Women in Astronomy

Women in Astronomy Workshop 2011

Demographics

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Aims of the ASA WiA Chapter

- Primary goals:
  1. monitor the status of women working in Australian astronomy via collection of statistics
  2. recommend future actions that will improve the environment for all astronomers
- Assist the community to ensure appropriate representation for women at scientific meetings and on high-level decision making committees
- Organise annual meetings at ASM (+ workshops like this!)

More info: **http://asawomeninastronomy.org/**

(1) Why do we need demographic data?

- Often reported that:
  - number of women in astronomy positions is not increasing at a rate commensurate with the availability of qualified female students, and
  - that women are not represented at highest levels

    ➔ statistics will help back up these claims
- To monitor the status of women in astronomy we need the data to see temporal trends

(2) What data to we need?

- gender and status statistics within (astro) academia:
  - % of women students (undergrads & PhDs)
  - % of junior women (postdocs & contracts)
  - % of tenured women (years past PhD & status)
- gender & status within organisations (ASA, NCA, IAU…)
- visibility of women:
  - % high-level executive committees
  - % awards & prizes
  - % invited speakers
  - % grant recipients

(3) How do we collect the data?

- Overall statistics via decadal review
  (and within organisations – but generally private)
- Membership & visibility via societies
- Government reporting (grants)
- Surveys (nearly impossible!!)

True in Australia and internationally

(4) Some numbers….

- National Committee of Astronomy (NCA)
  - community stats via decal review data
- Astronomical Society of Australian (ASA)
  - membership stats and meeting data
- Australian Research Council (ARC)
  - grant success
- Federation of Australian Sci &Tech Societies (FASTS)
- CSIRO – Australia's government science organisation
- Plus international:
  - IAU, USA: NSF, AAS, APS, European Commission,…

Some NCA data

- Over decadal timescale (96 → 05) % women increasing:
  - 15% to 20% W academics
  - 20% to 41% W grad students
- But last 5 years (05 → 10) pretty flat:
  - 20% to 21.5% W academics
  - 41% to 40% W grad students
- In last 5 years, 28% increase in total number of astro position [with increase in contracts: 37% → 48%]

  ➔ is this steady state??

Some NCA data

- **Total staff:**

Year	Total (%W)	Permanent (%W)	Contract (%W)
2005	417.4 (19.7%)	262.5	154.0
2010	536.3 (21.5%)	275.4 (21.8%)	260.8 (21.2%)

- **PhD Students:**

Year	Total	Women
2005	157	41.4%
2010*	237	39.7%

* 2010 PhD data excludes overseas students enrolled in JCU's online doctoral program.

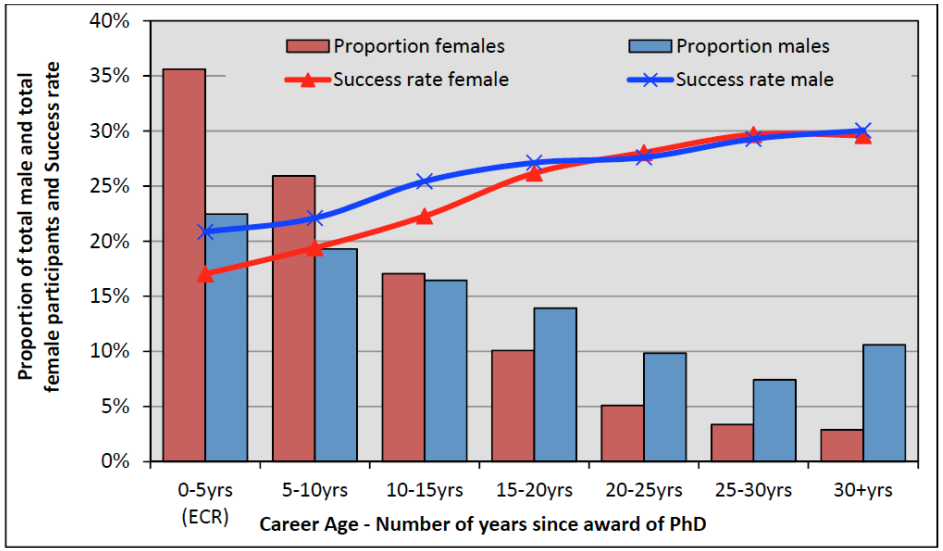
Some ASA data

Year	Total ASA members	% W of total	% students	% W stud	% W full
1995	282	14%	12%	27 %	14 %
2006	424	24%	29%	44%	18%
2009	489	21%	31%	34%	15%

