

# Use of Telescope Statistics by Observatories

Publications, Citations, and the *H* Index

Uta Grothkopf, ESO Library

# Overview

- Telescope statistics
- Methods overview
- Introducing the  $h$  index in telescope stats
- Use of bibliometrics by observatories



# Telescope Statistics

- Publications, citations, bibliometric analyses
- Scientific impact of facilities
- Funding authorities
- Comparison with other facilities

# Common Methods of Evaluation

	Good	Bad
# Publications	productivity	no impact
# Citations	impact	can be inflated
“High-Impact Papers”	balanced	difficult to find



# New measure: $h$ index

- **Jorge E. Hirsch**, UC San Diego  
Proc. Nat. Acad. Sci. vol. 102, 16569 (2005)
- Aim: quantify an individual's scientific research output

# Definition

A researcher with **index  $h$**  has  $h$  papers with at least  $h$  citations.

**index  $h$**  = highest number of papers a scientist has that have each received at least that number of citations



# *h* index

50 papers, 30 have 30 or more citations  
each: *h* index = 30

How to find it:

- list of all papers
- ranked by citation count
- *h*: # citations = rank #

# Finding $h$ with the ADS

Smithsonian/NASA ADS Custom Query Form Fri Jun 16 14:55:21 2006

http://esoads.eso.org/abstract\_service.html

Smithsonian/NASA ADS Cu...

**Smithsonian/NASA ADS Astronomy Query Form for Thu Jan 1 01:00:00 1970**

[Sitemap](#) [What's New](#) [Feedback](#) [Preferences](#) [FAQ](#) [HELP](#)

myADS: We now provide a personalized notification service. Sign up at <http://myads.harvard.edu>

Send Query Return Query Form Store Default Form Clear

Databases to query: ☒ [Astronomy](#) ☐ [Physics](#) ☐ [arXiv e-prints](#)

**Authors:** (Last, First M, one per line) ☒ [SIMBAD](#) ☒ [NED](#) ☐ [LPI](#) ☐ [IAUC Objects](#)

☐ [Exact name matching](#) ☐ [Object name/position search](#)

☐ Require author for selection ☐ Require object for selection

( ☒ OR ☐ AND ☐ [simple logic](#) ) (Combine with: ☒ OR ☐ AND )

Rees, M

Publication Date between   and    
(MM) (YYYY) (MM) (YYYY)

Enter [Title Words](#) ☐ Require title for selection  
(Combine with: ☒ OR ☐ AND ☐ [simple logic](#) ☐ [boolean logic](#))

Enter [Abstract Words/Keywords](#) ☐ Require text for selection  
(Combine with: ☒ OR ☐ AND ☐ [simple logic](#) ☐ [boolean logic](#))

Return  items starting with number



# Finding $h$ with the ADS

Smithsonian/NASA ADS Custom Query Form Fri Jun 16 14:55:21 2006

http://esoads.eso.org/abstract\_service.html

Send Query Return Query Form Store Default Form Clear

## SORTING

- ☐ Sort by score
- ☐ Sort by [normalized score](#)
- ☒ Sort by citation count
- ☐ Sort by [normalized citation count](#)
- ☐ Sort by first author name
- ☐ Sort by date (most recent first)
- ☐ Sort by date (oldest first)
- ☐ Sort by entry date

## FORMAT

- ☐ HTML abstracts
- ☐ plain text abstracts
- ☐ BIBTEX reference list
- ☒ short list format
- ☐ generic tagged abstracts
- ☐ EndNote format
- ☐ ProCite format
- ☐ Refman format
- ☐ MEDLARS format
- ☐ Dublin Core XML
- ☐ XML abstracts
- ☐ XML references
- ☐ VOTables
- ☐ RSS
- ☐ AASTeX
- ☐ Icarus
- ☐ MNRAS
- ☐ SoPh
- ☐ Link
- ☐ Custom

