



# Science Community Development and Research Services

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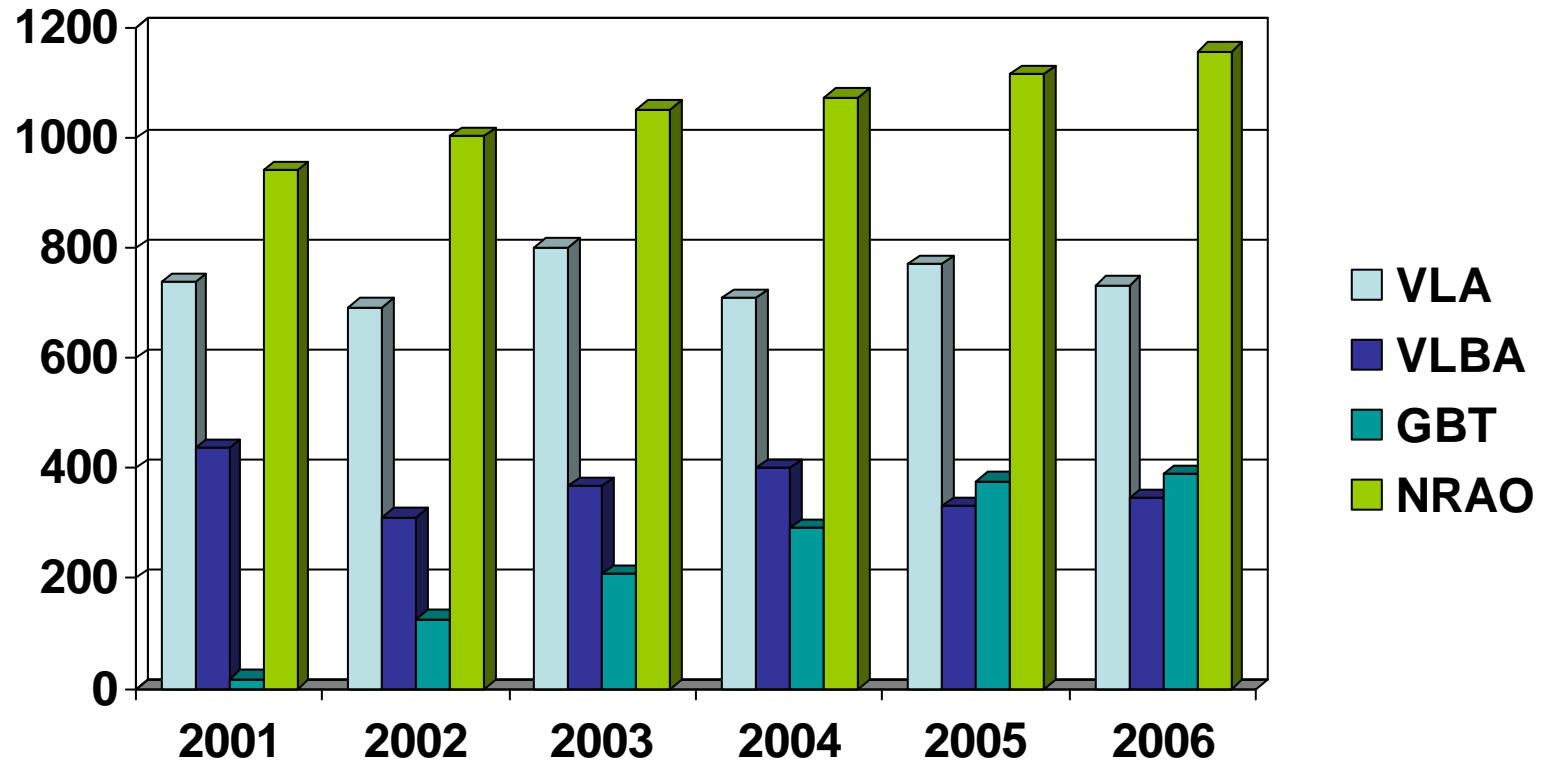
Office of Science and Academic Affairs