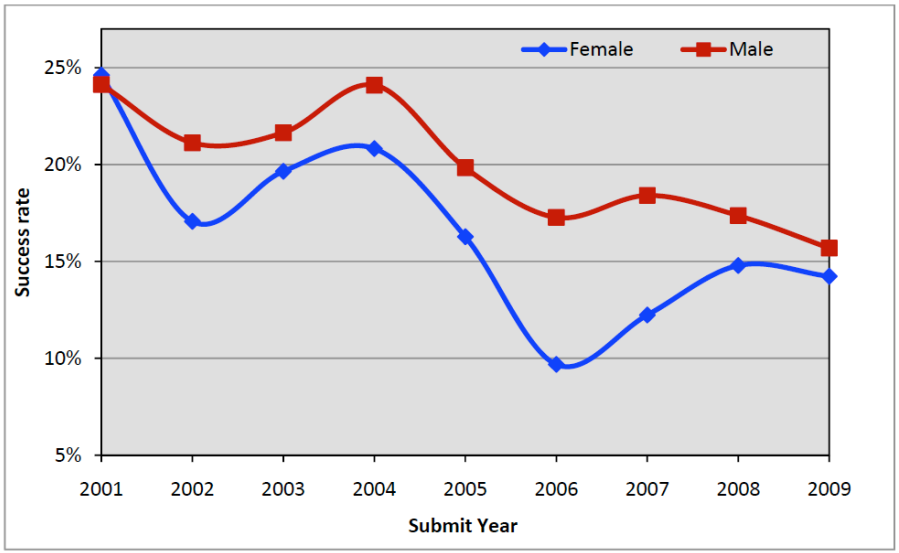
(Note that not all astronomers are members of the ASA!)

ARC DP grant success

(From 2010 ARC Discovery Project Consultation Paper)



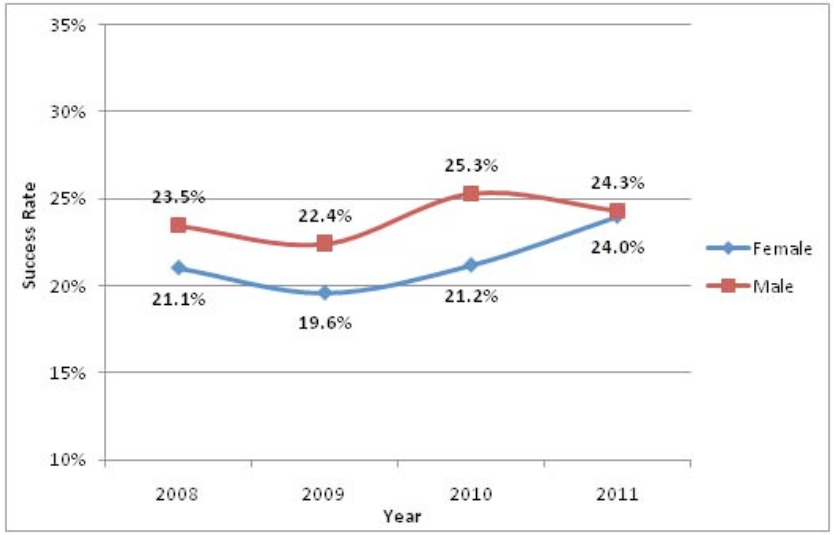
- Gender by career age (bar) and success rates (points) for ARC-DP (2004-2009)

