Online analysis of visual meteor data

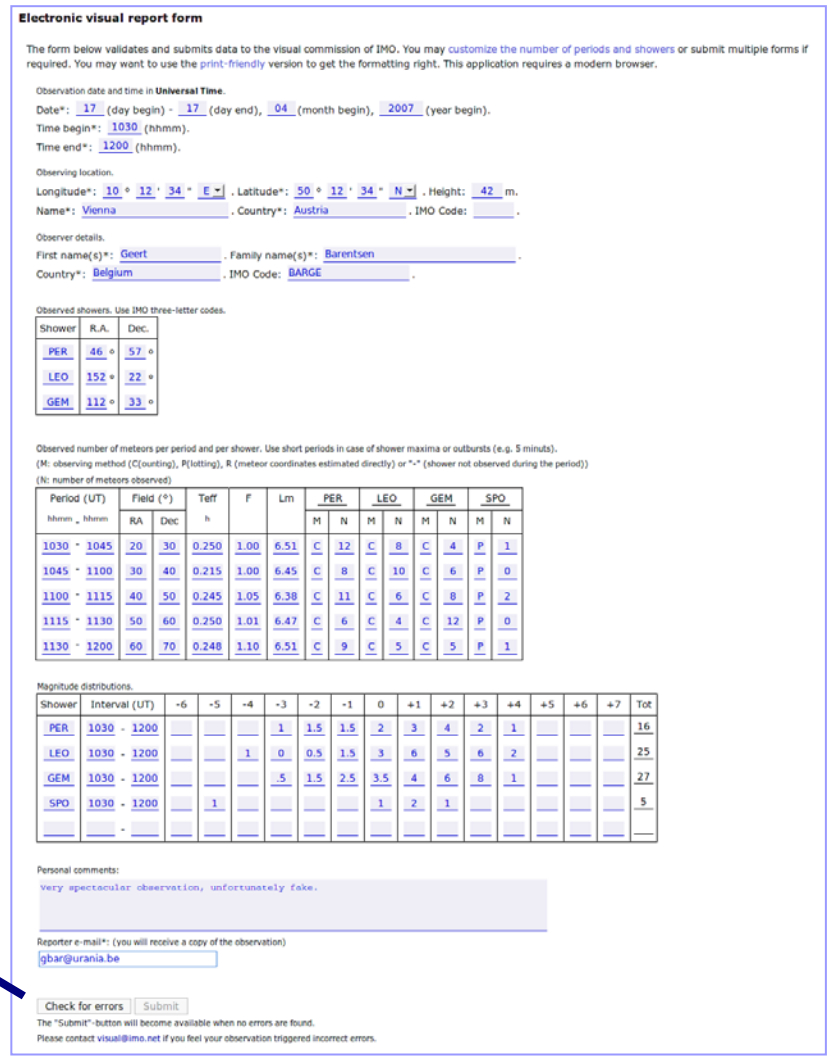
Geert Barentsen[1], Rainer Arlt[2]

IMC 2007

[1] Meteorological Institute, Brussels
[2] Astrophys. Institute, Potsdam

Online report form

http://www.imo.net/visual/report



Electronic visual report form

The form below validates and submits data to the visual commission of IMO. You may customize the number of periods and showers or submit multiple forms if required. You may want to use the print-friendly version to get the formatting right. This application requires a modern browser.

Observation date and time in **Universal Time**.

Date*: 17 (day begin) - 17 (day end), 04 (month begin), 2007 (year begin).
Time begin*: 1030 (hhmm).
Time end*: 1200 (hhmm).

Observing location.

Longitude*: 10 ° 12 ' 34 " E . Latitude*: 50 ° 12 ' 34 " N . Height: 42 m.
Name*: Vienna . Country*: Austria . IMO Code: .

Observer details.

First name(s)*: Geert . Family name(s)*: Barentsen .
Country*: Belgium . IMO Code: BARGE .

Observed showers. Use IMO three-letter codes.

Shower	R.A.	Dec.
PER	46 °	57 °
LEO	152 °	22 °
GEM	112 °	33 °

Observed number of meteors per period and per shower. Use short periods in case of shower maxima or outbursts (e.g. 5 minuts).
(M: observing method (C(ounting), P(lotting), R (meteor coordinates estimated directly) or "-" (shower not observed during the period))
(N: number of meteors observed)

Period (UT)		Field (°)		Teff	F	Lm	PER		LEO		GEM		SPO	
hhmm	hhmm	RA	Dec	h			M	N	M	N	M	N	M	N
1030	1045	20	30	0.250	1.00	6.51	C	12	C	8	C	4	P	1
1045	1100	30	40	0.215	1.00	6.45	C	8	C	10	C	6	P	0
1100	1115	40	50	0.245	1.05	6.38	C	11	C	6	C	8	P	2
1115	1130	50	60	0.250	1.01	6.47	C	6	C	4	C	12	P	0
1130	1200	60	70	0.248	1.10	6.51	C	9	C	5	C	5	P	1

Magnitude distributions.

Shower	Interval (UT)	-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6	+7	Tot
PER	1030 - 1200				1	1.5	1.5	2	3	4	2	1				16
LEO	1030 - 1200			1	0	0.5	1.5	3	6	5	6	2				25
GEM	1030 - 1200				.5	1.5	2.5	3.5	4	6	8	1				27
SPO	1030 - 1200		1					1	2	1						5
	-															

Personal comments:

Very spectacular observation, unfortunately fake.

Reporter e-mail*: (you will receive a copy of the observation)

gbar@urania.be

Check for errors | Submit

The "Submit"-button will become available when no errors are found.
Please contact visual@imo.net if you feel your observation triggered incorrect errors.