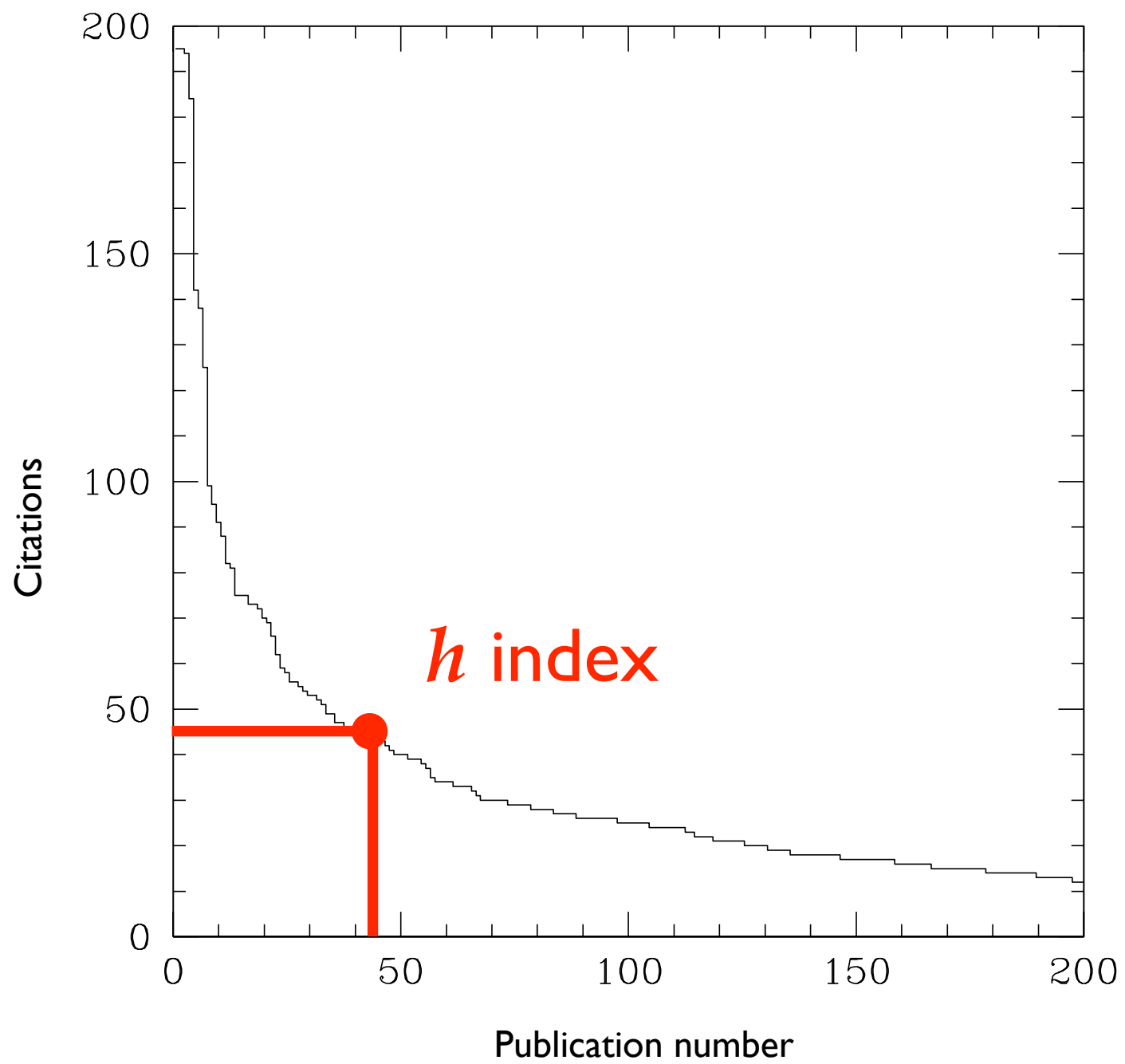
## SETTINGS

	Authors	Objects	Title	Abstract
<a href="#">Require Field for Selection</a>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<a href="#">Synonym Replacement</a>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

# Finding $h$ with the ADS

Author	Year	Journal	Volume	Page	Abstract	Full Text	References	Citations	Similar	Related
Miralda-Escude, Jordi; Rees, Martin J.	1997	ApJ	478	L57M	High-Redshift Supernovae and the Metal-poor Halo Stars: Signatures of the First Generation of Galaxies					
Penston, M. V.; Robinson, A.; Alloin, D.; Appenzeller, I.; Aretxaga, I.; Axon, D. J.; Baribaud, T.; Barthel, P.; Baum, S. A.; Boisson, C.; and 46 coauthors	1990	A&A	236	53P	The extended narrow line region of NGC 4151. I - Emission line ratios and their implications					
Kang, Hyesung; Shapiro, Paul R.; Fall, S. Michael; Rees, Martin J.	1990	ApJ	363	488K	Radiative shocks inside protogalaxies and the origin of globular clusters					
Rees, M. J.	1985	MNRAS	213	P.75R	Mechanisms for biased galaxy formation					
Begelman, Mitchell C.; Rees, Martin J.	1978	MNRAS	185	.847B	The fate of dense stellar systems					
Begelman, M. C.; Rees, M. J.; Blandford, R. D.	1979	Natur	279	.770B	A twin-jet model for radio trails					





# Common Methods of Evaluation

	Good	Bad
# Publications	productivity	no impact
# Citations	impact	can be inflated
“High-Impact Papers”	balanced	difficult to find
<i>h</i> index	productivity + impact	determined by years of operation



# Applying $h$ to observatories

## Methodology:

- collect papers that use VLT, La Silla, CFHT, HST, Keck, or Gemini data
- ESO papers: retrieve citations through ESO telescope bibliography
- others: feed bibcodes into ADS
- sort by descending citations
- find  $h$  index

# ESO Libraries homepage / ESO telescope bibliography

<http://www.eso.org/libraries/telbib.html>

ESO Telescope Bibliography


http://archive.eso.org/wdb/wdb/eso/publications/form


ESO Telescope Bibliography

## ESO Telescope Bibliography Query Form


[Libraries HOME](#) [Archive HOME](#) [ESO HOME](#) [search](#) [news](#)

### Description





The Telescope Bibliography is maintained by the ESO library. It contains refereed publications directly using ESO data. For more detailed information, please contact [esolib@eso.org](mailto:esolib@eso.org).



*The checkboxes in front of the parameters define whether or not they will be displayed on the query result page. For more detailed information on how to use this interface, follow the hyperlinked search option labels.*

[query Help](#)

### Bibliographic Information

[Author](#)..... :   
\* Replace diacritics (accent, Umlaut etc.) by asterisk (\*)

☒ [Title](#)..... :   
\* Title words are automatically combined by AND in the order entered

☒ [Journal](#)..... :    
☒ [Vol.](#)



# ESO Libraries homepage / ESO telescope bibliography

<http://www.eso.org/libraries/telbib.html>

ESO Telescope Bibliography

http://archive.eso.org/wdb/wdb/eso/publications/form

ESO Telescope Bibliography

## Observation Information

*\* Select matching Site--Telescope--Instrument or choose Any*

☐ Site / Archive..... : Any  
*\* Pre-2002 La Silla archive papers cannot be combined with specific instruments*

☐ Telescope(s)..... : La Silla -- 3.6m  
*\* Paranal telescopes from 1999 onwards*  
*\* La Silla telescopes from 1996 onwards*

☒ Instrument(s)..... : Any  
*\* Paranal instruments from 1999 onwards*  
*\* La Silla instruments from 2002 onwards*

☒ Program ID(s)..... :  
*\* Paranal Program IDs from 1999 onwards*  
*\* La Silla Program IDs from 2004 onwards*

## Display Options

Order by Author / Public.year / Journal/Vol.

☐ Use tabular output even if only one row is returned.  
☐ Use full-screen output even if more than one row is returned.  
☐ Format results in plain text only (without HTML tables).

Return max 500 rows.

Search ShowAll Default ShowNone

[query Help](#)

# ESO telescope bibliography, librarians' interface

ga004109.ads.eso.org

European Southern Observatory Bibliography

File Papers Window Tools Help

Search Dialog

Advanced Search Wizard

Bibliographic Data Telescope/Instrument Information ESO Program Information Data Entry Information

Instrument Search Logic

Search Results: 36 Papers Found.

