

IDA impact analysis of NOT science (7 Nov 2006)

Background

An important task of the Instrument Center for Danish Astrophysics (IDA) is to monitor and optimize the Danish use of international astronomical facilities.

In preparation for the NOT Strategy Meeting 8–10 Nov 2006 in Copenhagen, IDA has conducted a bibliographic analysis of publications arising from NOT observations.

The purpose of this study is to compare the impact of NOT to other major observatories and to assess the competitiveness of the Danish community in using the NOT.

Upon request in late October 2006, the NOT Director swiftly provided ADS bibcodes for all publications listed on the NOT web page containing the NOT publication list. All publications listed on the NOT web page now contain links to the ADS for each publication.

The database

As of 28 Oct 2006 there are 700 publications listed covering the time span 1990 to 2006. The database is available here:

http://cdsads.u-strasbg.fr/cgi-bin/nph-abs_connect?library&libname=NOT&libid=446cbbdbaf

The total number of citations to these 700 papers are 12861. By far the highest cited papers (about 500 each) are the Supernova Cosmology Project paper on the first 7 supernovae (Perlmutter et al., co-author Goobar (S)) and the discovery paper on the optical afterglow of a gamma-ray burst (van Paradijs et al., co-authors Pedersen, Nørgaard-Nielsen, Linden-Vørnle (DK)). None of these papers however featured the NOT as an essential contributor to the datasets gathered.

h-index

The *h*-index (Hirsch, *PNAS* **102**, 16569, 2005; physics/0508025; http://en.wikipedia.org/wiki/Hirsch_number) is defined as an author's number of papers with more than *h* citations. It has recently been introduced as a superior way of quantifying an author's impact (e.g., as compared to the ISI counts of papers, citations, and impact). The *h*-index can also be used to quantify telescope impact (Grothkopf & Stevens-Rayburn, astro-ph/0610274).

For the NOT the *h*-index is 48 for the period 1990–2005. The *m*-index (defined as *h* divided by the number of years) is $48/15 = 3.2$. For computation of the *h*-index we can study other periods of time. We here always take 2005 as the end year. Representative values for different start years are given below

<i>Start year</i>	<i>h</i>	<i>m</i>
1990	48	3.2
1996	45	5.0
1999	39	6.5
2000	36	7.2

Clearly, NOT has an increasing m value with time which means that the general impact of NOT publications is increasing with time.

We may compare NOT to other facilities. The values for VLT (1999) are $h=69$ ($m=11.5$) and for Gemini $h=26$ ($m=5.2$). The VLT has a much larger impact, but remarkably, NOT is competitive with Gemini.

For other facilities the statistics is for 1996–2005:

<i>Telescope</i>	<i>h</i>	<i>m</i>
NOT	45	5.0
CFHT	62	6.9
Keck	105	11.7
HST	118	13.1

2000 – 2005

We have conducted a more detailed analysis of a subset of the database.

1. We limit the period to 2000–2005. The motivation for this is (i) to get a more recent snapshot, (ii) to get a more manageable data set, (iii) to study the period since the last 'The NOT in the 2000's' meeting and (iv) for ease of comparison with other facilities.
2. We study the highest cited papers that essentially contribute to the h and m index. This limits the number of papers that need to be scrutinized and gives a useful impression of what kind of high-impact science is done at the NOT. We perform statistics on the top h papers, which corresponds roughly to the top 10 % papers, only.
3. We prune the list for papers that actually do not report NOT data (but e.g. refer to other papers published or in press) or only show e.g. an image of a field for illustration while the rest of the paper does not rely on this and the NOT data are not described in any detail. We only prune the highest cited papers. This procedure is obviously somewhat subjective. We do not add missing papers to the lists, even if identified.

The pruned 2000–2005 database is available here:

http://cdsads.u-strasbg.fr/cgi-bin/nph-abs_connect?library&libname=NOT-pruned&libid=446cbbdbaf

With this limited high-impact list we study h and m index compared to other telescopes. We also study the distribution of first-author papers depending on national affiliation or citizenship within the Nordic countries (highest ranked paper, number of papers on the list).

The h -index in the pruned list is 33 ($m=33/5=6.6$), down from 36 in the non-pruned list, so not strongly affected by the pruning. We have obtained statistics from Uta Grothkopf at the ESO library (as of Nov 4 2006) for comparison:

<i>Telescope</i>	<i>h</i>	<i>m</i>
NOT	33	6.6
VLT	74	14.8
Keck	84	16.8
Gemini	29	5.8

We next classify publications according to first author affiliation or nationality. Below we list the number of papers of the 33 according to these:

<i>Country</i>	<i>Number according to affiliation</i>	<i>Number according to nationality</i>
DK	8	7
S	3	2
N	2	4
FIN	0	0
IS	0	0

We also study the highest ranked papers:

According to first author affiliation

<i>Country</i>	<i>Original rank</i>	<i>Pruned rank</i>	<i>Citations</i>	<i>Author</i>
DK	2	1	101	Jensen
S	30	19	40	Wold
N	33	22	38	Jaunsen
IS	59	45	30	Björnsson
FIN	61	47	30	Pursimo

According to first author citizenship

<i>Country</i>	<i>Original rank</i>	<i>Pruned rank</i>	<i>Citations</i>	<i>Author</i>
DK	2	1	101	Jensen
S	46	32	34	Sollerman
N		15	41	Burud
IS	52	40	32	Jakobsson
FIN	61	47	30	Pursimo

How about co-authorship? In this study we have not counted the number of top h papers each country had an affiliated co-author contributing to, but it is in principle straightforward to do.

We conclude, that whether we study highest cited or the number of top h papers, DK is doing very well compared to the other Nordic countries.

2006

Finally, we have obtained a very recent snapshot by studying the published 2006 papers. At the time of writing there are 34 papers with a total of 114 citations. The

h -index is 5. The top 5 papers have 81 citations alone and all report various aspects of the GRB phenomenon. 3 of them are led by scientists affiliated to the Dark Cosmology Centre (DARK) in Copenhagen and all have DARK co-authors.

Conclusions

We do not pretend that this study provides the full picture. One might well question the exclusive focus on high-impact (large h -index) papers. Also, this is looking at the past which need not be relevant for the future. This said, we note that

many papers with many citations often include very little data from the NOT, and probably not from approved programs but rather obtained as favors from others or as part of other programs.

a very large fraction of the high-impact papers are based on TOO, monitoring, or short exposure observations.

almost all Nordic led high-impact papers are led by authors currently affiliated to or associated with DARK

high-impact papers are in extragalactic astronomy and cosmology and high-energy astrophysics

there is clear evidence (but not quantified in this context) that the highest cited papers are more frequently posted to astro-ph