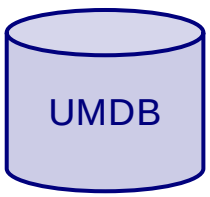
Check for errors

XML

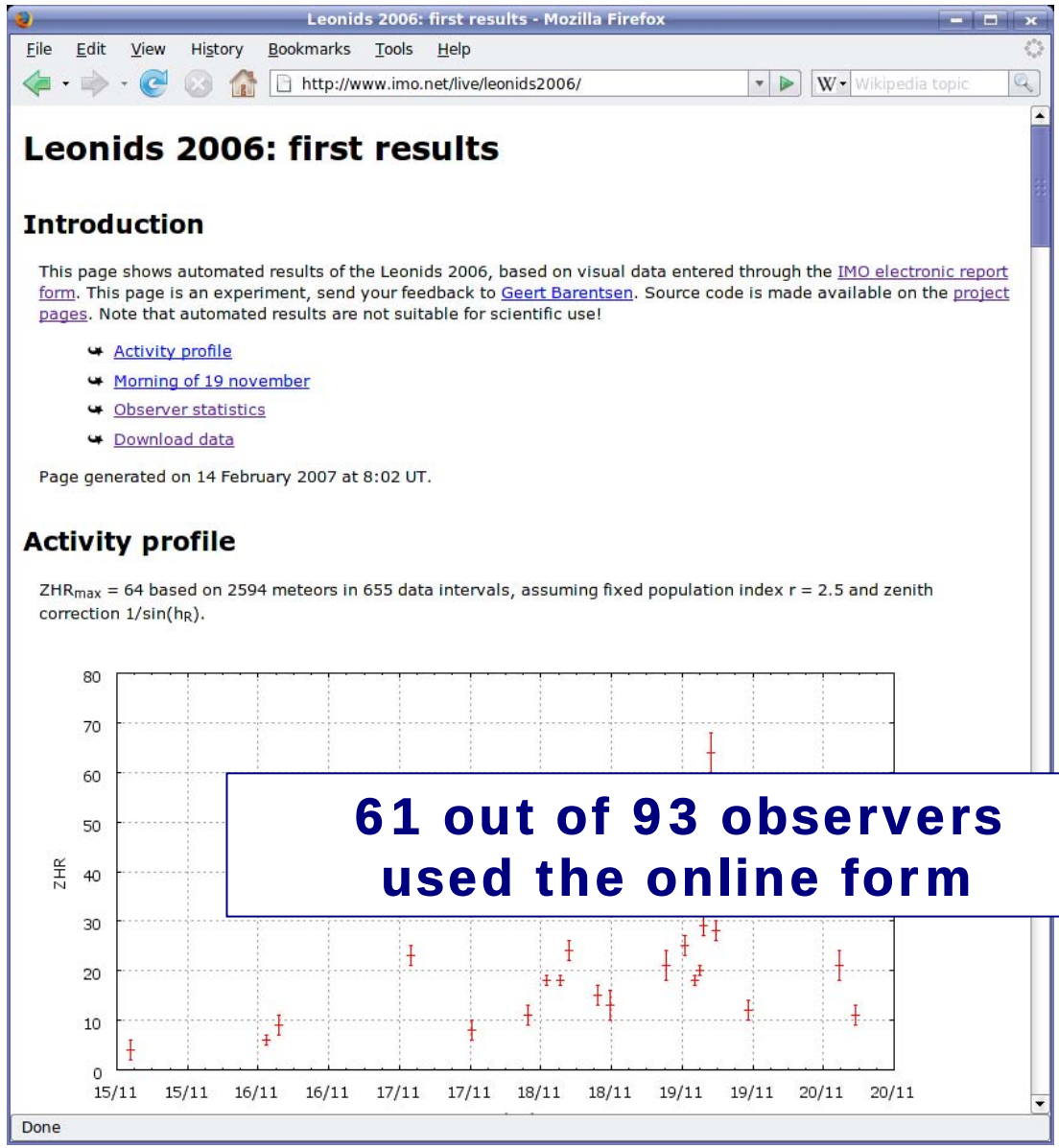
UMDB

PostgreSQL
online database

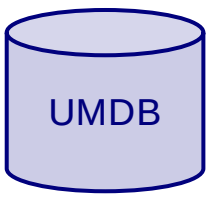
http://www.imo.net/live/leonids2006



online database



61 out of 93 observers used the online form



online database

Leonids 2006: first results - Mozilla Firefox

File Edit View History Bookmarks Tools Help

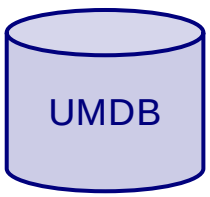
http://www.imo.net/live/leonids2006/

Wikipedia topic

Table of observers

Observer	Country	Teff	nLEO
Harshad Abhyankar	India	1.90h	4
Ioan Agavriloaiei	Romania	1.15h	6
Karl Antier	France	4.33h	65
Julia Babina	Ukraine	1.08h	10
Jaydeep Belapure	India	2.00h	13
Felix Bettonvil	Netherlands	2.92h	34
Sushrut Bhanushali	India	1.00h	12
Hans Buchholtz	Denmark	0.64h	7
Andreas Buchmann	Switzerland	3.18h	70
Vasko Cacanoski	Macedonia	4.03h	40
Ed Cannon	United States	4.19h	39
Jakub Cerny	Czech Republic	1.51h	12
Igor Chalenko	Ukraine	2.41h	9
Sarthak Chandra	India	0.83h	7
Marcin Chwala	Poland	3.16h	52
Lorenzo Comolli	Italy	2.27h	41
Tim Cooper	South Africa	3.41h	8
Nadka Dankova	Bulgaria	2.15h	17
Sarthak Dasadia	India	4.50h	22
Judith De Koster	Netherlands	1.95h	6
Samer Derbi	Jordan	2.99h	22
Onkar Dixit	India	1.50h	19
Jaka Dobaj	Slovenia	1.79h	37
Kenneth Drake	United States	0.92h	11
Shawn Dvorak	United States	0.50h	1
Shlomi Eini	Israel	3.30h	55
Eric Flescher	United States	3.18h	10
Mitja Govedic	Slovenia	2.00h	8
Robin Gray	United States	4.05h	18
Peter Greskovic	Slovakia	1.51h	6
Pavol Habuda	Slovakia	1.29h	11
Torsten Hansen	Germany	2.68h	64
Roberto Haver	Italy	2.58h	39
Petr Horalek	Czech Republic	3.55h	55

Done



online database

Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://umdb.urania.be/v2/obsview/view.php?id=1338

Wikipedia topic

Observation report

Type:	visualsummary
Date:	2007-04-23
Observer:	MICHEL VANDEPUTTE (VANMC)
Location:	Ellezelles, Belgium (53095)
Coordinates:	50.72N , 3.63E
Remarks:	

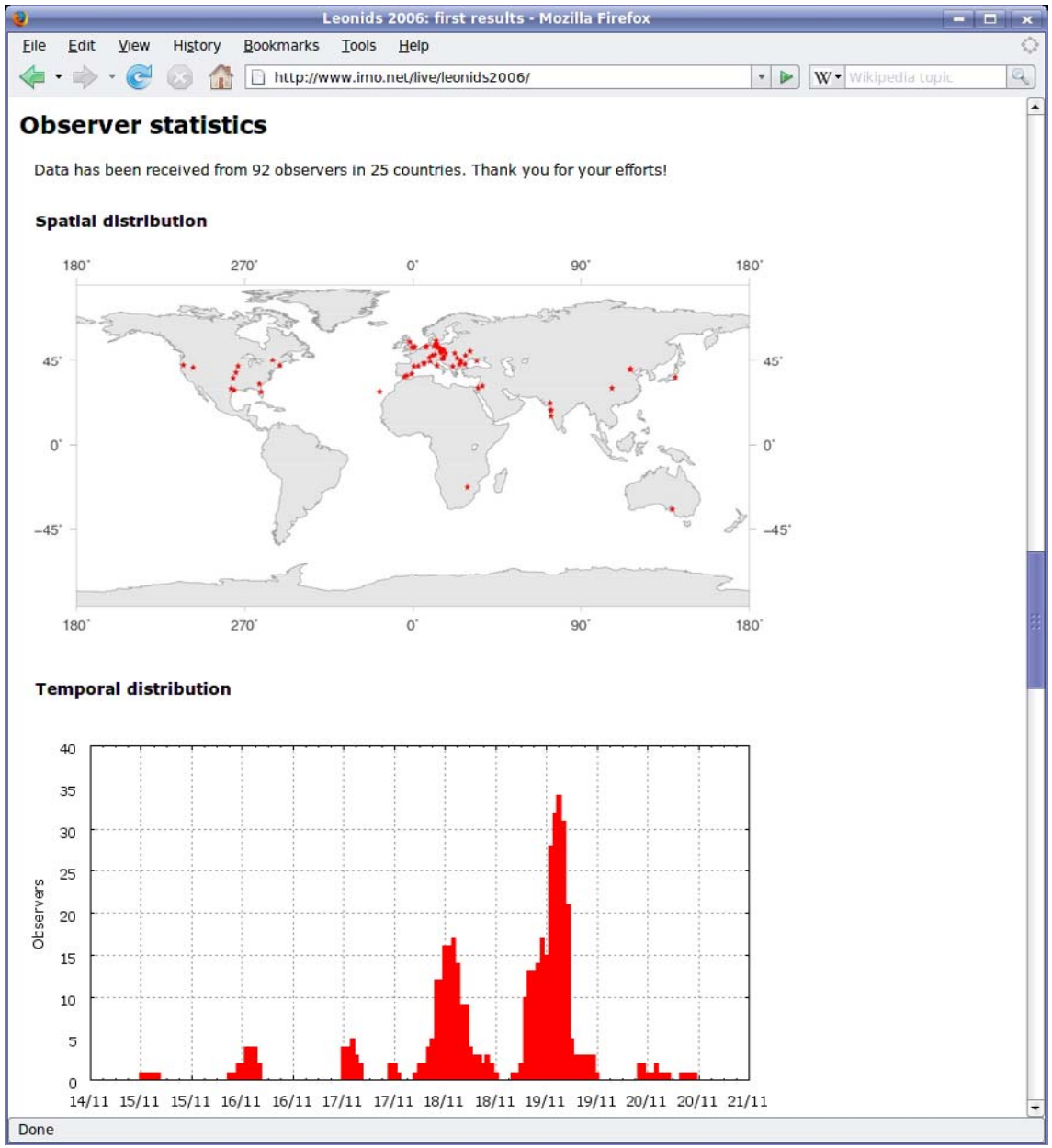
Period (UT)		Field (°)		Teff	F	Lm	ANT		FTA		LYR		SPO	
date	hh:mm:ss - hh:mm:ss	RA	Dec	h			M	N	M	N	M	N	M	N
22/4	22:30:00 - 23:00:00	225	30	0.500	1.00	6.20	C	0	C	0	C	8	C	3
22/4	23:00:00 - 23:30:00	225	30	0.500	1.00	6.20	C	0	C	0	C	3	C	2
22/4	23:30:00 - 00:00:00	240	30	0.500	1.00	6.30	C	0	C	0	C	6	C	1
23/4	00:00:00 - 00:30:00	240	30	0.500	1.00	6.30	C	0	C	0	C	9	C	1
23/4	00:30:00 - 01:00:00	240	30	0.500	1.00	6.40	C	1	C	0	C	4	C	3
23/4	01:00:00 - 01:30:00	255	35	0.500	1.00	6.40	C	0	C	0	C	7	C	3
23/4	01:30:00 - 02:00:00	255	35	0.500	1.00	6.60	C	0	C	0	C	6	C	1
23/4	02:25:00 - 03:10:00	255	35	0.750	1.00	6.42	C	0	C	2	C	8	C	12

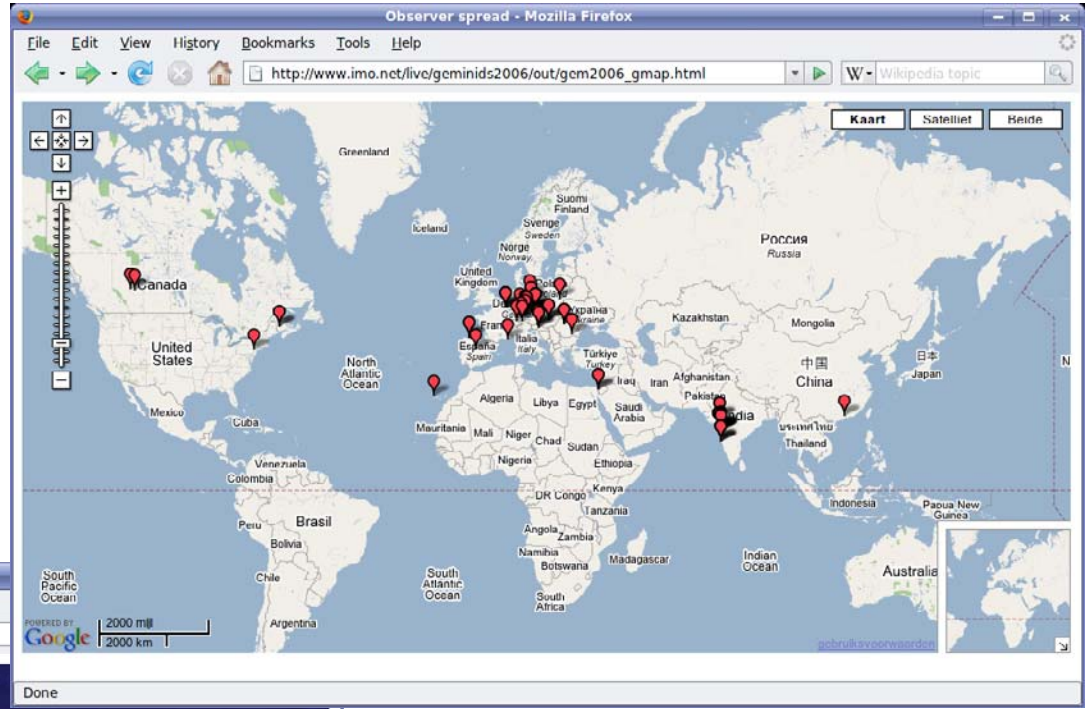
Show	Period (UT)		Lm	-6	-5	-4	-3	-2	-1	+0	+1	+2	+3	+4	+5	+6	+7	Tot
LYR	22/4	22:30:00 - 03:10:00	6.36	0	0	0	1	0	2	1	3	10	16	13	5	0	0	51
ETA	22/4	22:30:00 - 03:10:00	6.36	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2
ANT	22/4	22:30:00 - 03:10:00	6.36	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
SPO	22/4	22:30:00 - 03:10:00	6.36	1	0	0	0	0	0	0	1	1	4	17	2	0	0	26