ESO Key	Full Citation	Citations
BOUC	Bouchy, F.; Pont, F.; Santos, N. C.; Melo, C.; Mayor, M.; Queloz, D.; Udry, S.; Two new "very hot Ju...	99
PONT	Pont, F.; Bouchy, F.; Queloz, D.; Santos, N. C.; Melo, C.; Mayor, M.; Udry, S.; The "missing link": A 4...	66
KONA	Konacki, Maciej; Torres, Guillermo; Sasselov, Dimitar D.; Jha, Saurabh; A Transiting Extrasolar Giant ...	42
BOUC	Bouchy, F.; Pont, F.; Melo, C.; Santos, N. C.; Mayor, M.; Queloz, D.; Udry, S.; Doppler follow-up of O...	34
PIOT	Piotto, Giampaolo; Villanova, Sandro; Radin, Luigi R.; Gratton, Raffaele; Cacciari, Santi; Momany, Yaza...	31
TOLS	Tolstoy, Eline; Irwin	30
ARNA	Amaboldi, Magda	18
PONT	Pont, F.; Bouchy, F.	17
PONT	Pont, F.; Melo, C. I	16
CARR	Carretta, Eugenio	15
CARR	Carretta, E.; Braga	13
BAST	Bastian, N.; Saglia	11
PRAC	Pracy, Michael B.	10
FLOR	Flores, H.; Puech	9
SBOR	Sbordone, L.; Boni	9
EVAN	Evans, C. J.; Smar	8
CACC	Cacciari, C.; Braga	7
KOCH	Koch, Andreas; Gr	7
PALL	Palla, Francesco; I	6
MONA	Monaco, L.; Bellaz	6
JEFF	Jeffries, R. D.; Oliv	5

Citation Statistics

Number of papers in sample: 36

Minimum number of citations: 0

Average number of citations: 13.58

Standard Deviation: 20.06

Median number of citations: 6.50

Maximum number of citations: 99

Total number of citations: 489

Close

Close

Exit < Back Retrieve Next >



# ADS: HST, CFHT

Smithsonian/NASA ADS Custom Query Form Mon Aug 28 09:36:05 2006

http://esoads.eso.org/abstract\_service.html

Google

ESO Telescope Bibliogra... Smithsonian/NASA ADS ...

## FILTERS

Select References From:

- ☒ [All bibliographic sources](#)
- ☐ [All refereed articles](#)
- ☐ [All non-refereed publications](#)

Select/deselect publications:  (',' separated list)

Select References With:

- ☒ A bibliographic entry
- ☐ At least one of the following (OR):
- ☐ All of the following (AND):
- ☐ None of the following (NOT):

<input type="checkbox"/> Abstracts	<input type="checkbox"/> Data Links	
<input type="checkbox"/> Full Text Articles	<input type="checkbox"/> Scanned Articles	<input type="checkbox"/> Electronic Articles
<input type="checkbox"/> arXiv e-print	<input type="checkbox"/> Table of Contents	<input type="checkbox"/> Mail Order Links
<input type="checkbox"/> References	<input type="checkbox"/> Citations	<input type="checkbox"/> Other related articles
<input type="checkbox"/> SIMBAD Objects	<input type="checkbox"/> NED Objects	<input type="checkbox"/> PDS Information
<input type="checkbox"/> Author Comments	<input type="checkbox"/> Library Links	<input type="checkbox"/> Also-read
<input type="checkbox"/> Multimedia	<input type="checkbox"/> HEP/SPIRES Links	

Select References In:

- ☐ All Groups
- ☐ At least one of the following groups (OR):
- ☒ All of the following groups (AND):

<input type="checkbox"/> <a href="#">ARI</a>	<input type="checkbox"/> <a href="#">CfA</a>	<input checked="" type="checkbox"/> <a href="#">CFHT</a>	<input type="checkbox"/> <a href="#">Chandra</a>
<input type="checkbox"/> <a href="#">ESO/LA</a>	<input type="checkbox"/> <a href="#">ESO/Telescopes</a>	<input type="checkbox"/> <a href="#">Gemini</a>	<input type="checkbox"/> <a href="#">Helioseismology</a>
<input checked="" type="checkbox"/> <a href="#">HST</a>	<input type="checkbox"/> <a href="#">ISO</a>	<input type="checkbox"/> <a href="#">IUE</a>	<input type="checkbox"/> <a href="#">Leiden</a>
<input type="checkbox"/> <a href="#">LPI</a>	<input type="checkbox"/> <a href="#">NCSA/ADIL</a>	<input type="checkbox"/> <a href="#">ROSAT</a>	<input type="checkbox"/> <a href="#">USNO</a>
<input type="checkbox"/> <a href="#">VSGC</a>	<input type="checkbox"/> <a href="#">XMM</a>		

Entry Date:

# ADS: ESO – no search on telescopes or instruments

Smithsonian/NASA ADS Custom Query Form Mon Aug 28 09:36:05 2006

http://esoads.eso.org/abstract\_service.html

Google

ESO Telescope Bibliogra... Smithsonian/NASA ADS ...

## FILTERS

Select References From:

- ☒ [All bibliographic sources](#)
- ☐ [All refereed articles](#)
- ☐ [All non-refereed publications](#)

Select/deselect publications:  (',' separated list)

Select References With:

- ☒ A bibliographic entry
- ☐ At least one of the following (OR):
- ☐ All of the following (AND):
- ☐ None of the following (NOT):

<input type="checkbox"/> Abstracts	<input type="checkbox"/> Data Links	
<input type="checkbox"/> Full Text Articles	<input type="checkbox"/> Scanned Articles	<input type="checkbox"/> Electronic Articles
<input type="checkbox"/> arXiv e-print	<input type="checkbox"/> Table of Contents	<input type="checkbox"/> Mail Order Links
<input type="checkbox"/> References	<input type="checkbox"/> Citations	<input type="checkbox"/> Other related articles
<input type="checkbox"/> SIMBAD Objects	<input type="checkbox"/> NED Objects	<input type="checkbox"/> PDS Information
<input type="checkbox"/> Author Comments	<input type="checkbox"/> Library Links	<input type="checkbox"/> Also-read
<input type="checkbox"/> Multimedia	<input type="checkbox"/> HEP/SPIRES Links	

Select References In:

- ☐ All Groups
- ☐ At least one of the following groups (OR):
- ☒ All of the following groups (AND):

<input type="checkbox"/> <a href="#">ARI</a>	<input type="checkbox"/> <a href="#">CFHT</a>	<input type="checkbox"/> <a href="#">Chandra</a>
<input type="checkbox"/> <a href="#">ESO/Lib</a>	<input type="checkbox"/> <a href="#">Gemini</a>	<input type="checkbox"/> <a href="#">Helioseismology</a>
<input checked="" type="checkbox"/> <a href="#">HST</a>	<input type="checkbox"/> <a href="#">IUE</a>	<input type="checkbox"/> <a href="#">Leiden</a>
<input type="checkbox"/> <a href="#">LPI</a>	<input type="checkbox"/> <a href="#">ROSAT</a>	<input type="checkbox"/> <a href="#">USNO</a>
<input type="checkbox"/> <a href="#">VSGC</a>		

Entry Date:



# Our Sample

Telescope bibliographies made available by observatories

CFHT	1980 - 2005
HST	1991 - 2005
Keck	1996 - 2005
La Silla	1996 - 2005
VLT	1999 - 2005
Gemini	2000 - 2005

# Comparisons

- **Beware!**

Telescope statistics are **NEVER** totally comparable

## Procedures

- **criteria** for paper selection not uniform
- **methodologies** for building telescope bibliographies vary

## Telescopes

- **ground-based / space-based** observatories
- different **apertures**, different **wavelengths**



# *h* index

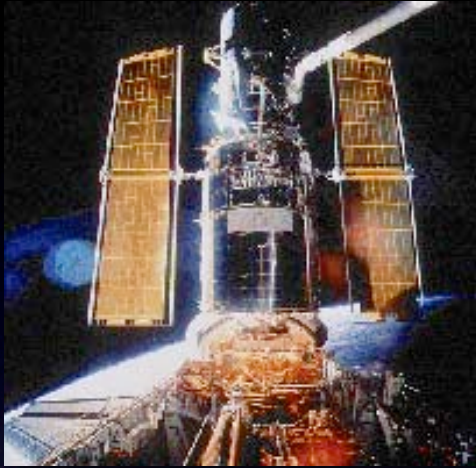
		<i>h</i> index
CFHT	1980 - 2005	94
HST	1991 - 2005	131
Keck	1996 - 2005	105
La Silla	1996 - 2005	89
VLT	1999 - 2005	69
Gemini	2000 - 2005	26

# *h* index





# Timeline (of our sample)



1980  
CFHT

1991  
HST

1996  
Keck  
La Silla

1999  
VLT

2000  
Gemini

# Parameter $m$

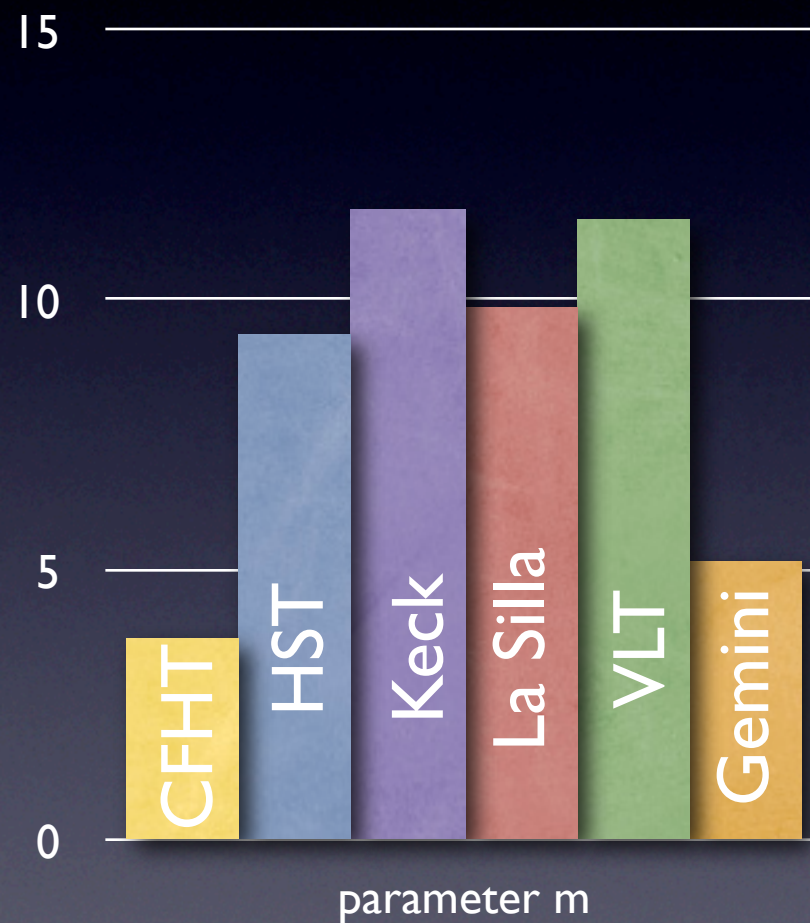
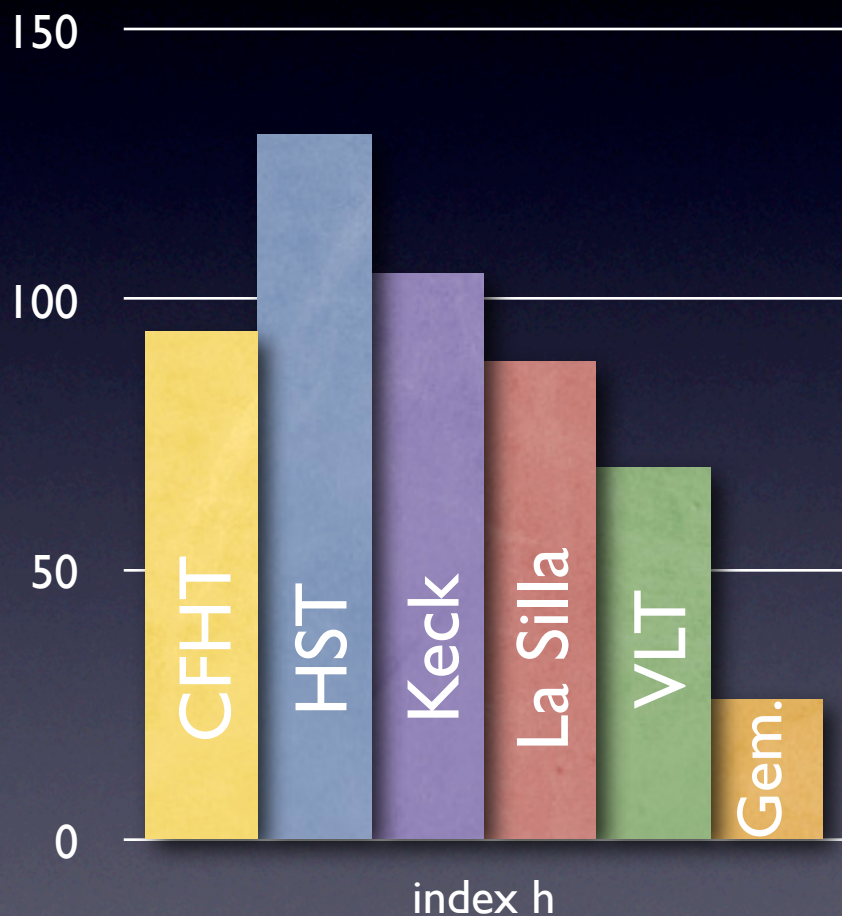
- $m = h$  divided by number of years of operation (Hirsch 2005)
- $h$  index 20 after 20 years  $\rightarrow m = 1$   
 $h$  index 40 after 20 years  $\rightarrow m = 2$