# Topics for discussion

- The general health of the NRAO user community
- Assorted subjects in student training and community development programs and
  - A brief overview of programs
  - PhD students using NRAO telescopes
  - Tracking progress of postdoctoral fellows

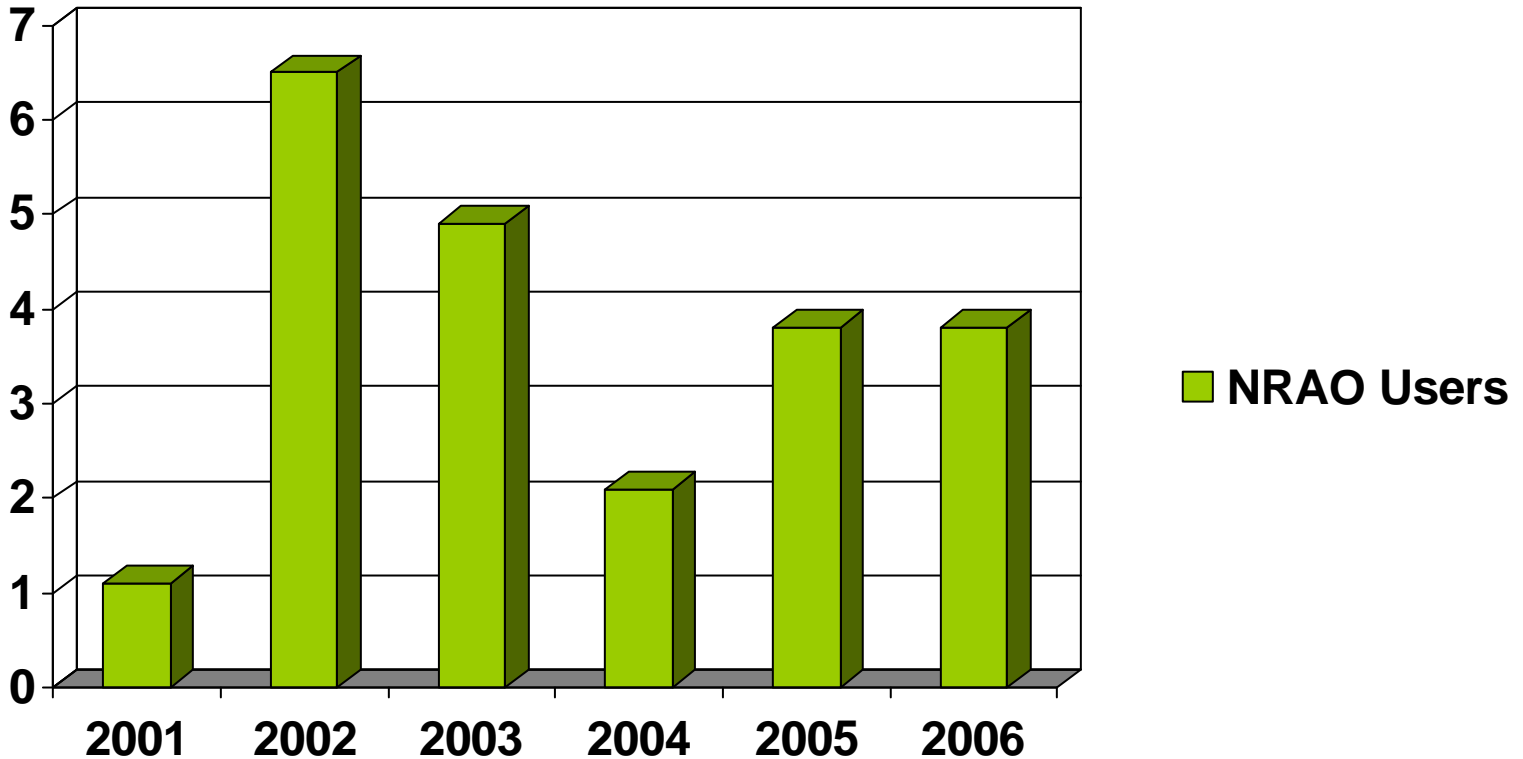
# Overview of Number of NRAO Users



Reference: NRAO Observing Summaries

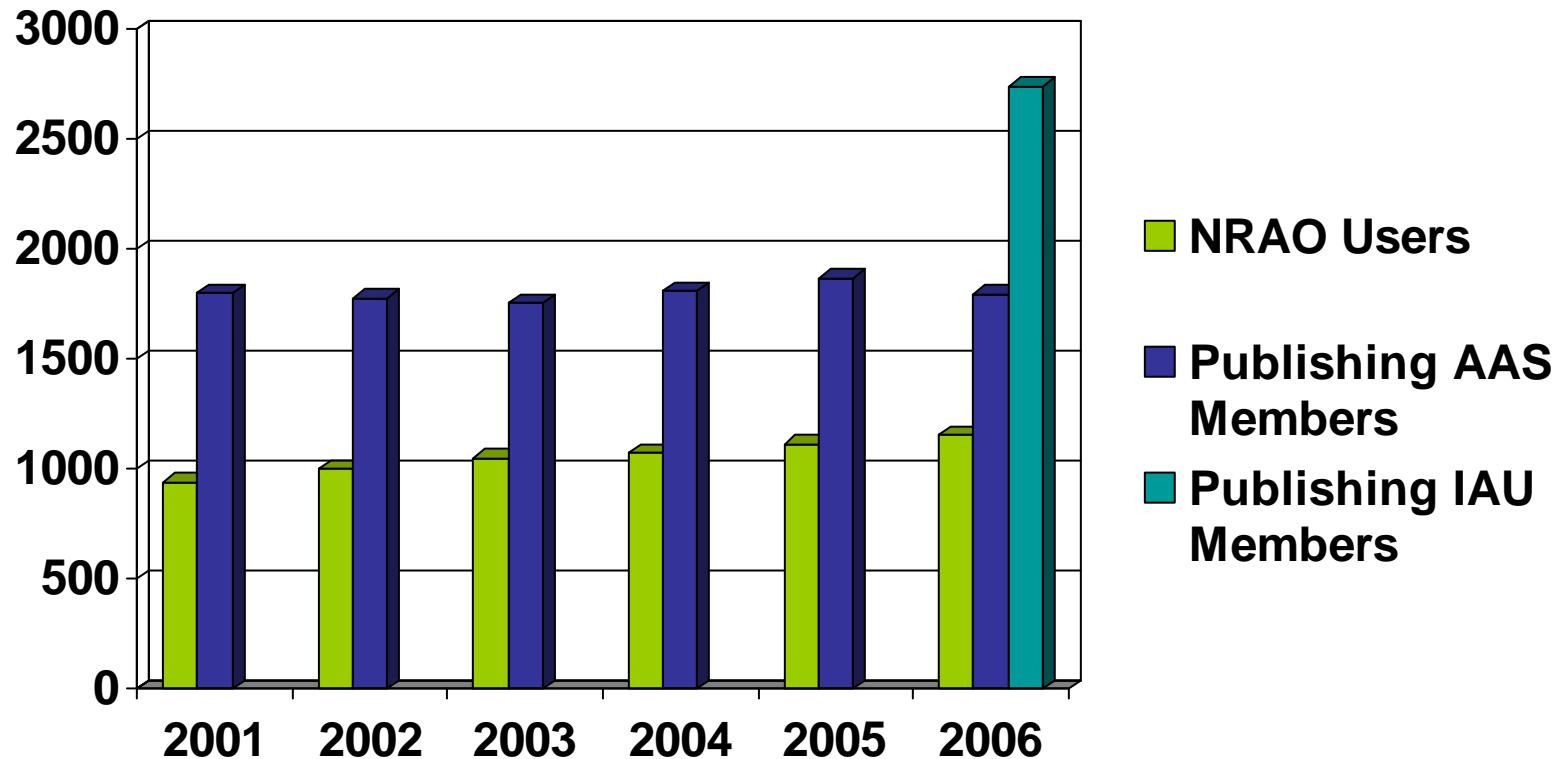
# Growth Rate in Number of NRAO Users

Percent Increase over previous year



Reference: NRAO Observing Summaries

# NRAO Users Relative to Full Community



References: NRAO Observing Summaries, BAAS, IAU Home Page

Publishing astronomers = 0.28 times all astronomers (Pearce 2004)

# Summary of NRAO User Community

- Number of NRAO users
  - About 1000 each year
  - 900 (CXO), 1800 (HST), 1000 (SST)
- Growth rate in number of NRAO users
  - A few percent per year (GDP-like)
  - Growth rate expected to accelerate with ALMA and EVLA
- NRAO users as a fraction of community
  - Significant. 1/2-1/3 of “active” astronomers
  - Challenge is to reach non-traditional users

# Training and Outreach Programs

1. Undergraduate Programs