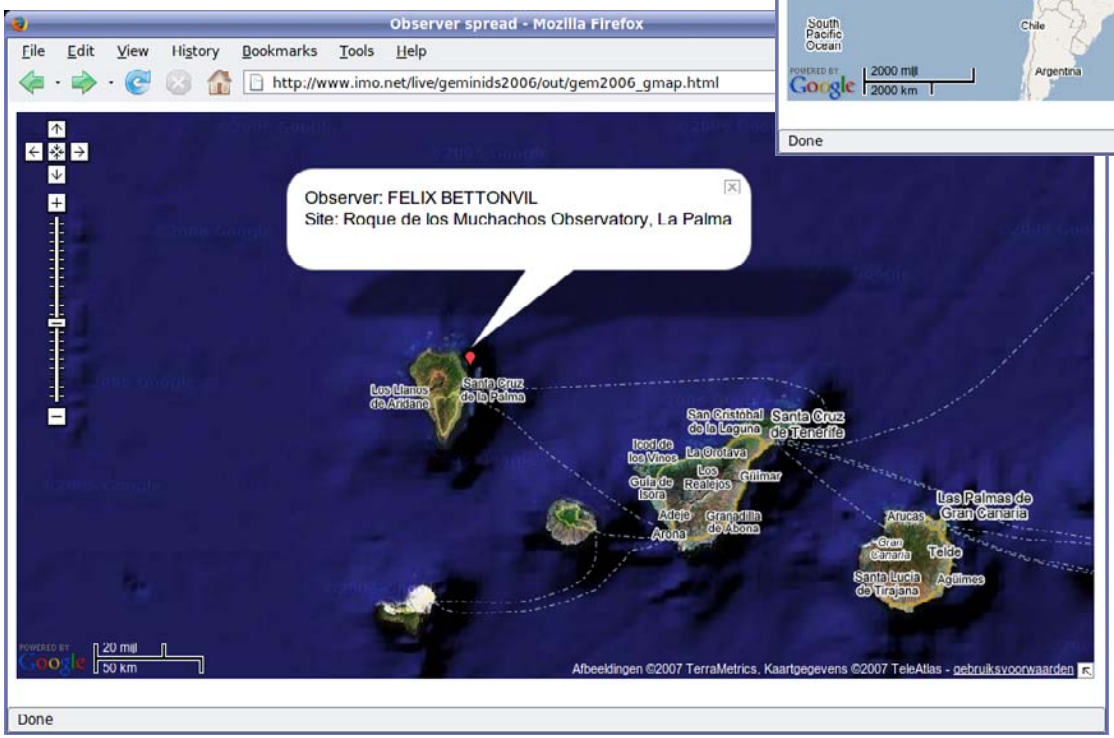
Done

UMDB

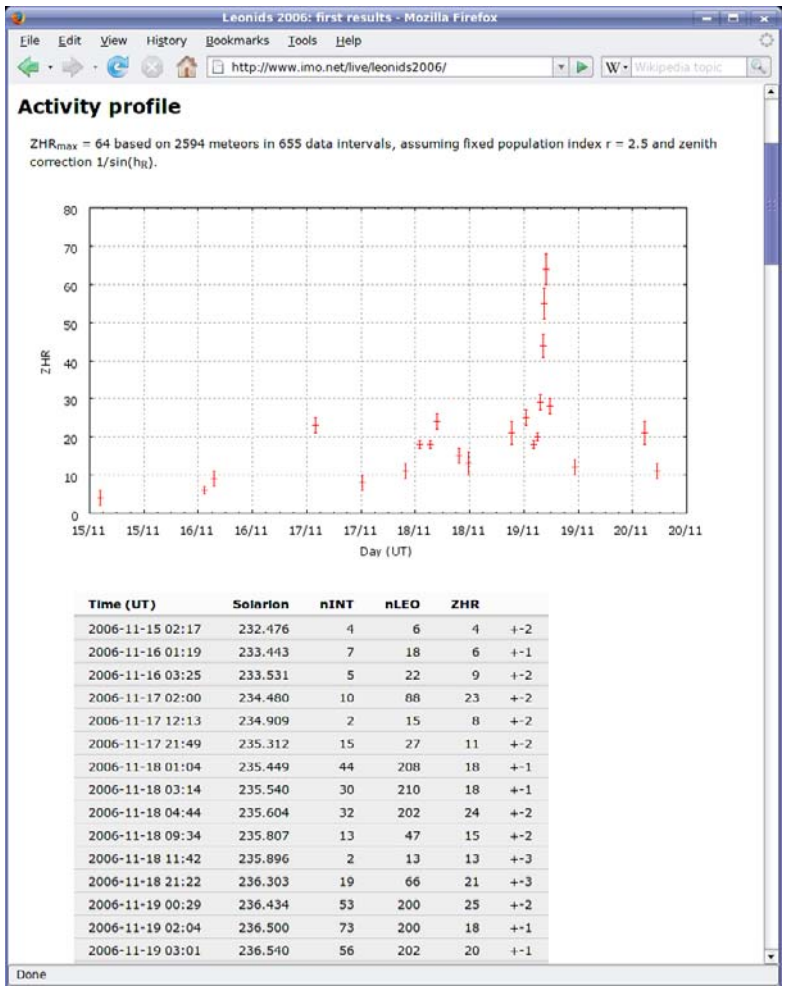
online database




Observer spread - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://www.imo.net/live/geminids2006/out/gcm2006_gmap.html
Kaart
Satelliet
Heide
Greenland
Canada
United States
Iceland
Suomi Finland
Sverige Sweden
Norge Norway
Россия Russia
United Kingdom
España Spain
Italia Italy
Türkiye Turkey
Kazakhstan
Mongolia
China
Japan
Afghanistan
Iran
Pakistan
India
Thailand
Indonesia
Paqua New Guinea
Australia
Algeria
Libya
Egypt
Saudi Arabia
Mauritania
Mali
Niger
Chad
Sudan
Nigeria
Ethiopia
Kenya
DR Congo
Tanzania
Angola
Zambia
Namibia
Botswana
Madagascar
Mexico
Cuba
Venezuela
Colombia
Peru
Brasil
Bolivia
Chile
Argentina
North Atlantic Ocean
South Pacific Ocean
South Atlantic Ocean
Indian Ocean
South Africa
2000 mijl
2000 km
gebruiksvoorwaarden
Done


Observer spread - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://www.imo.net/live/geminids2006/out/gem2006_gmap.html
Observer: FELIX BETTONVIL
Site: Roque de los Muchachos Observatory, La Palma
Los Llanos de Aridane
Santa Cruz de la Palma
San Cristóbal de la Laguna
Santa Cruz de Tenerife
Icod de los Vinos
La Orotava
Los Realejos
Güímar
Guía de Isora
Adeje
Arona
Granadilla de Abona
Arucas
Las Palmas de Gran Canaria
Gran Canaria
Telde
Santa Lucía de Tirajana
Agüimes
20 mijl
50 km
Afbeeldingen ©2007 TerraMetrics, Kaartgegevens ©2007 TeleAtlas - gebruiksvoorwaarden
Done

«Adaptive averaging algorithm»



1. Group data periods into adaptive bins.

   Parameters:
   - Optimum number of meteors (*200*)
   - Minimum bin width (*5 minutes*)
   - Maximum bin width (*5 hours*)

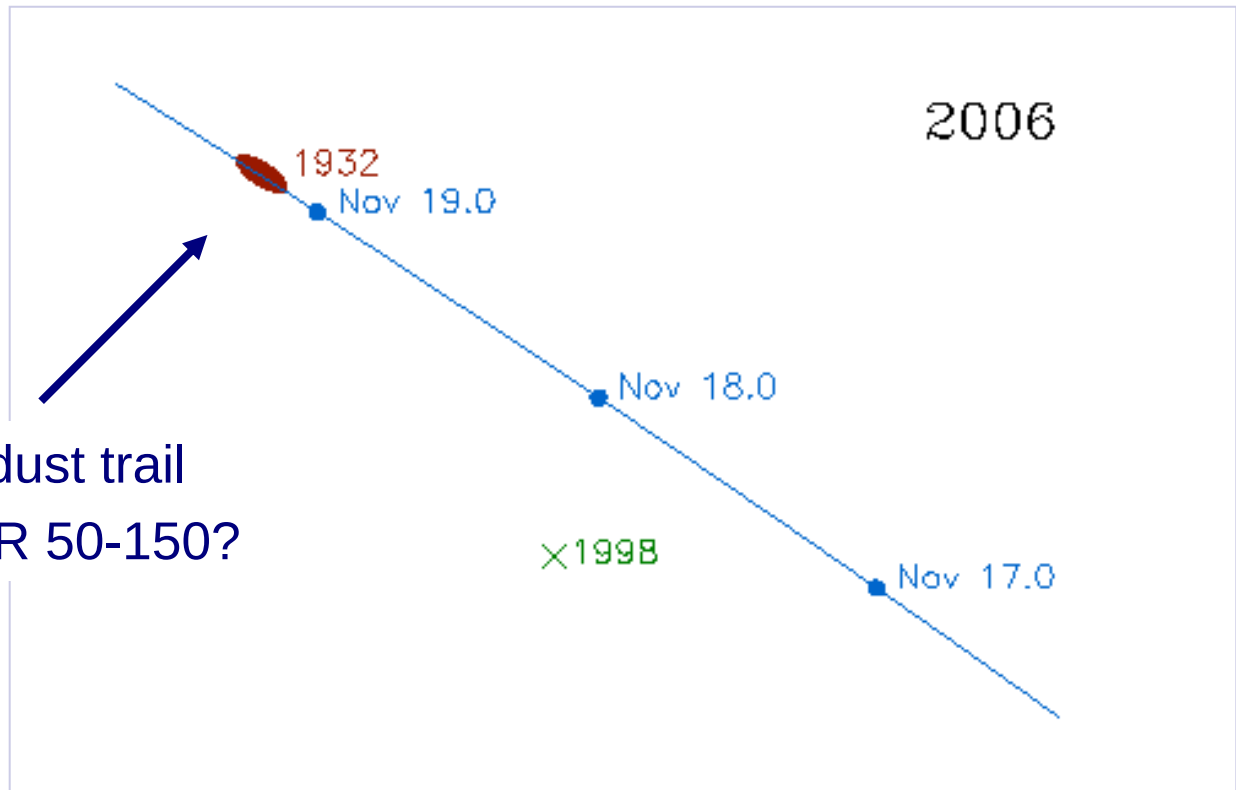
2. Estimate ZHR for each bin using weighted averaging:

$$\overline{ZHR} = \left(\sum_{i=1}^{N} n_i + 1\right) \Big/ \sum_{i=1}^{N} C_i$$

$$C = \frac{r^{6.5-lm}\, F}{T_{eff}\, \sin h_R}$$

(!) Fixed population index (*r = 2.5*)