# Years since first paper / $h$ / $m$

		Years since first paper	$h$	$m$
CFHT	1980 - 2005	25	94	3.76
HST	1991 - 2005	14	131	9.36
Keck	1996 - 2005	9	105	11.67
La Silla	1996 - 2005	9	89	9.89
VLT	1999 - 2005	6	69	11.5
Gemini	2000 - 2005	5	26	5.2

# *h* and *m* since first paper



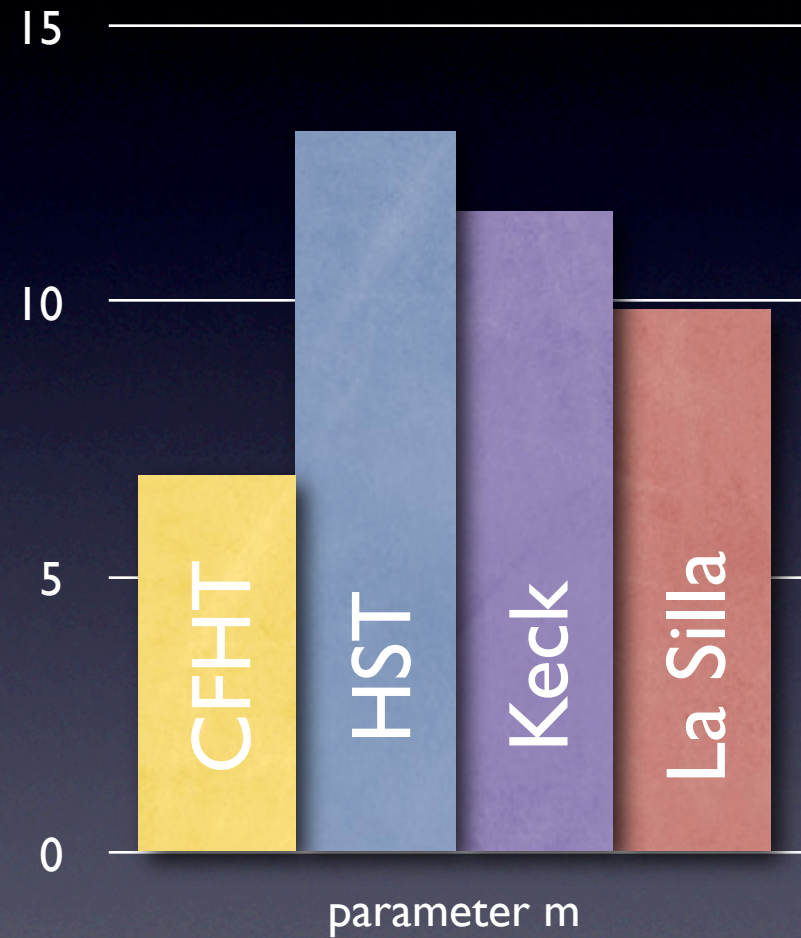
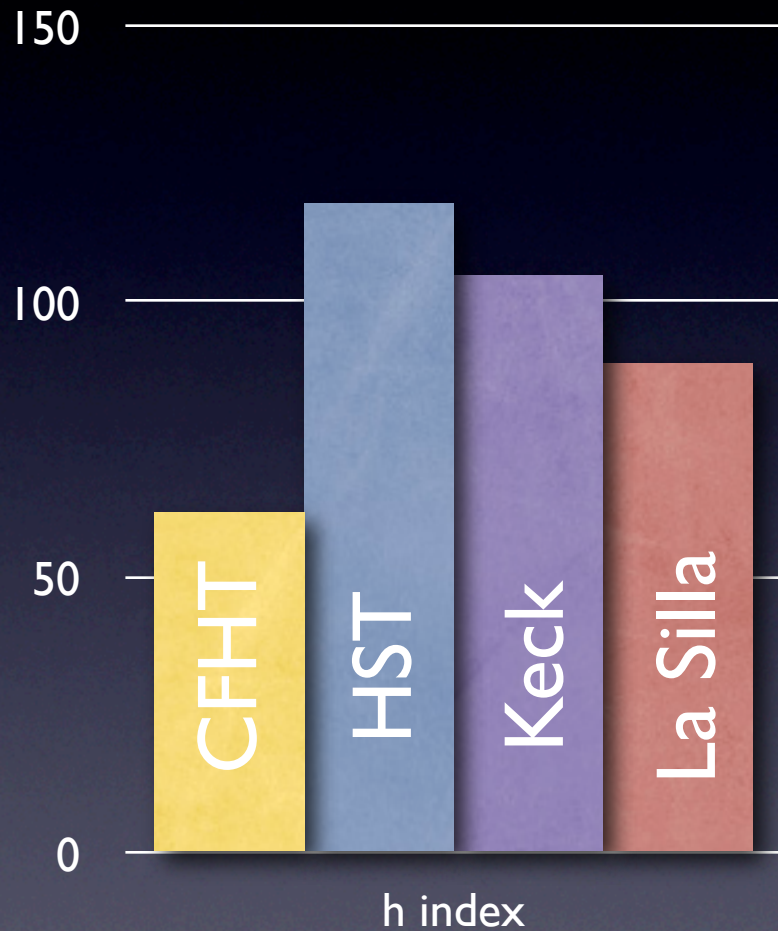


# 1996 - 2005 / *h* / *m*

		# years	<i>h</i>	<i>m</i>
CFHT	1996 - 2005	9	62	6.89
HST	1996 - 2005	9	118	13.11
Keck	1996 - 2005	9	105	11.67
La Silla	1996 - 2005	9	89	9.89



# *h* and *m* 1996 - 2005



# Conclusions *h* index

- Advantages of *h* index:
  - combines productivity and impact
  - (relatively) easy to find using the ADS
  - not sensitive to extreme values
- Disadvantages:
  - determined by # years of operation
  - needs to be combined with *m* for comparison