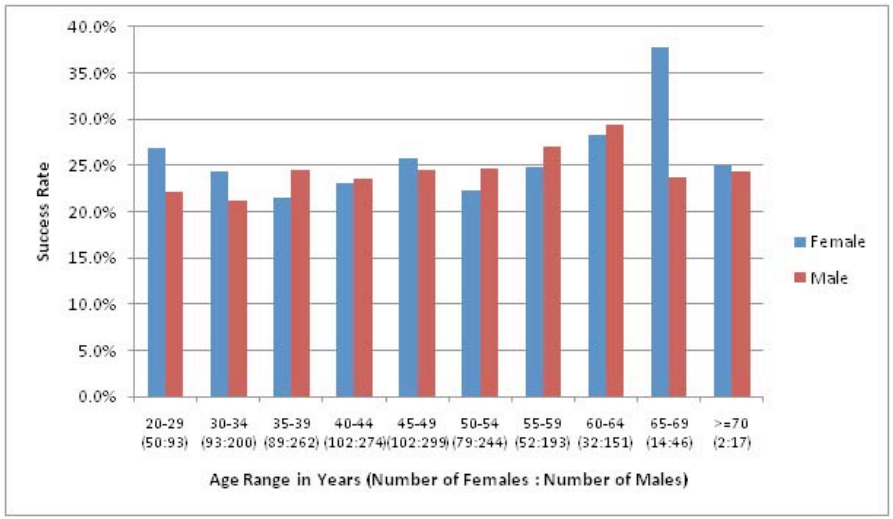


- Gender success rate of ECR-only ARC DP proposals (2001-2009)

ARC DP grant success

(From ARC website: *Discovery Projects Selection Report for Funding Commencing in 2011*)

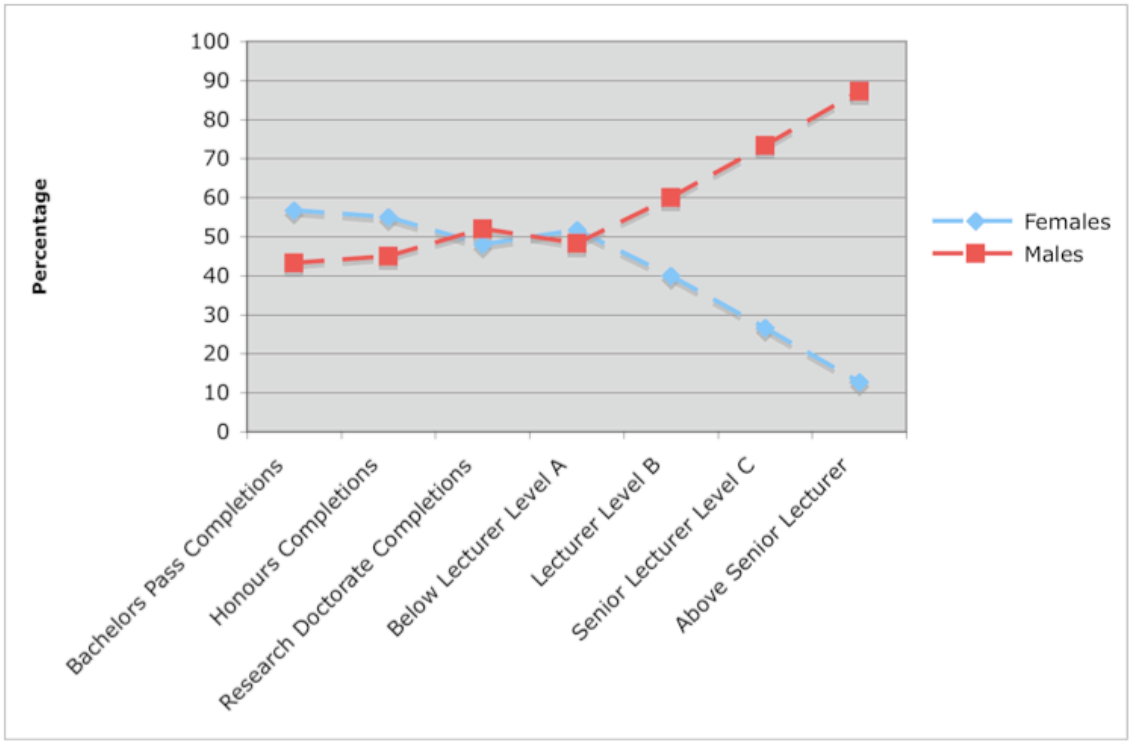




- Of the 753 ECRs nominated on ECR-only proposals, 33.5 % are female.
- Of the 95 participants on ECR-only proposals approved for funding, 40% female.
- Of the 1,389 nominated fellowship candidates, 31.2% are female.
- Of the 193 fellowship candidates approved for funding, 32.6% are female.

