IVOA Interop | Heidelberg | May 2013

LOFAR & MeerKAT Transients

John Swinbank j.swinbank@uva.nl

LOFAR

30 to 240 MHz

32 MHz bandwidth

0.76 kHz spectral resolution

Multiple beams

Wide range of observing modes

Science operations since December 2012

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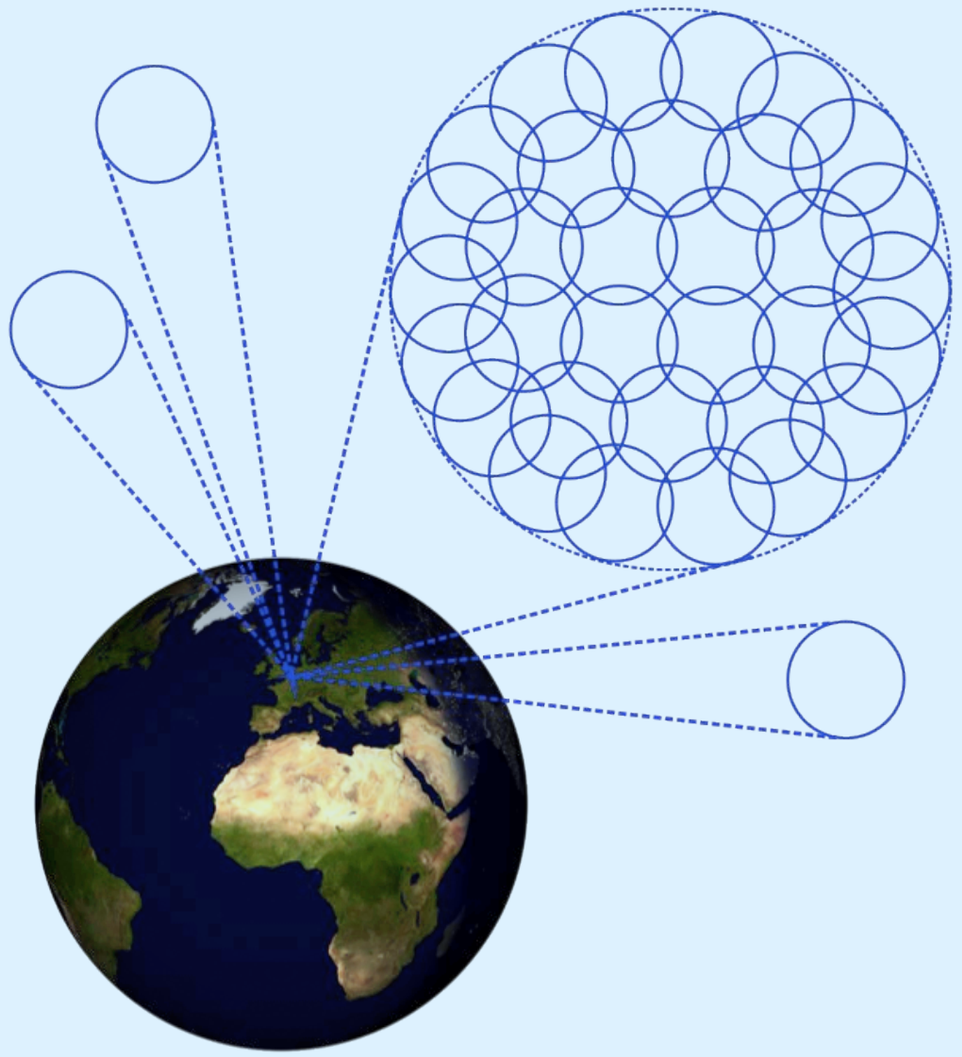
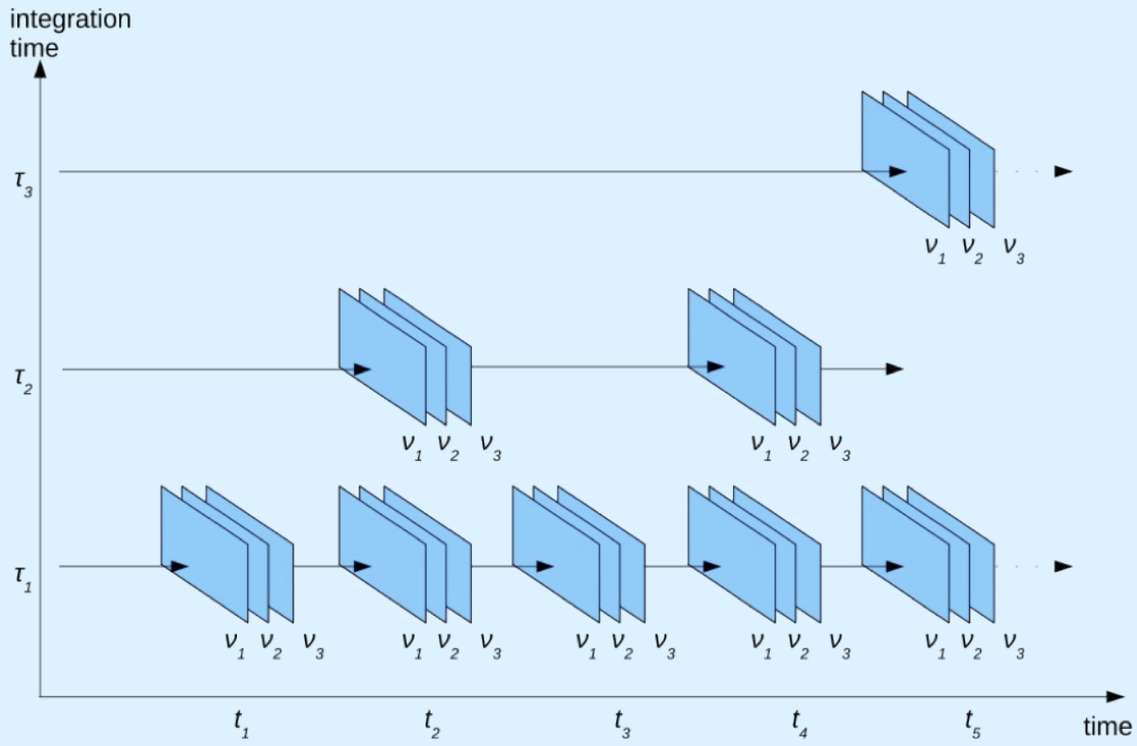
Science operations since December 2012