2006 Nov 19: Leonids outburst?



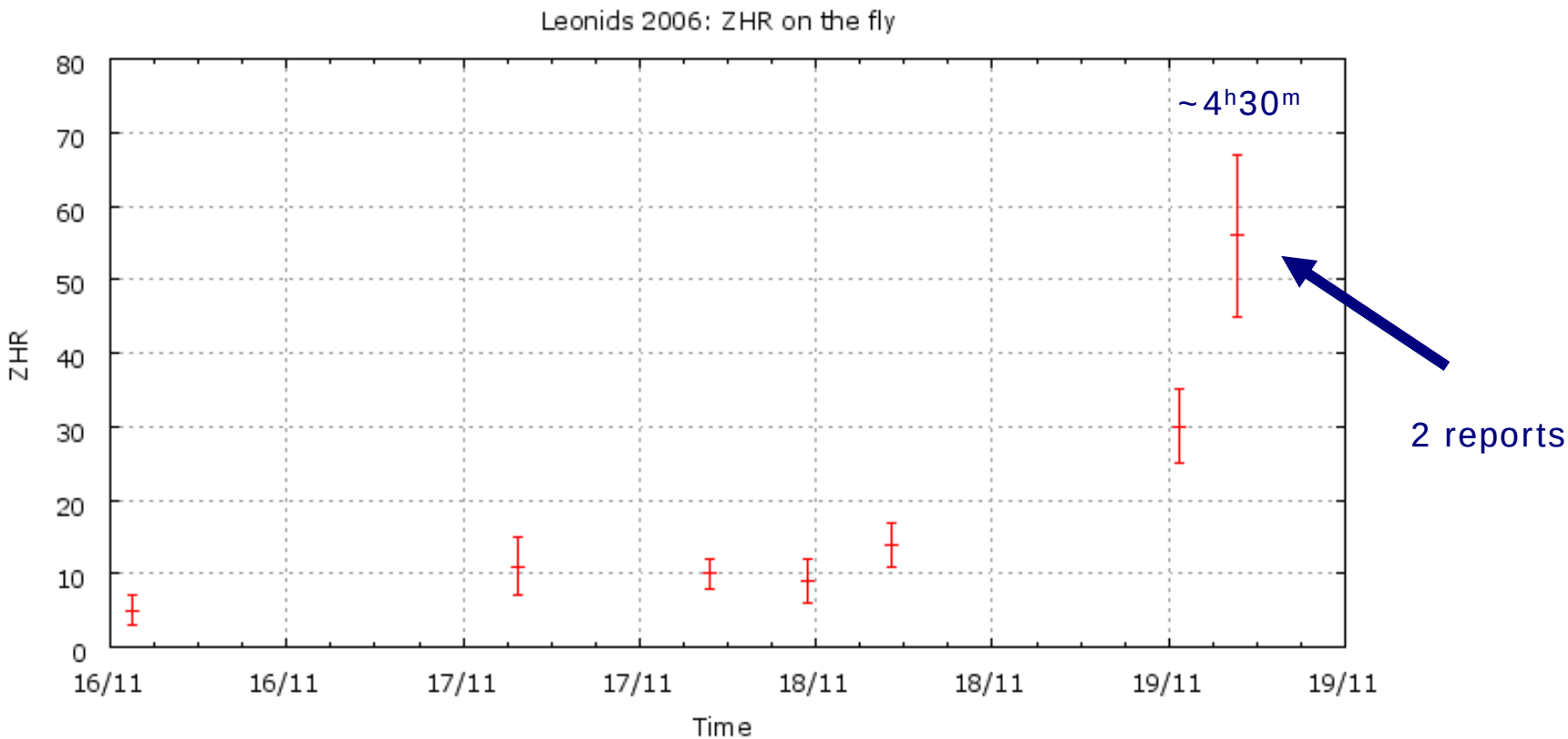
2-revolution dust trail

~4^h45^m UT, ZHR 50-150?

(Asher & McNaught)