Some FASTS data

(From FASTS Report: *Women in Science in Australia: Maximising Productivity, Diversity and Innovation*, 2009)



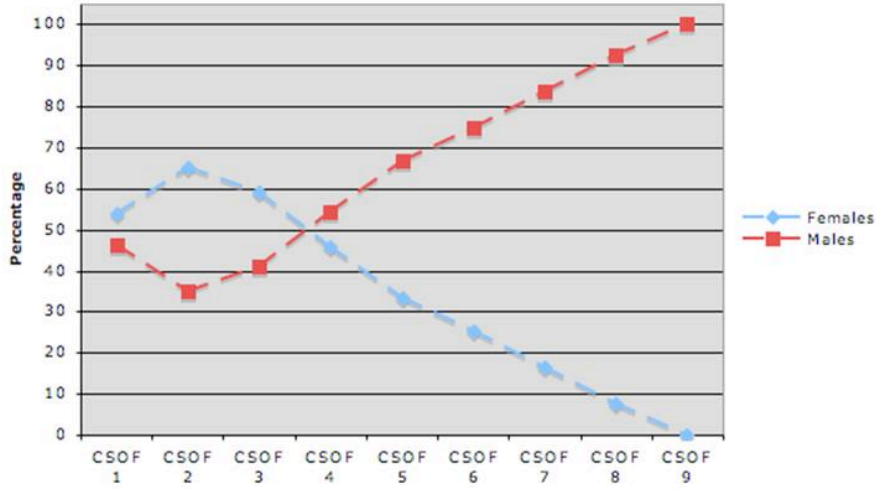
Academic Profiles by Gender - Natural and Physical sciences 2007
(DEEWR Selected Higher Education Student Statistics + DEST Special Report FTE Staff in AOU Groups 2007)

2007 snapshot data clearly indicates:

- relatively high levels of participation at undergraduate and post-graduate levels achieved
- but persistently low levels of representation of women at senior levels of the academy

Some CSIRO data

(From *Women in science at CSIRO,* excerpt from *2009: FASTS Women in Science in Australia: Maximising Productivity, Diversity and Innovation report.)*



Percentage of CSIRO women by CSOF level, from 2009 Annual Report

Summary: CSIRO has few women particularly in the higher levels and in the physical sciences across all levels.

- 38.5% women in CSIRO
- 8% of level 8 are female (was 4.5% ten years ago)
- at this rate, will ~60 years for % of women at Level 8 to equal % of CSIRO women (i.e. 38%)

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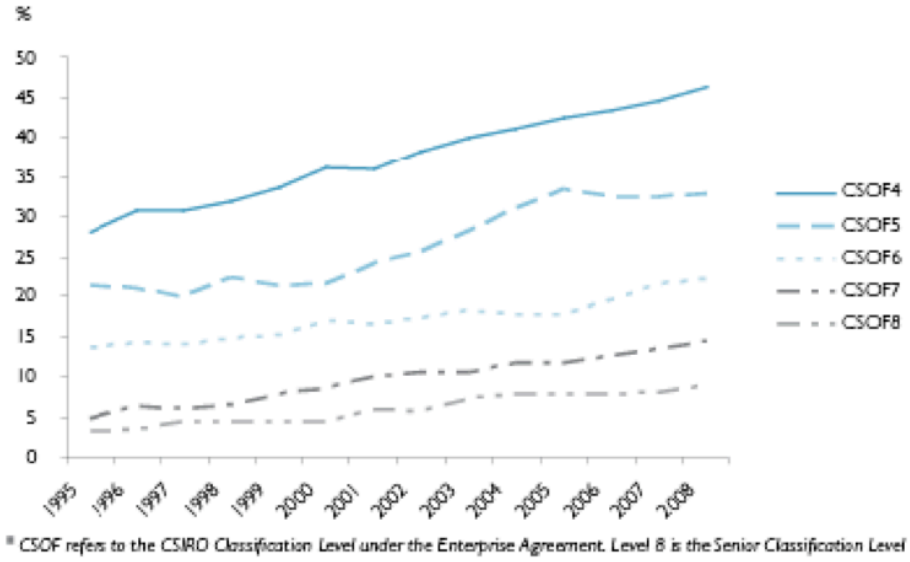

Figure 1.8 Percentage of Females by CSOF level 1995 - 2008
Source: CSIRO Annual Report 07/08