  - Co-op (\$145k)
  - Summer students (\$150k REU + \$25k = \$175k)
2. Graduate Programs
  - Summer students (\$45k)
  - Student observing support (\$330k)
  - Internships (\$85k)
  - Pre-docs (\$170k)
  - Summer schools (~\$20k)
3. Postdoctoral Programs
  - NRAO postdocs
  - Jansky postdocs (resident and non-resident) (\$950k)
4. University-NRAO Programs
  - Visitor program (\$115k)
  - Adjunct staff appointments
  - University instrumentation programs

# Undergraduate Programs

## 1. Co-op (<http://www.nrao.edu/students/co-op.shtml>)

- 6 FTEs/year
- Fine. Some recruitment problems
- New diversity component

## 2. Summer Student

([http://www.nrao.edu/students/NRAOstudents\\_progsum07.pdf](http://www.nrao.edu/students/NRAOstudents_progsum07.pdf))

- ~25 students per year
- OSA submitted successful NSF proposal to renew REU/RET pgm
- 2009 will be our 50<sup>th</sup> year
- Most racial and gender diverse pgm at NRAO
- Graduate student conduit to US universities
- Strain on staff

Carl Heiles

Bruce Draine

Jay Gallagher

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Dan Stinebring

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# Graduate Programs

1. Summer Students
2. Student Observing Support (<http://wiki.gb.nrao.edu/bin/view/Observing/NRAOStudentSupportStatus>)
  - Most popular program. Eligibility is limited. VLBA added.
  - External review committee
  - 50% increase in funds. 100% increase in grants
3. Internships ([http://www.nrao.edu/students/NRAO\\_graduate\\_interns.php](http://www.nrao.edu/students/NRAO_graduate_interns.php))
  - New program. Short term visits (weeks to months)
  - Forge links between (US) Universities and NRAO staff
  - Train multi-wavelength generation
4. Pre-Docs ([http://www.nrao.edu/students/NRAO\\_predoc\\_students.php](http://www.nrao.edu/students/NRAO_predoc_students.php))
  - Spotty record. No single reason. Under budget threat
5. Summer Schools (<http://www.aoc.nrao.edu/events/synthesis/2008/>)
6. *Essential Radio Astronomy by Condon and Ransom*  
(<http://www.cv.nrao.edu/course/ast534/ERA.shtml>)

# Postdoctoral Programs

## 1. Recent changes

- Increase in number of postdocs at NRAO
- Increased salary and research funds of Jansky Fellows
- Diversity remains a problem for remote sites
- NAASC is becoming a magnet for CV