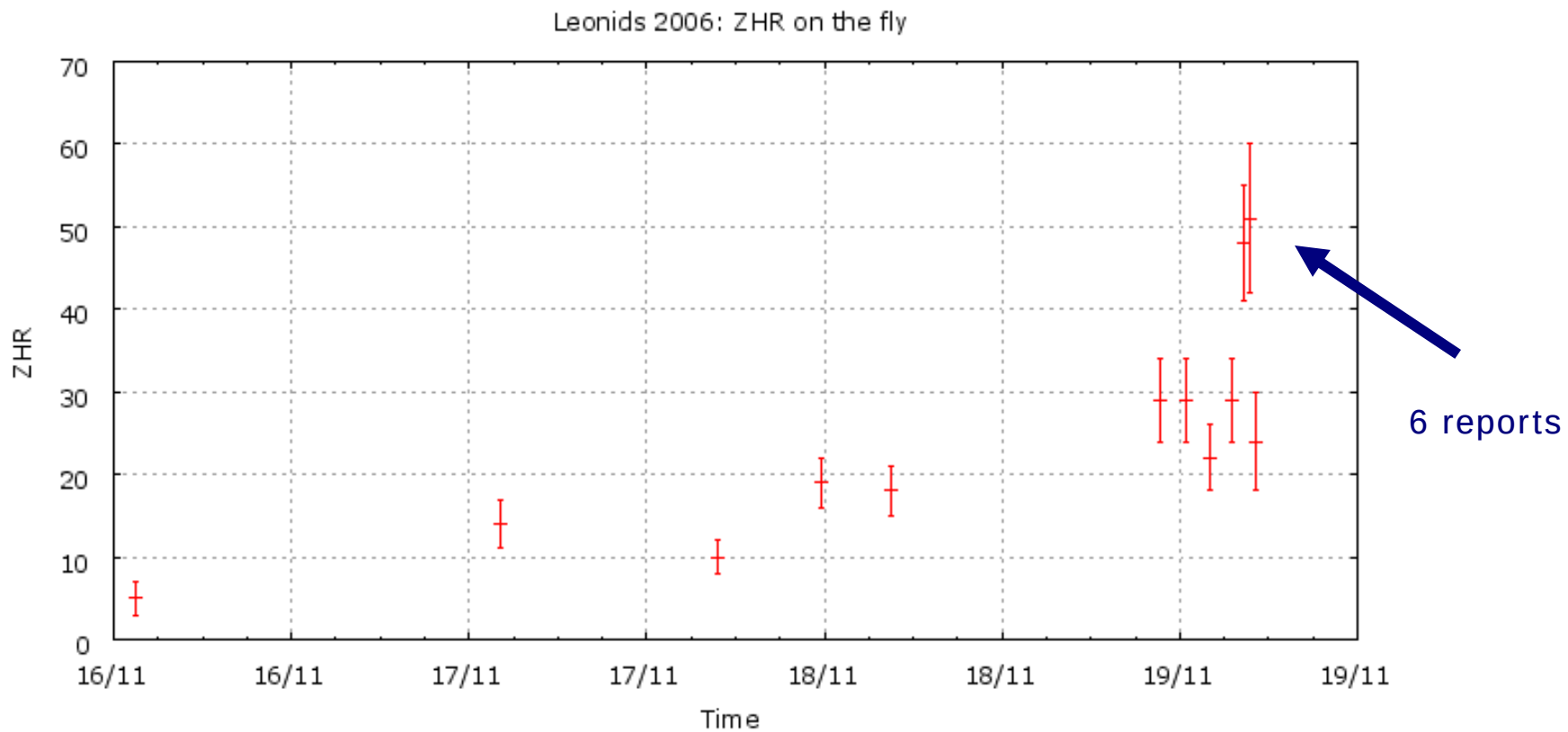
2 hours after outburst

2006 November 19, 7^h00^m.



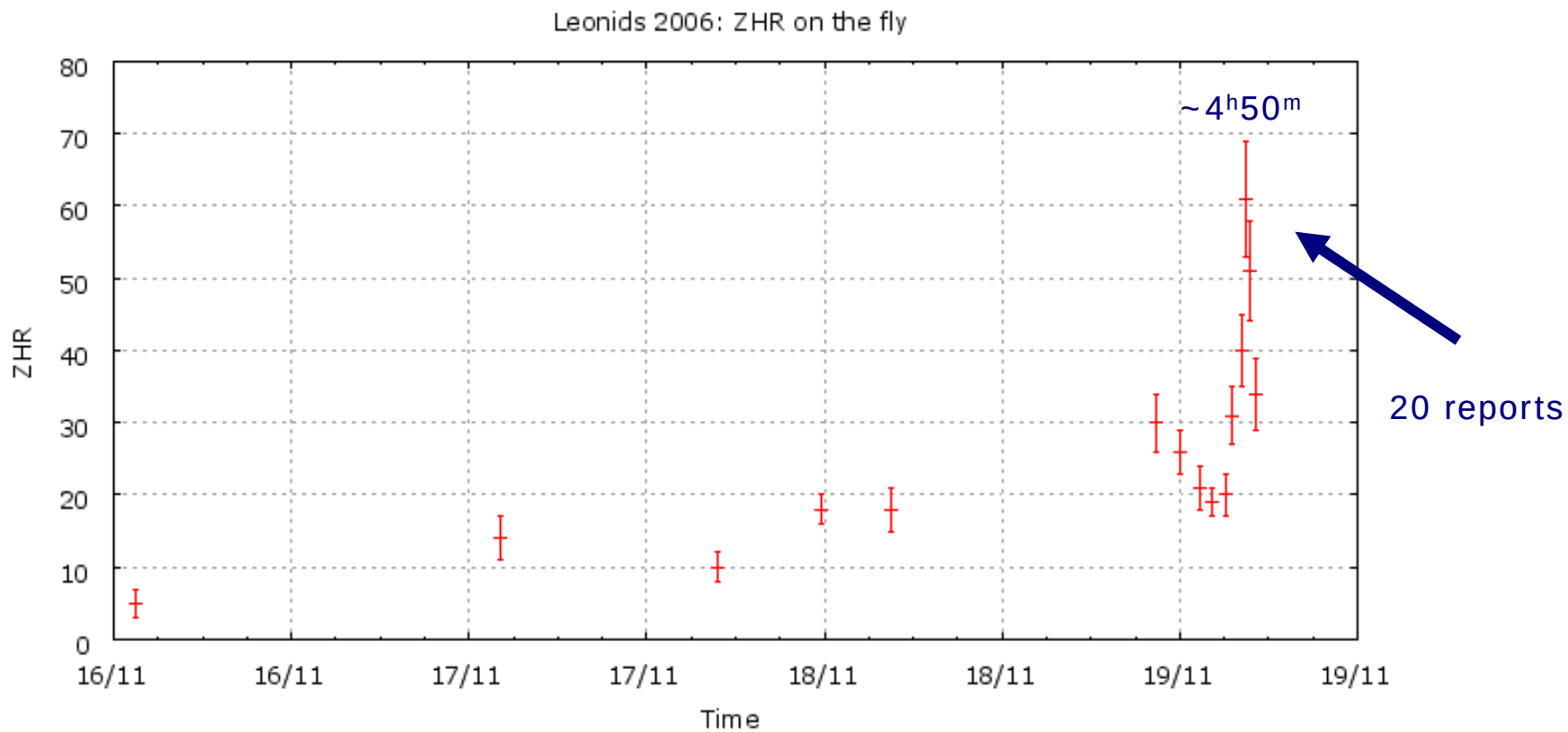
8 hours after outburst

2006 November 19, 13^h00^m.



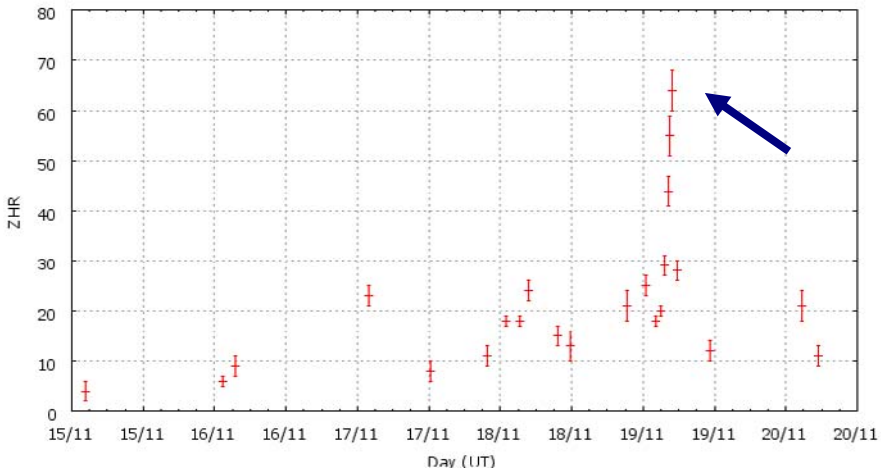
20 hours after outburst

2006 November 20, 1^h00^m.



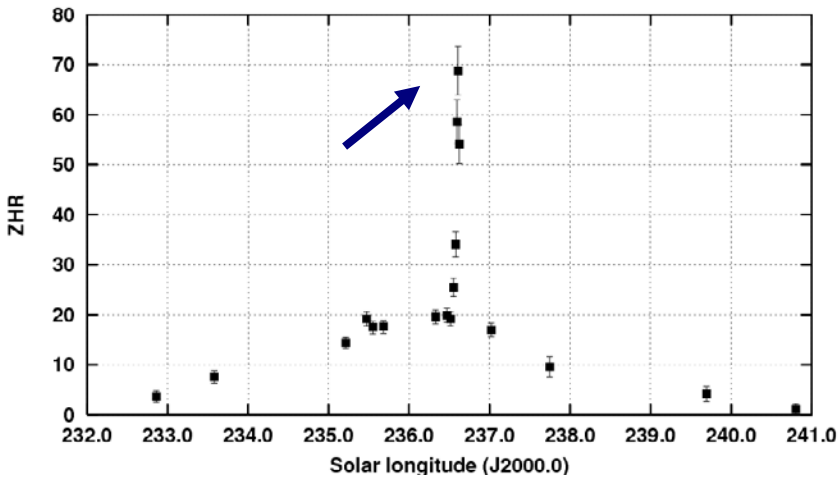
Final result

Automated analysis (website)



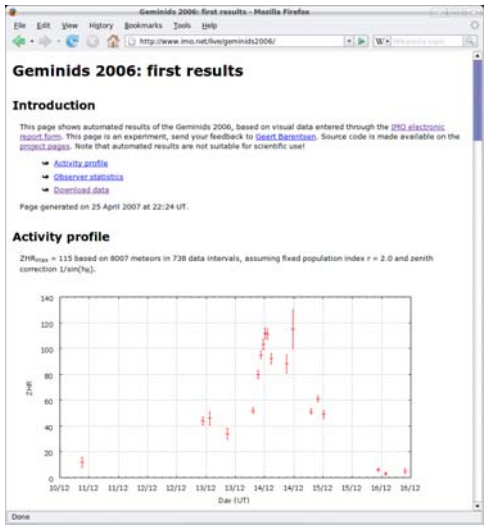
(fixed population index)

Manual analysis (WGN)



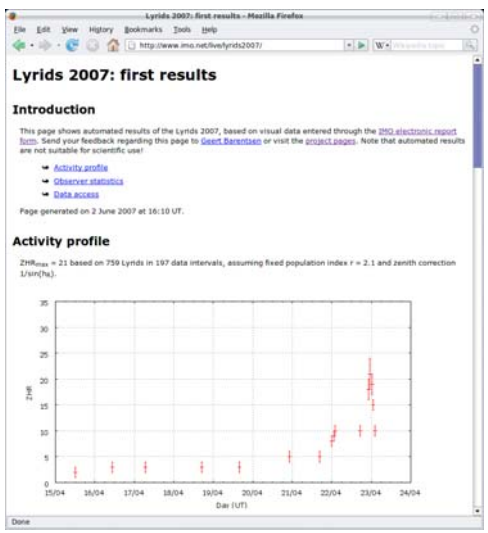
(calculated population index)

Peak: Nov 19, 4^h46^m UT ($\pm 6^m$)
ZHR: 75 (± 8)