Percentage of CSIRO women by CSOF level from 1995 to 2008
(from 2009 Annual Report)

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Some USA data

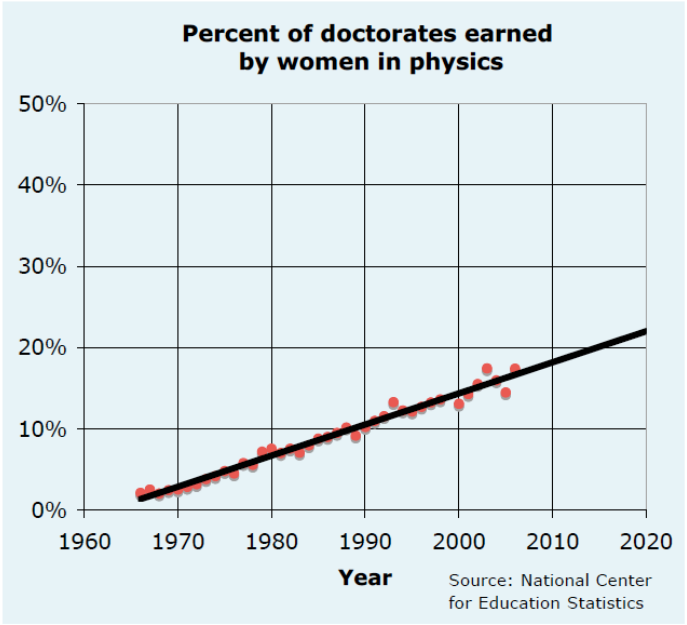


Figure 1. Fraction of physics PhD's earned by women showing a 0.4% annual increase[18]

(From American Physical Society *Gender Equity Report,* 2007)

Academic Rank	1994	1998	2002	2006
Full Prof	3%	3%	5%	6%
Assoc/Prof	8%	10%	11%	14%
Assist/Prof	12%	17%	16%	17%

Physics Faculty Positions Held by Women

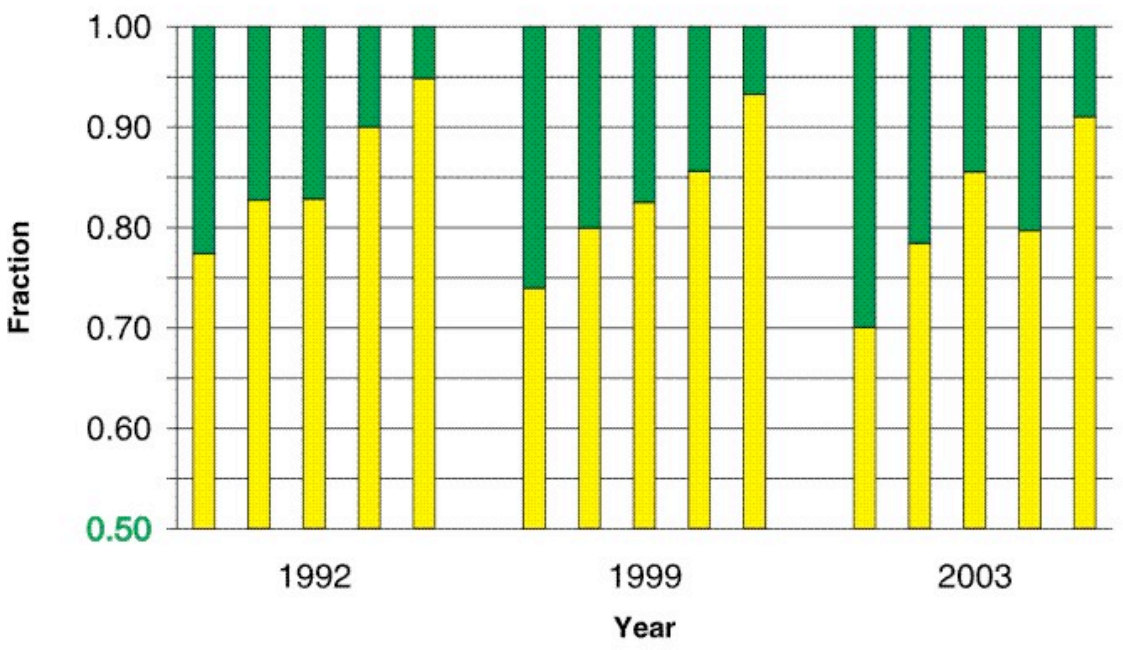
Discipline	Assist/ Prof	Assoc/ Prof	Full Prof	Other
Physics	17.5%	12.6%	6.8%	9.5%
Astronomy	25.3%	21.6%	12.3%	15.8%
Chemistry	21.7%	21.3%	9.7%	12.7%
Maths	28.0%	15.5%	7.2%	12.1%