# Telescope Statistics Questionnaire

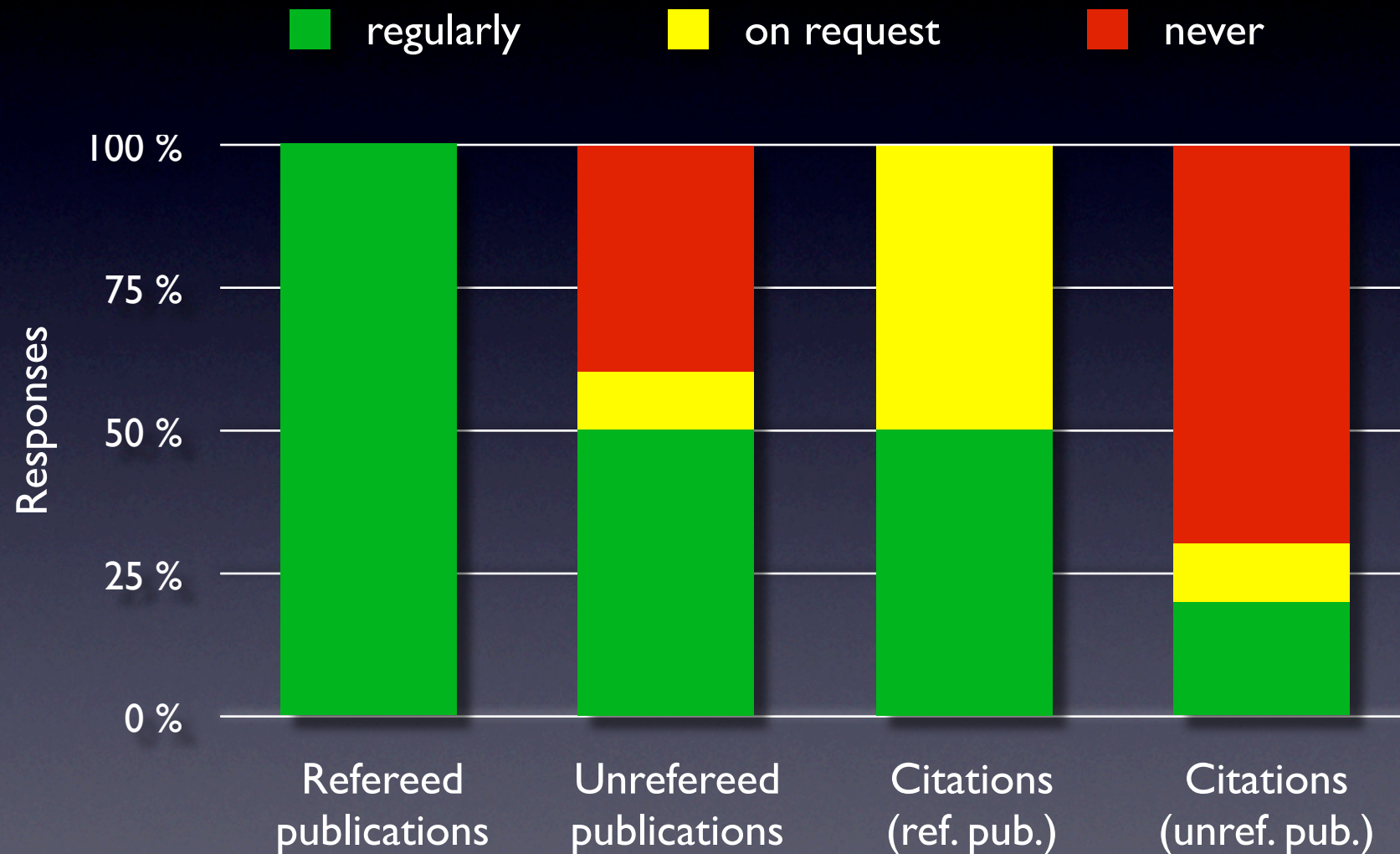
- Use of statistics by observatories
- <http://www.eso.org/libraries/telstats-questionnaire.html>
- Results:
  - CFHT, Gemini, ING, Keck, NRAO, Subaru, (ESO)
  - Chandra, HST, XMM Newton

# Who compiles the bibliography and derives statistics?

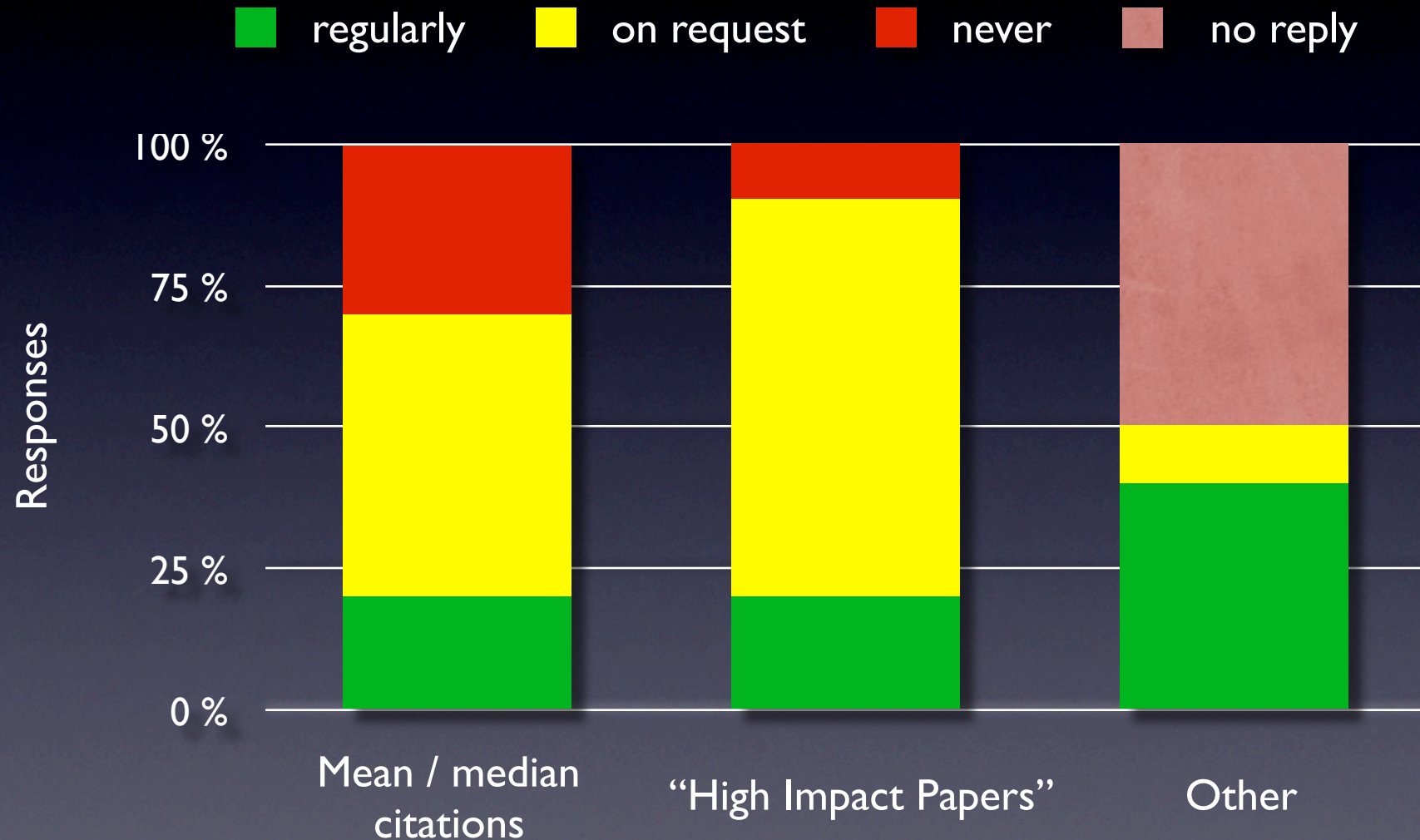
Librarians (occasional help from astronomers)	ESO, Gemini, NRAO
Data archive specialists	Chandra
Team of librarians, secretary, astronomers	CFHT, HST, ING, Keck, Subaru, XMM