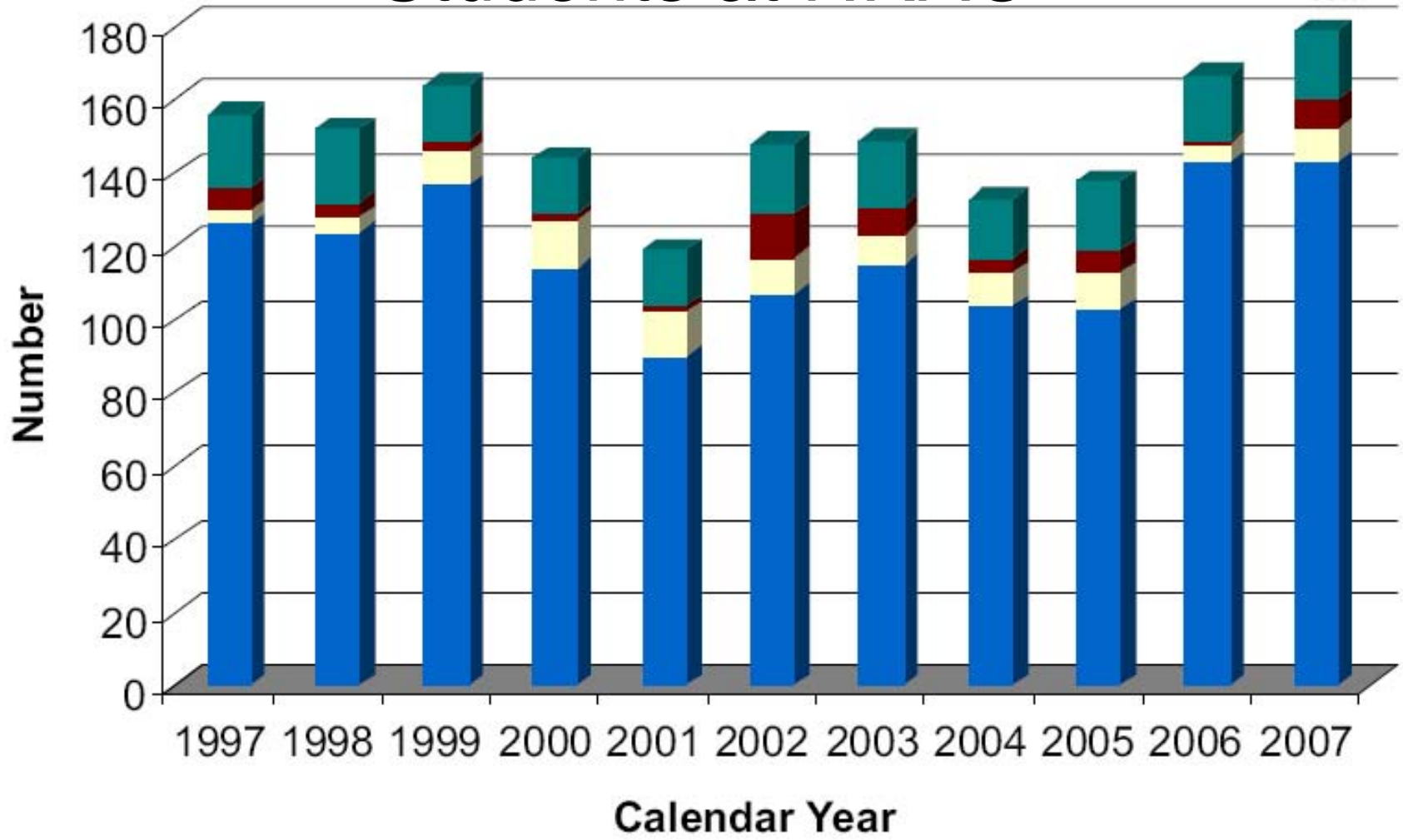
## 2. By the numbers...