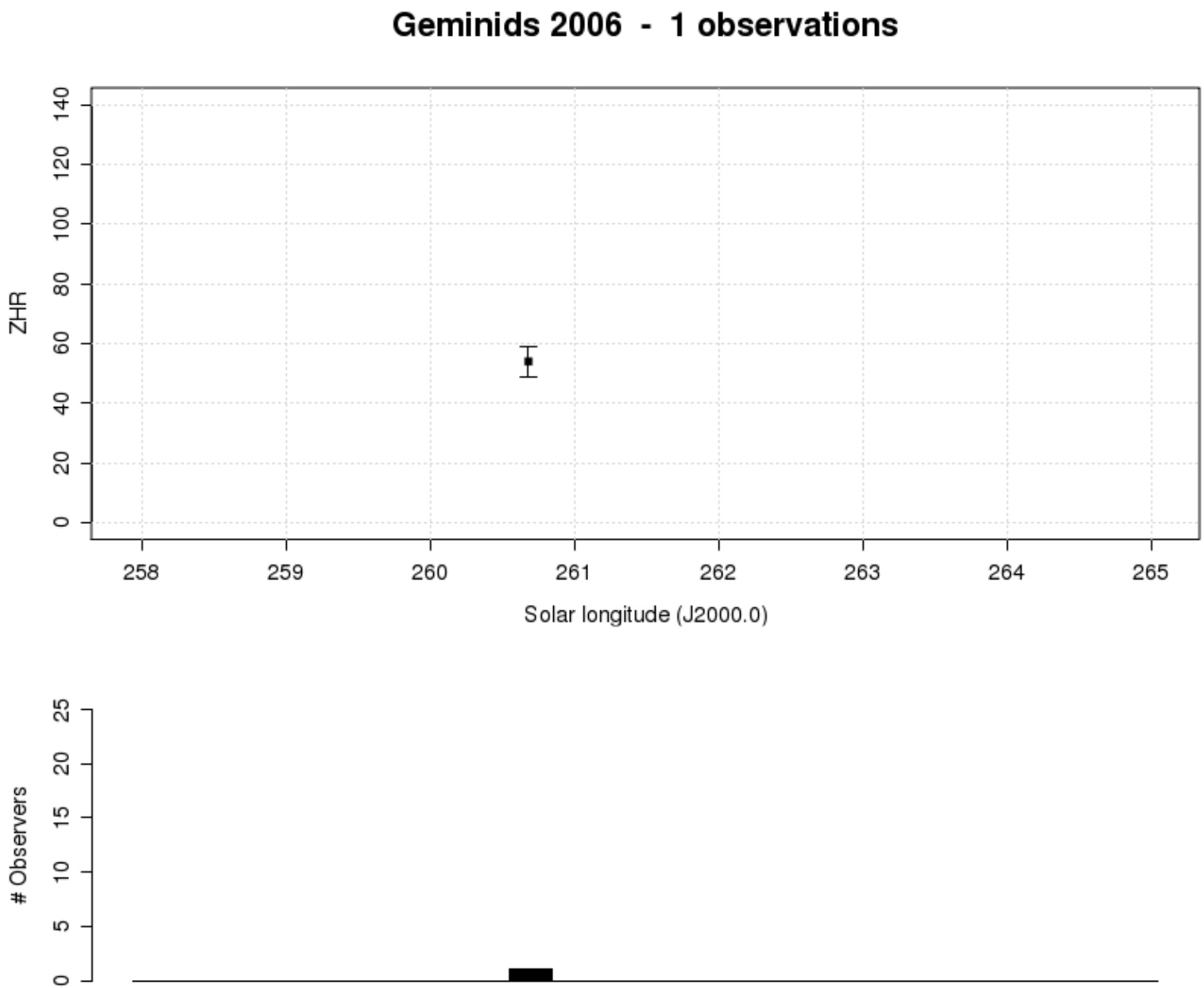
Geminids 2006

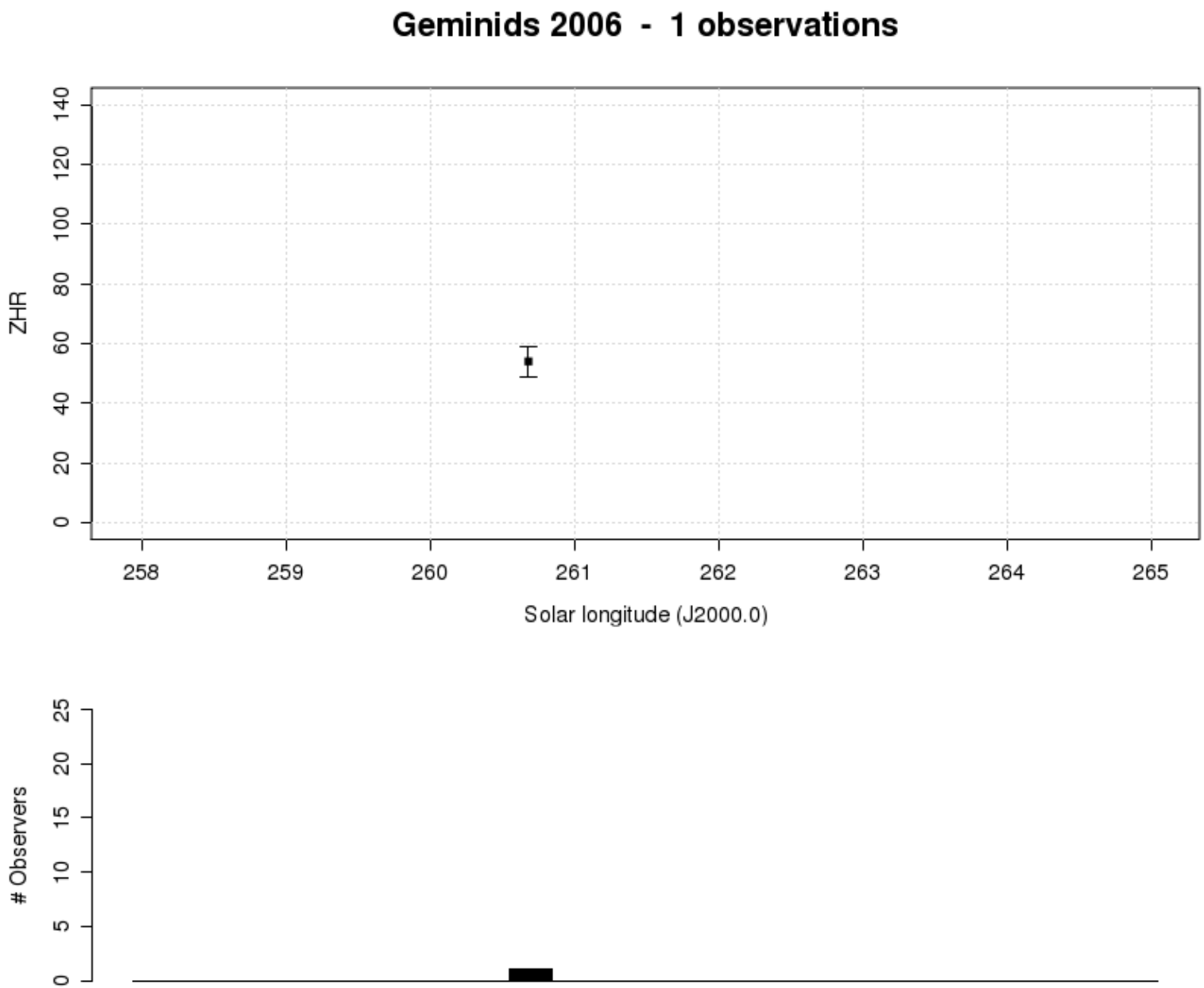
- 100 observations reported online
- http://www.imo.net/live/geminids2006