# Which Statistics? How often?



# Mean/median Cites – “HIP” – Others

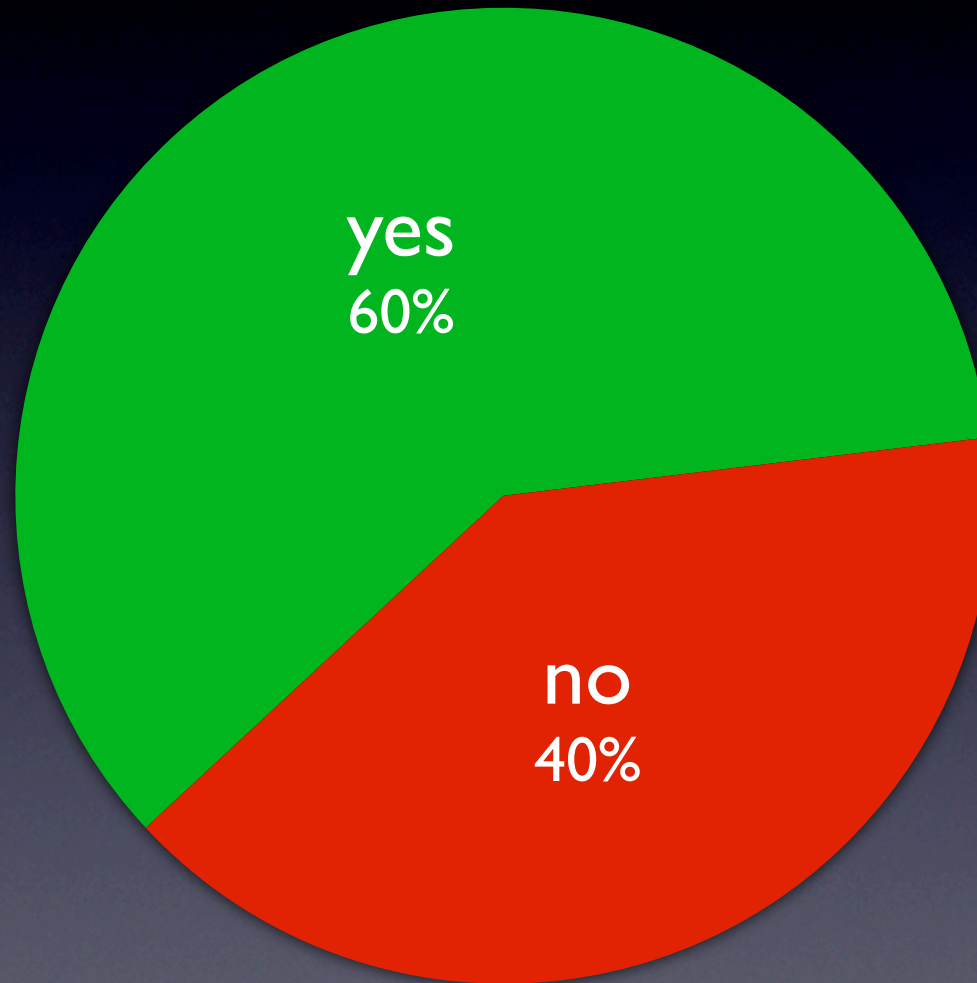




# Which other Statistics?

Average	Publications / citations per... instrument, program type, cycle, orbit etc.
Ranking	Most productive... instrument, program, individual author etc.
“HIP”	across observatories: STScI
<i>h</i> index	internally: ESO across observatories: ESO+STScI (LISA proc.)

# Comparisons with other Observatories?





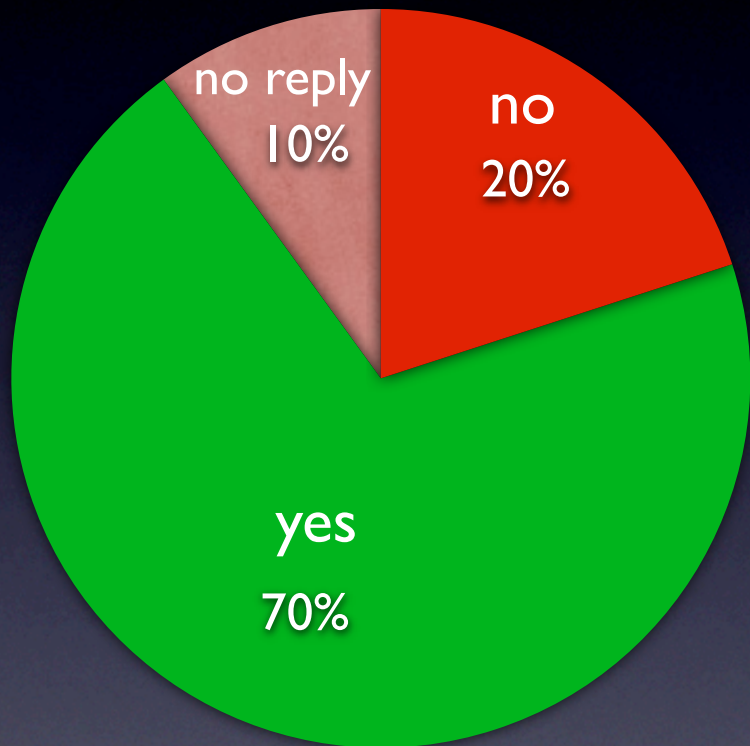
# Facility/data set identifiers helpful?