- 22 postdocs
- 11 Jy: 7 NRAO: 4 non-NSF
- 4 women: 18 men
- 6 in CV, 2 in GB, 7 in Socorro, and 7 “non-resident”
- Non-resident sites: Berkeley, Caltech, Chicago, Colorado, JHU, UMass, UVa

# University-NRAO Programs

1. Visitor Programs (<http://www.nrao.edu/astrores/visitors.shtml>)
  - Support visits by outside scientists and engineers
  - Look for expertise not present within the Observatory
  - Future focus on recruiting expertise for EVLA commissioning to address staffing shortfalls (AUI Proposal)
  - Current focus on GBT instrument commissioning
2. Adjunct Staff (<http://www.nrao.edu/internal/dsaa/Adjunctstaff.pdf>)
3. University instrumentation programs

# Students at NRAO



■ Summer Undergraduate

■ Co-op

■ Graduate

■ Ph. D.

# PhD Students and NRAO Telescopes

Year of PhD	Total PhDs Using NRAO	US PhDs Using NRAO	Total US PhDs	GBT	VLA	VLBA
2004	43	16	~112	5	32	16
2005	42	19	91	11	30	14
2006	52	25	119	20	33	15
2007	63	27	N/A	24	48	15
2008	65	41	N/A	25	45	18
<b>Average</b>	<b>53</b>	<b>26</b>	<b>~100</b>	<b>17</b>	<b>38</b>	<b>16</b>

(Source: NRAO Telescope statistics for NSF/AST and American Institute for Physics US Astronomy PhD Reports)

# PhD Students and NRAO Telescopes

- An average of 50 PhDs a year using NRAO facilities for their thesis research.
- 25% of all PhD astronomy graduates in the United States use NRAO telescopes for their research
- Significant growth in total number (esp. at GBT)
- Trends may indicate recent policy and funding decisions
  - PhD friendly policy
  - Student Observing Support (SOS) Program
  - <http://wiki.gb.nrao.edu/bin/view/Observing/NRAOStudentSupportStatus>

...But Catch-22 for adjunct faculty. **Policy decision**

# NRAO Fellows and Janskys



*Users Committee Meeting- Green Bank, WV  
May 20-21, 2008*

# Postdoctoral Programs: Metrics

What fraction stay on in astronomy?

What fraction get permanent positions in astronomy?

What fraction work at research universities in North America?

What fraction work at NRAO?

What fraction join faculty of “top” research Universities in North America?

Has the non-resident program been an "success"?

Questions	1987-1991	1992-1996	1997-2002	2003-2007	Total
# of postdocs	12	18	29	31	90
Stay?	11	15	28	(31)	85
Permanent?	11	15	25	(6)	57
NA Research ?	6	12	24	(29)	71
NRAO?	3	6	4	(23)	36
Top NA?	0	3	4	3	10



# Postdoctoral Programs: Metrics

- A significant fraction (>80%) stay in astronomy and remain in North America. NRAO has nurtured many non-US astronomers careers
- Not doing as well at “stocking” North American research universities

Van Zee (Indiana)

Johnson (UVa)

Yun (UMass)

Stairs (UBC)

Wilcots (Wisconsin)

Speckens (RMC/Queens)

Bower (Berkeley)

Aguirre (UPenn)

Shirley (Arizona)

Baker (Rutgers)

- Too early to judge non-resident pgm but initial results are promising
- Some hint of an ALMA-driven hiring surge

# US Radio Astronomy Community

- Harvard/SAO
- MIT
- U Mass
- Maryland
- Princeton
- Columbia
- Yale
- Illinois
- Michigan
- Wisconsin
- Iowa
- Cornell
- Virginia
- Virginia Tech
- U Penn
- Colorado
- UT Texas
- Rochester IT
- New Mexico
- NMT
- Minnesota
- UC Berkeley
- Caltech
- UCLA
- West Virginia
- Rutgers
- +
- Naval RL
- Naval Obs.
- JPL & GSFC
- SETI