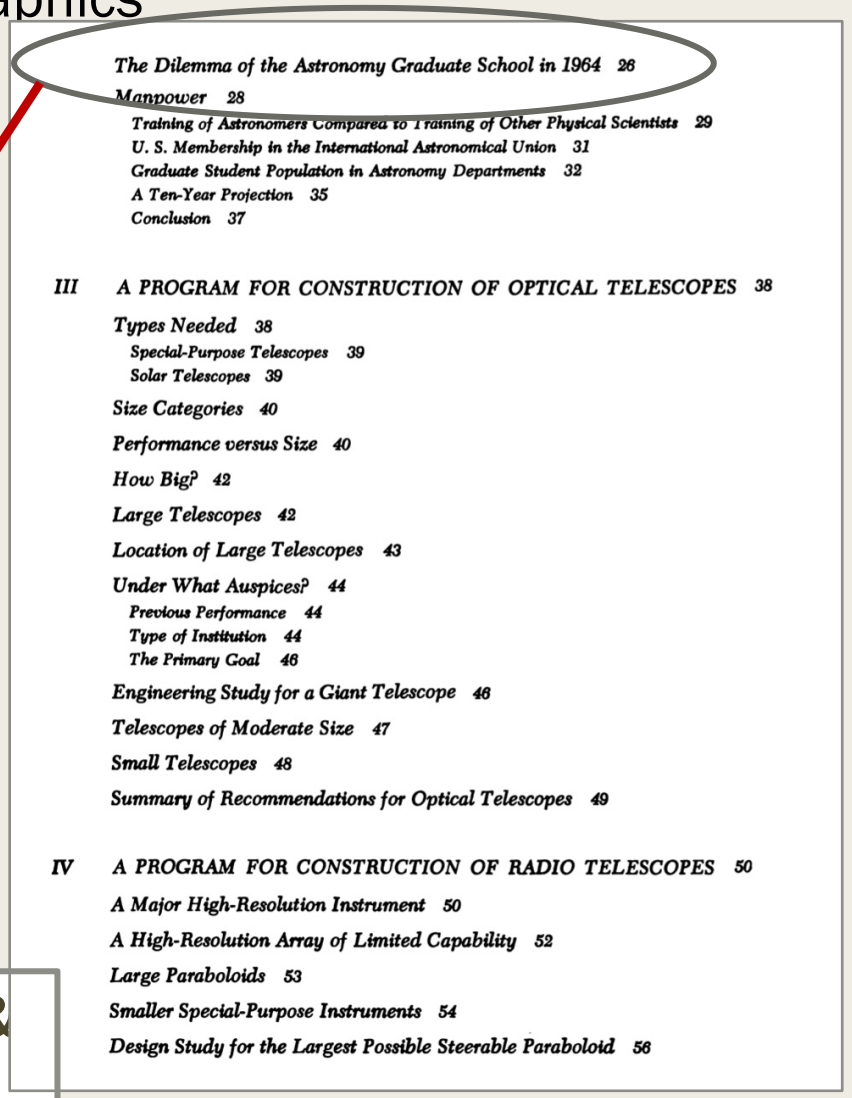
I Introduction and General Statement

II The Present Position in Ground-Based Astronomy

- Theoretical Astrophysics
- Optical Astronomy
- Radio Astronomy
- The dilemma of the astronomy graduate school in 1964
- Manpower

III A Program for construction of Optical Telescopes

IV A Program for construction of Radio Telescopes



Survey concern: Not enough telescopes & instruments to get good data for theses.