Radio Sky Monitor





- Huge field of view
- 1-1000 second cadence
- Full Stokes
- Detect & respond in real time

AARTFAAC

Amsterdam-ASTRON Radio Transients Facility & Analysis Centre

"All of the sky, all of the time"

...starting late 2013

MeerKAT

13.5 metre offset Gregorian

64 dishes, 8 km baseline

0.9 to 1.7 GHz

Most sensitive cm-wave instrument in the Southern Hemisphere

Science operations 2016

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13.5 metre offset Gregorian

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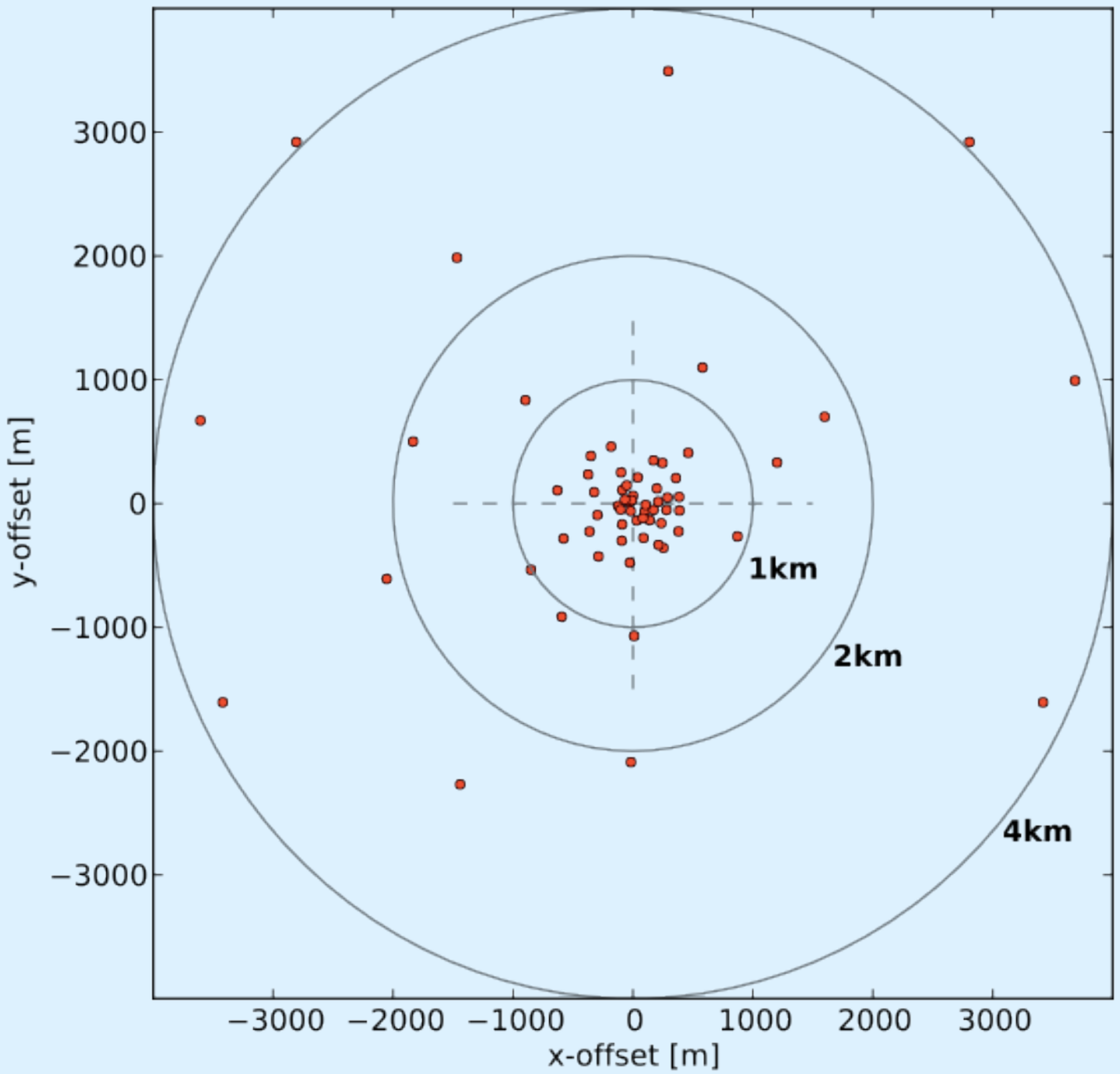
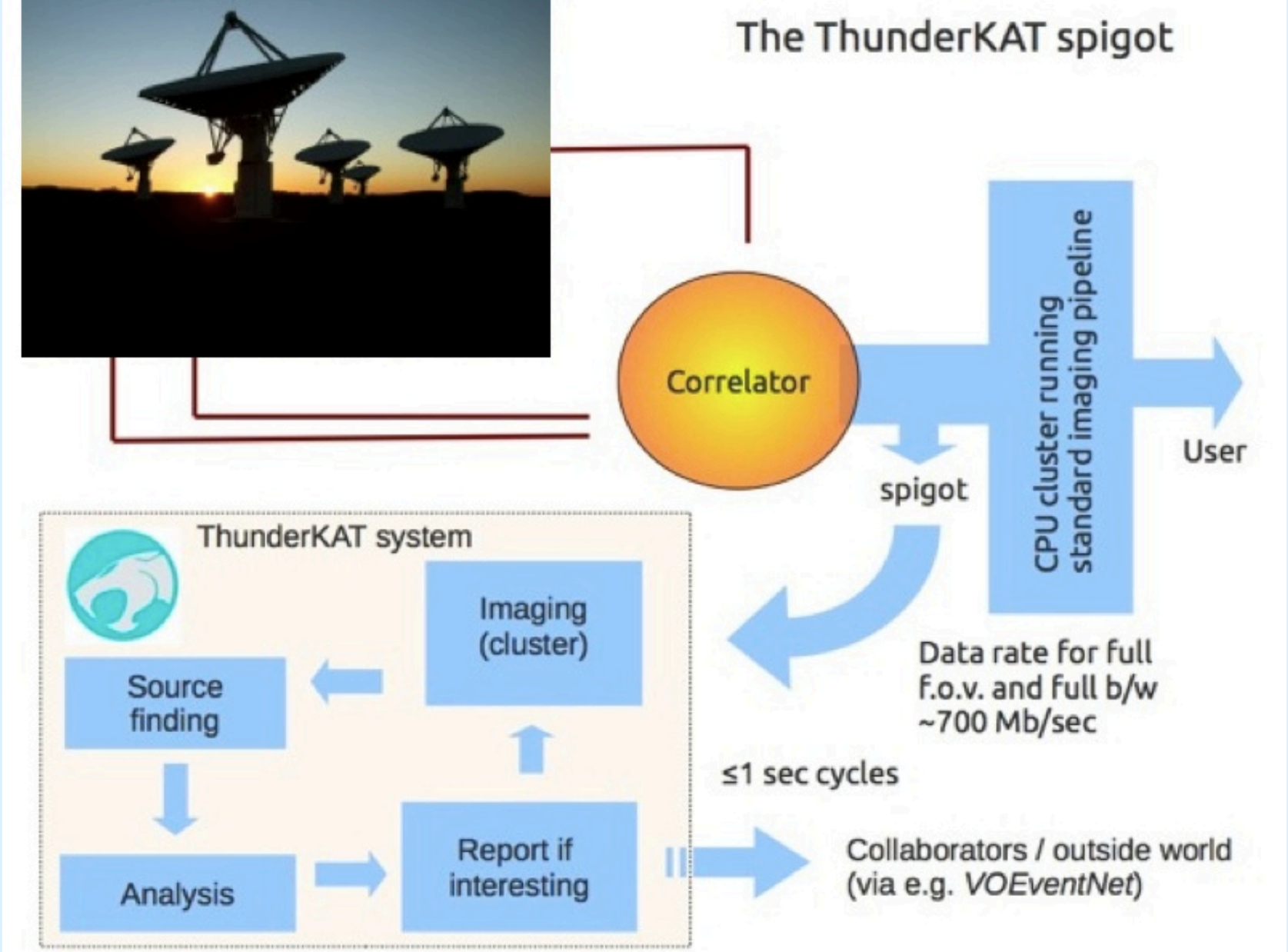
Most sensitive cm-wave instrument in the Southern Hemisphere