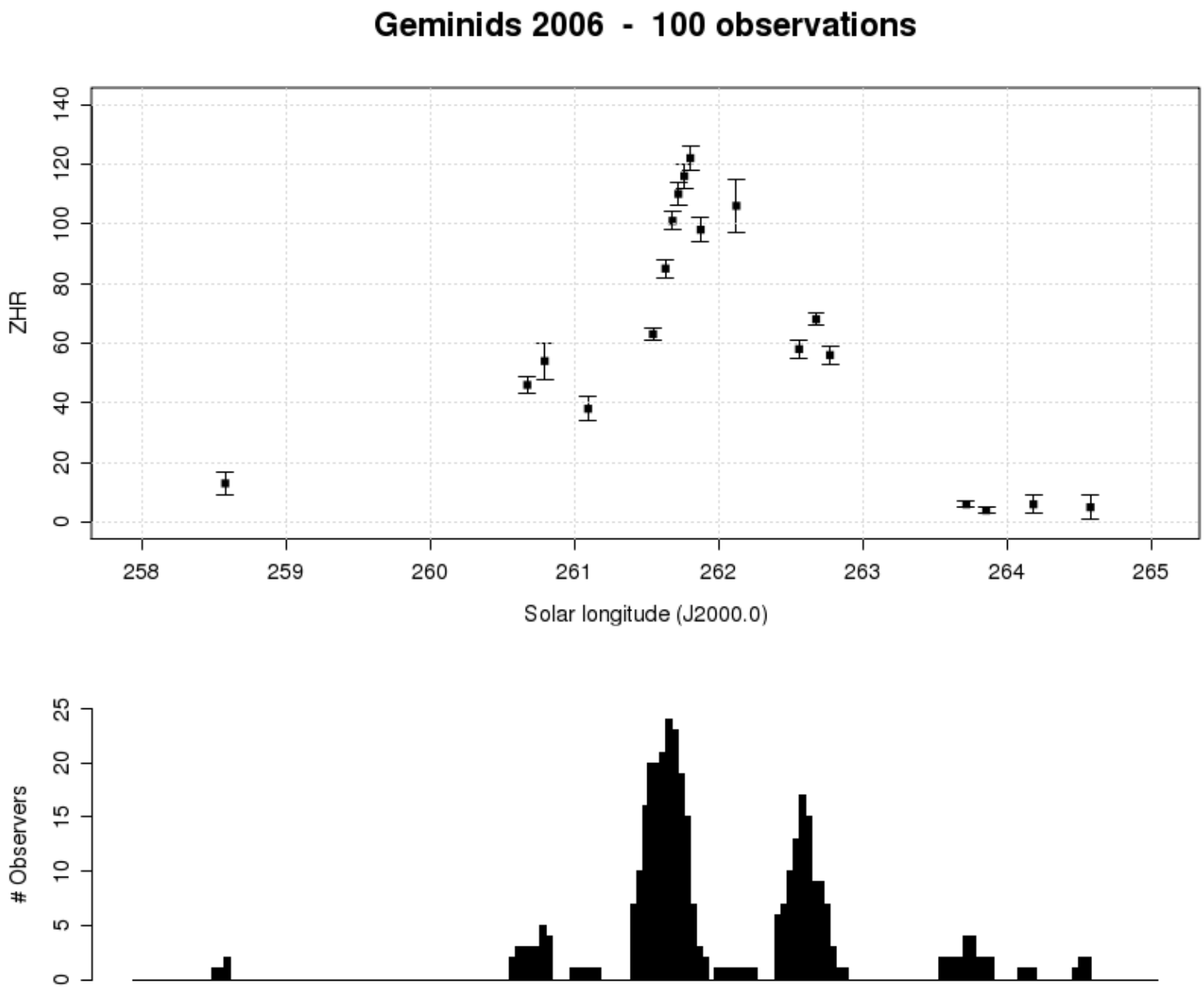


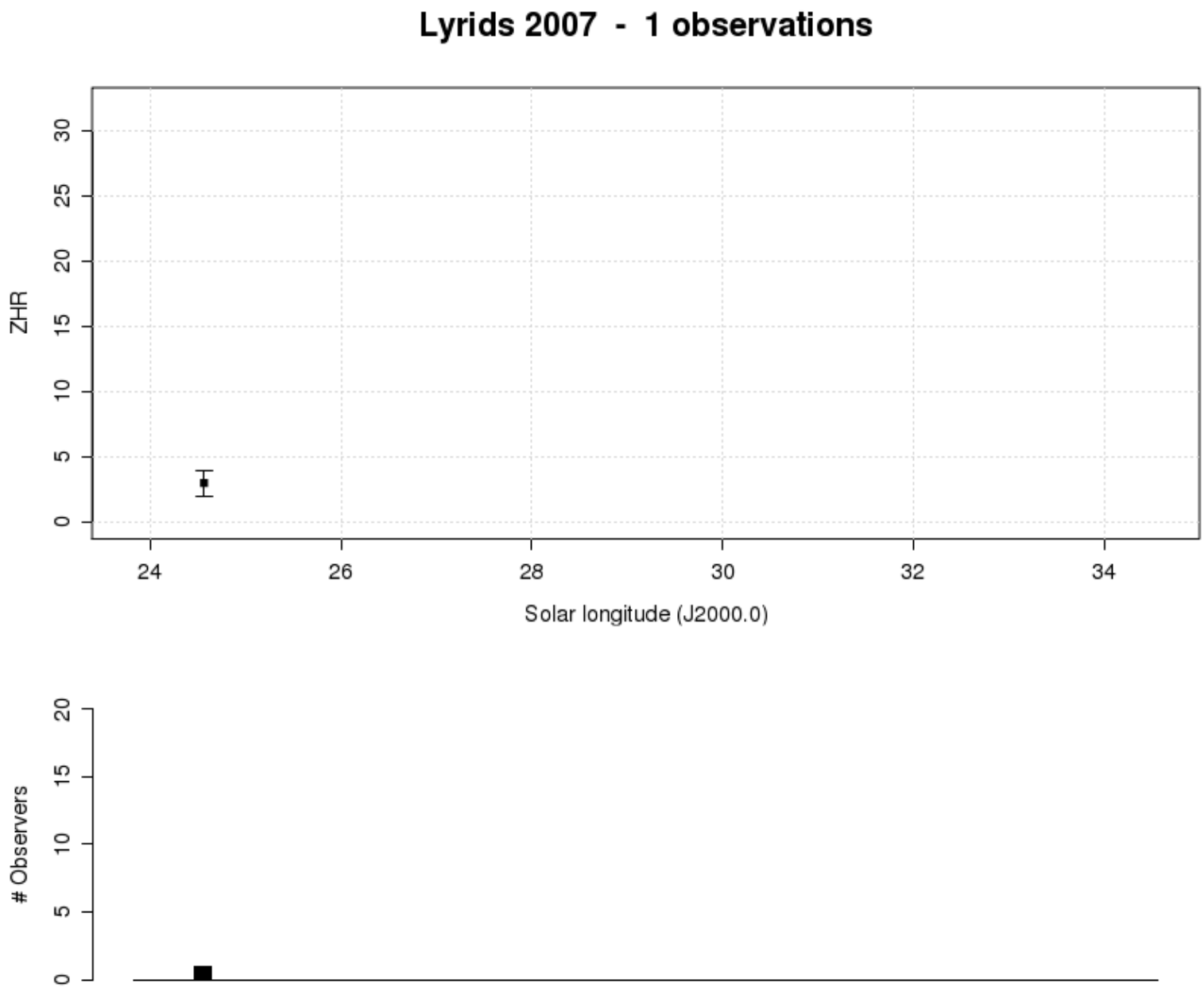
Lyrids 2007

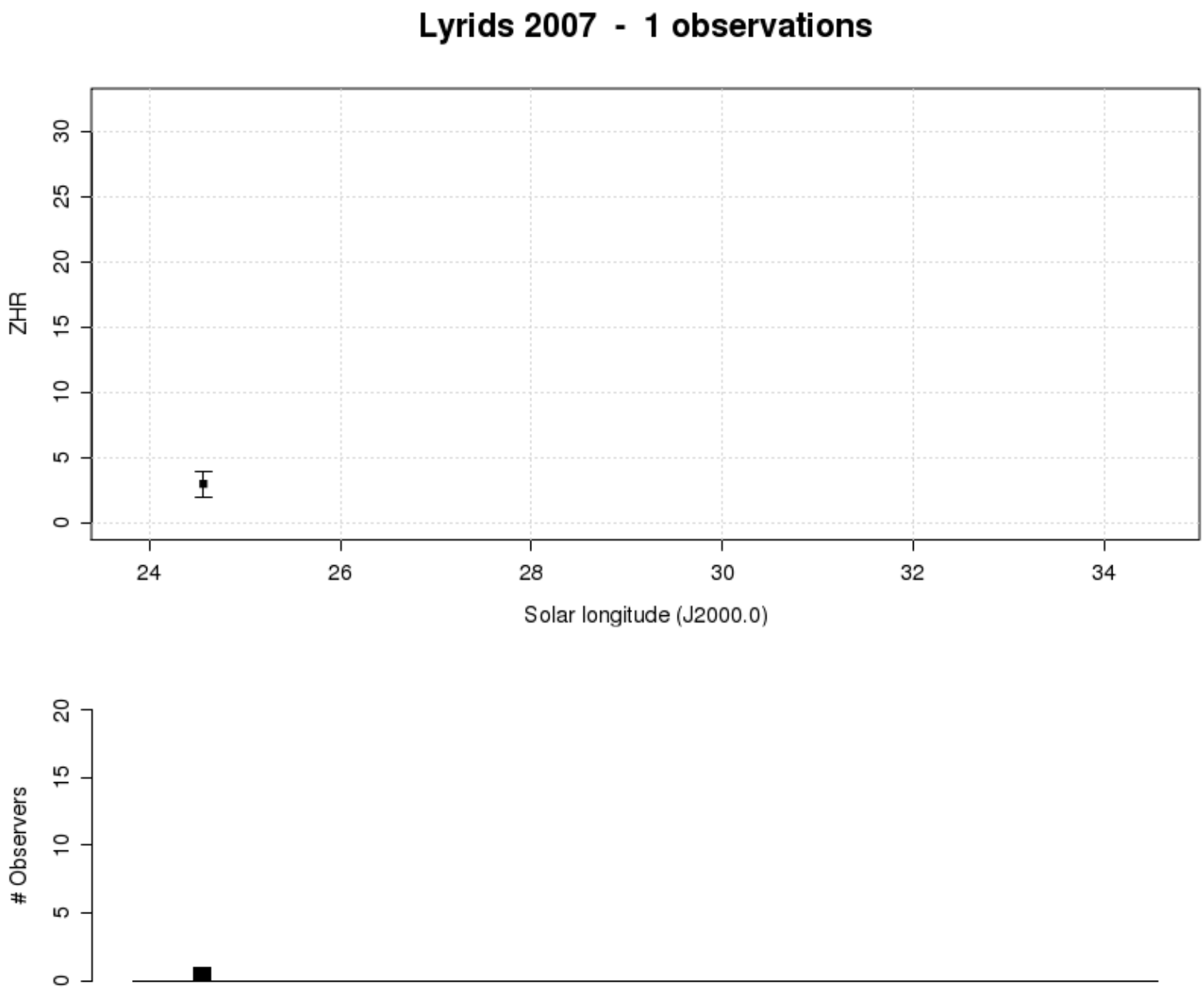
- 68 observations reported online
- http://www.imo.net/live/lyrids2007

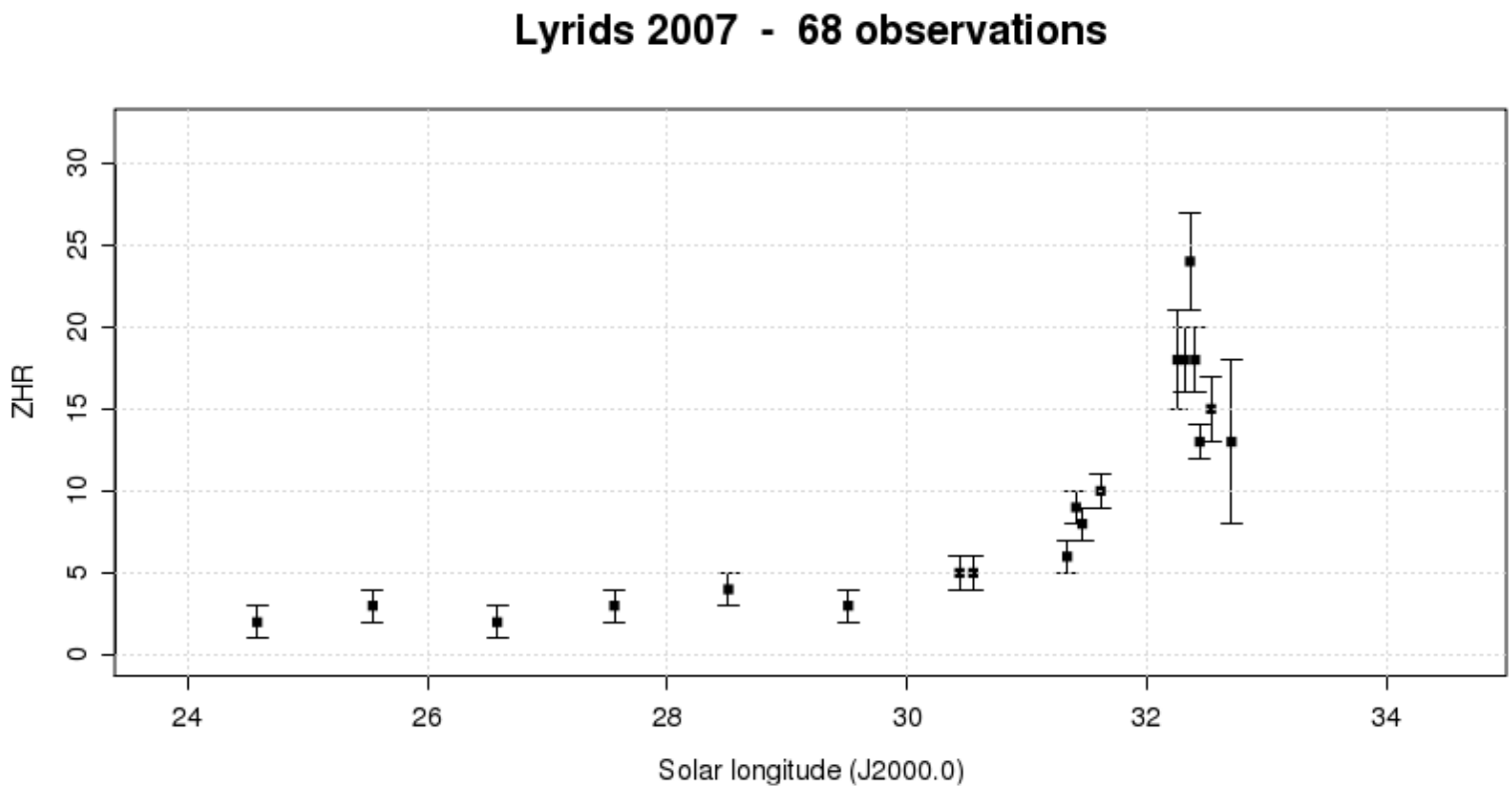

Geminids 2006 - 1 observations
ZHR
0
20
40
60
80
100
120
140
258
259
260
261
262
263
264
265
Solar longitude (J2000.0)
Observers
0
5
10
15
20
25