Women's Faculty Positions by Discipline

Some USA data

(From AAS/CSWA *Survey of USA Astronomy, Hoffman & Kwitter*)

Fig. 2. Fraction of Astronomers by Gender and Rank



Left to right in each year: graduate students, postdocs, assistant professors, associate professors, and full professors. Note y-axis scale does not go to zero.

- US women astronomer: 25% of grad students, 15% of postdocs &A/Profs, and just 5% of Profs (Urry 2000)

Some USA data

(From *The Ongoing Demographic Shift in the AAS,* STATUS, Jan 2009)

Prize	Men		Women	
	As of 1990	Since 1991	As of 1990	Since 1991
Russell	41	11	2	2
Warner	38	17	1	1
Pierce	15	12	3	4
Tinsley	3	11	1	0
Heinman	10	19	1	0

Table 1: Prizes of the AAS through 2008

AAS members:
1973: 8%
1990: 12.6%
1995: 16.5%

Some European data

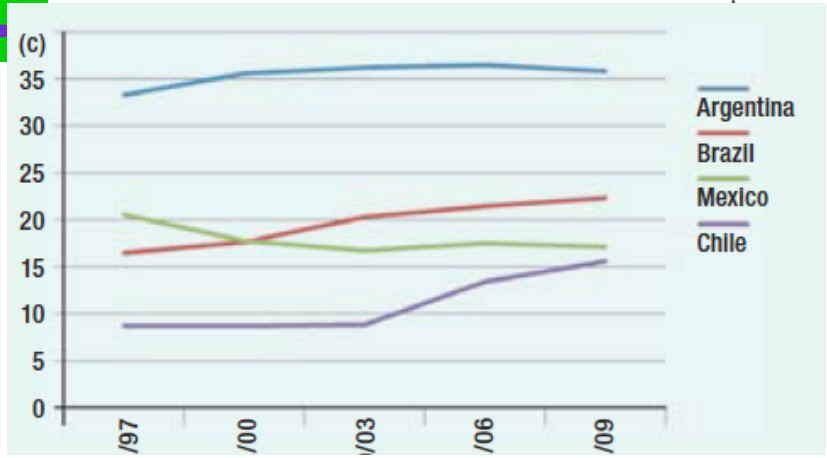
(IAU Women in Astronomy, Catherine Cesasky, 2009)

France:
- CNRS: 26% women
- CNRS medals: gold 0%, silver 14%, bronze 25%
- French Academy of Science: 10% women

European Southern Observatory (2005):
- 18.7% women staff
- 3.4% women top level

UK astro women:
- 22% postdocs
- 10% lecturers
- 4% profs

Some international data



IAU data…

Latin America
- Argentina – 35.8% women (cf. 35% tenure)
- Brazil – 25%

Asia
- Japan – 5.5%
- China – 15 % (cf. Chinese Astro Soc. 19.8% of N=2131)

USA
- 12% (N=2394, 25% of IAU membership)

(*IAU Women in Astronomy, Catherine Cesasky, 2009)*

(5) Plans for Future Data Collection

- NCA asks ASA to collect demographic data
  ➔ WiA Chapter to assist

"We recommend that the Astronomical Society of Australia (ASA) should oversee future demographic surveys, conduct these on a regular basis, and keep long-term records to allow for easier and more accurate tracking of demographic trends in the astronomy community."

(From NCA Mid-Term Review document)

Make sure we're consistent from now on!

(5) Plans for Future Data Collection

- NCA asks ASA to collect demographic data
  ➔ WiA Chapter to assist
- WiA Chapter to collect ASA AGM statistics:
  - gender stats of participants, speakers, invited speakers, LOC/SOC
- WiA Chapter to collate:
  - ASA prize winners
  - ASA Council members
  - ASA membership

See http://asawomeninastronomy.org/statistics/