- *Yes, but...*

...only if used widely and reliably

- Incentives for authors
- Mandatory use

# Centralized compilation?



## By whom?

- CDS, “Worldwide VO”, IAU...
- not one single institution
- decentralized team



# Bibliographies publicly available?

- Dedicated **webpage** or through **ADS (Filter)**
- Collection of publication lists at ESO Library

# ESO Libraries homepage / Other telescope bibliographies

<http://www.eso.org/libraries/publicationlists.html>

Telescope bibliographies

http://www.eso.org/gen-fac/libraries/publicationlists.html

Google

ESO Telescope Bibliogra... Telescope bibliographies



## Telescope Bibliographies

[HOME](#) [INDEX](#) [SEARCH](#) [HELP](#) [NEWS](#)

**Please note**  
This page contains links to various telescope bibliographies. They are **not meant for direct comparison** as the criteria for inclusion of papers and the methodology of compiling the lists vary.

### Ground-based Observatories



[Canada-France-Hawaii Telescope \(CFHT\)](#)  
▶ [CFHT Refereed Publications](#) (via ADS; select References in: CFHT)



[European Southern Observatory \(ESO\)](#)  
▶ [VLT \(Very Large Telescope\) and La Silla Observatory Bibliography](#)



[Gemini Observatory](#)  
▶ [Publications arising from Gemini data](#)  
▶ [Gemini Publications by Users](#)  
▶ [U.S. Gemini publications \(via NOAO Gemini Science Center\)](#)



[Instituto de Astrofísica de Canarias \(IAC\)](#)  
▶ [Investigación Astrofísica / Resultados y Publicaciones](#)  
▶ [Producción científica 1961 - 2003](#)  
▶ [The impact of the ING science](#)



[Keck Observatory](#)  
▶ [Keck Science Bibliographies](#)

Open "http://archive.eso.org/wdb/wdb/eso/publications/form" in a new tab behind the current one



# ESO Libraries homepage / Other telescope bibliographies










<http://www.eso.org/libraries/publicationlists.html>

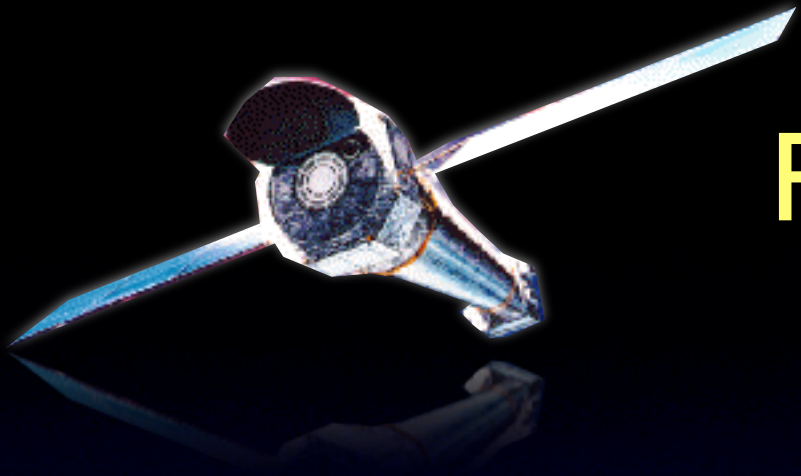
Telescope bibliographies

<http://www.eso.org/gen-fac/libraries/publicationlists.html> Google

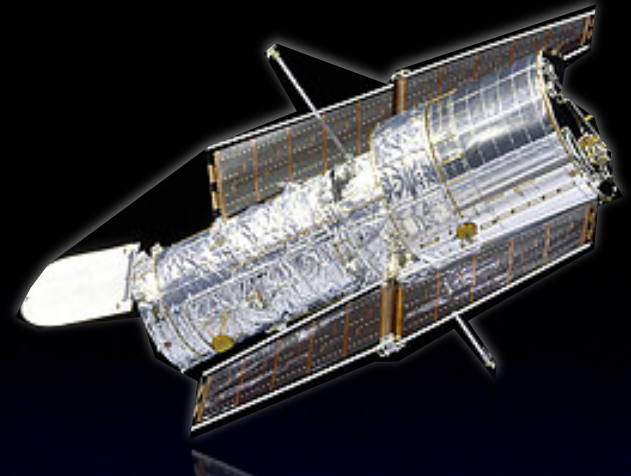
ESO Telescope Bibliogra... Telescope bibliographies

## Space-based Observatories

-  **[ASCA \(Advanced Satellite for Cosmology and Astrophysics\)](#)**
  - ▶ [HEASARC Bibliographic Code Status](#) (NASA's HEASARC:Archive)
  - ▶ [ASCA Bibliographies](#)
-  **[Chandra](#)**
  - ▶ [Chandra Bibliography Search](#)
  - ▶ [Chandra Bibliographic Statistics](#)
-  **[FUSE \(Far Ultraviolet Spectroscopic Explorer\)](#)**
  - ▶ [FUSE Publications](#)
-  **[HST \(Hubble Space Telescope\)](#)**
  - ▶ [HST Bibliography](#) (STEPsheets, maintained by the library)
  - ▶ [HST/MAST Bibliography](#) (via ADS, activate Filter "Select References In: HST")
-  **[ISO \(Infrared Space Observatory\)](#)**
  - ▶ [Scientific Publications](#)
-  **[IUE \(International Ultraviolet Explorer\)](#)**
  - ▶ [IUE Scientific Publications 1978 - 2001](#)
-  **[ROSAT](#)**
  - ▶ [HEASARC Bibliographic Code Status](#) (NASA's HEASARC:Archive)
  - ▶ [ROSAT Bibliography](#)
-  **[RXTE](#)**
  - ▶ [HEASARC Bibliographic Code Status](#) (NASA's HEASARC:Archive)
-  **[XMM-Newton \(X-ray Multi-Mirror\)](#)**
  - ▶ [HEASARC Bibliographic Code Status](#) (NASA's HEASARC:Archive)
  - ▶ [XMM-Newton in the Journals](#) (by author and subject)



# Prospects



- Better coordination of selection criteria and methodologies
- Meeting ?