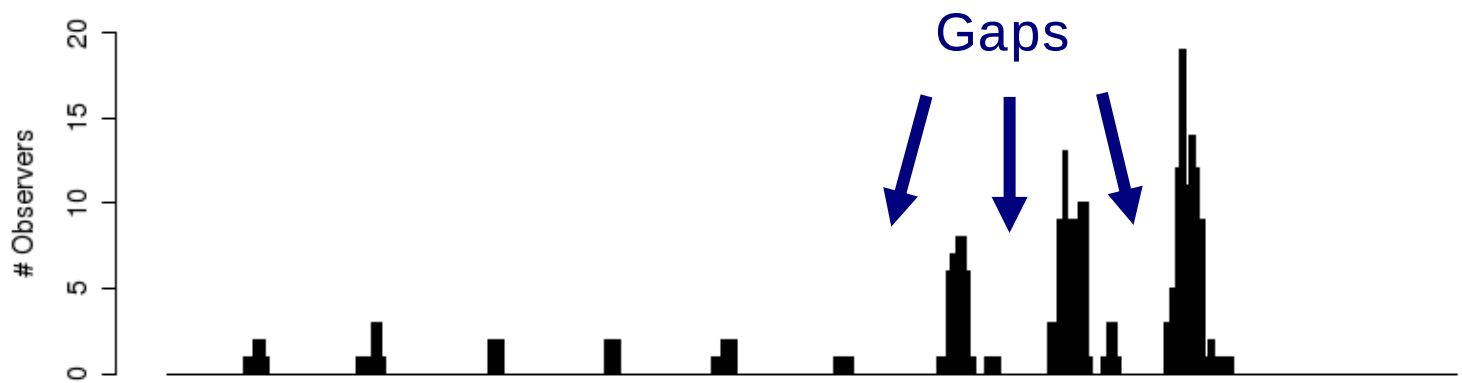

Geminids 2006 - 1 observations
ZHR
0
20
40
60
80
100
120
140
258
259
260
261
262
263
264
265
Solar longitude (J2000.0)
Observers
0
5
10
15
20
25


Geminids 2006 - 100 observations
ZHR
0
20
40
60
80
100
120
140
258
259
260
261
262
263
264
265
Solar longitude (J2000.0)
Observers
0
5
10
15
20
25

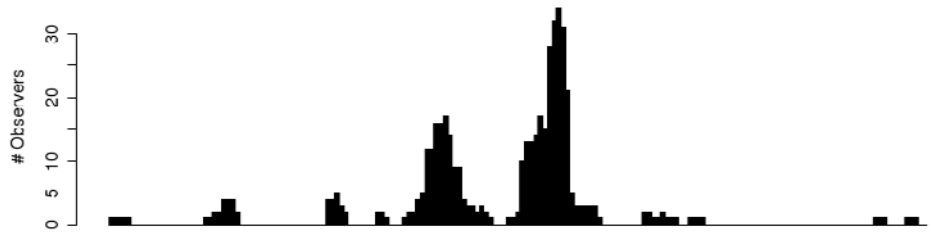

Lyrids 2007 - 1 observations
ZHR
0
5
10
15
20
25
30
24
26
28
30
32
34
Solar longitude (J2000.0)
Observers
0
5
10
15
20


Lyrids 2007 - 1 observations
ZHR
0
5
10
15
20
25
30
24
26
28
30
32
34
Solar longitude (J2000.0)
Observers
0
5
10
15
20

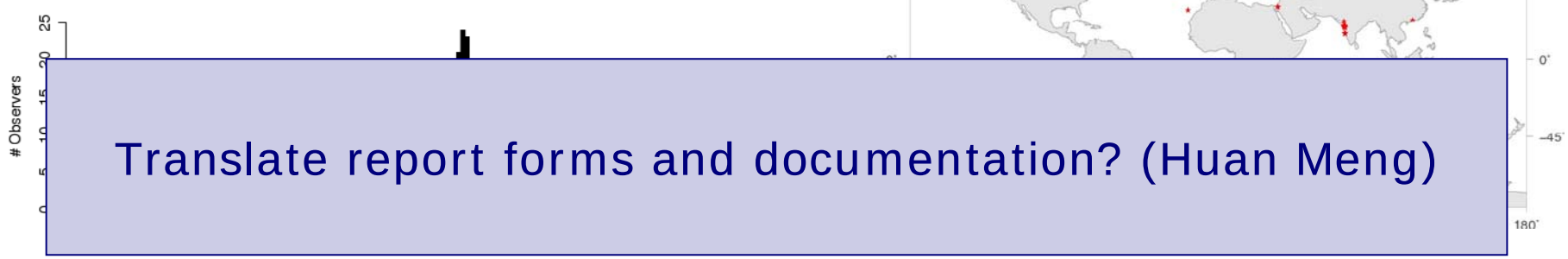

Lyrids 2007 - 68 observations
ZHR
0
5
10
15
20
25
30
24
26
28
30
32
34
Solar longitude (J2000.0)


Gaps
Observers
0
5
10
15
20

Leonids 2006

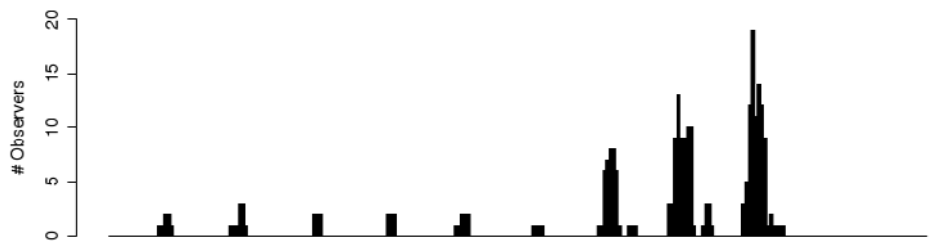


Geminids 2006



Translate report forms and documentation? (Huan Meng)

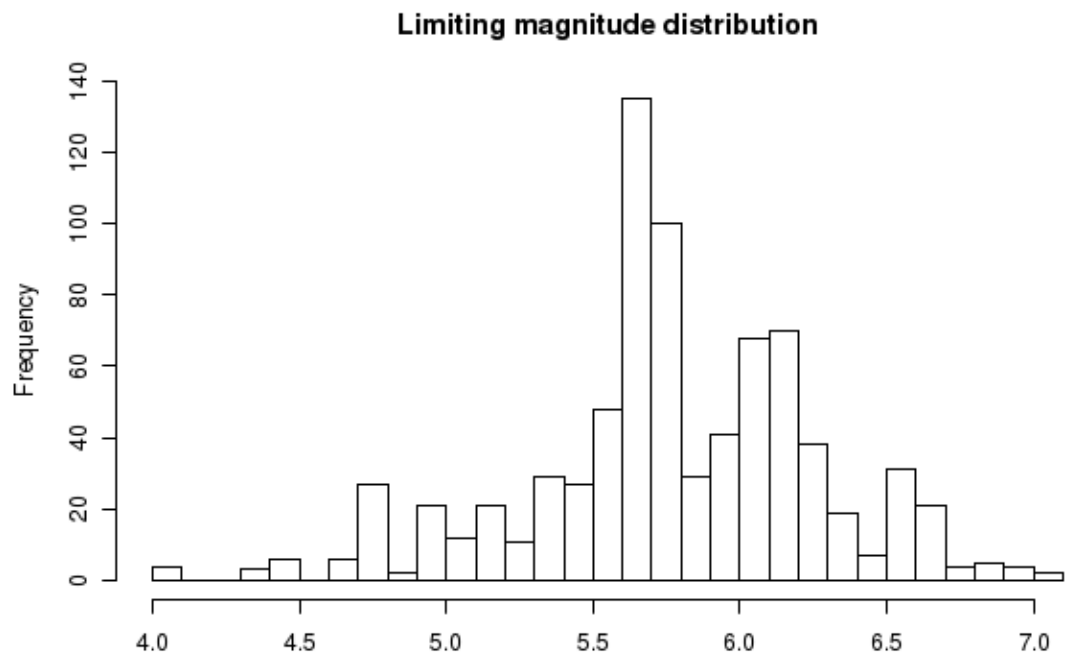
Lyrids 2007



Using an online database...

Example: open-source statistics software ("R"):

```
> db <- odbcConnection("umdb", uid="imo", pwd="immy");
> lm <- sqlQuery(db, "SELECT lm FROM vmdb_rates WHERE shower = 'GEM'");
> hist(lm)
> title("Limiting magnitude distribution")
```



Goals for 2007

- Synchronize VMDB and online database
  - Phase 1: observer and location data
  - Phase 2: observation data
- Improve report form
  - Quality control
  - Translations

Needs to be maintained by a team (!)
Project wiki: http://umdb.urania.be/trac

Suggestions?