Science operations 2016



Commensal ThunderKAT



KAT-7

MeerKAT test array

7 × 12 m dishes

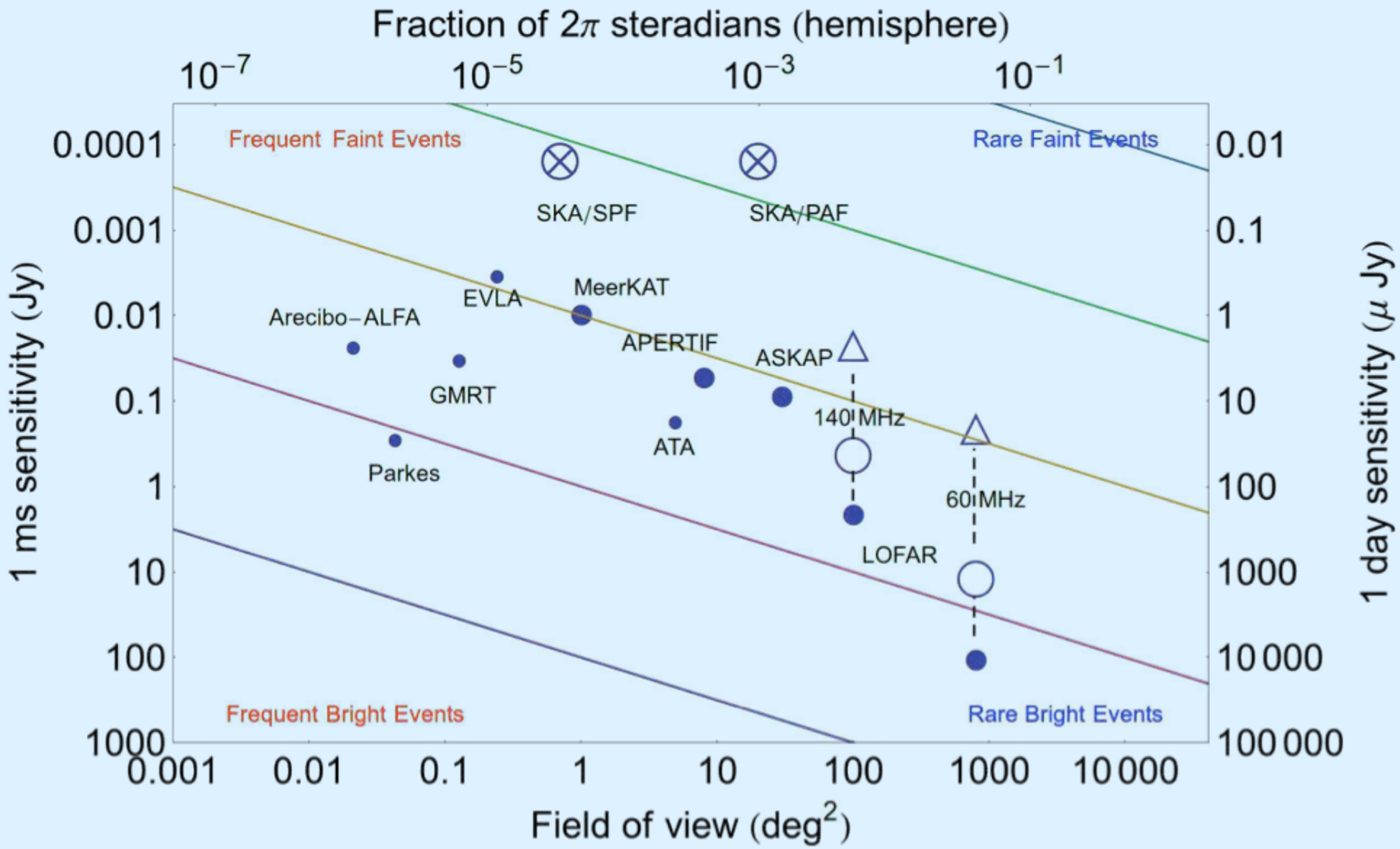
185 metre baseline

1.2 to1.9 GHz

256 MHz bandwidth

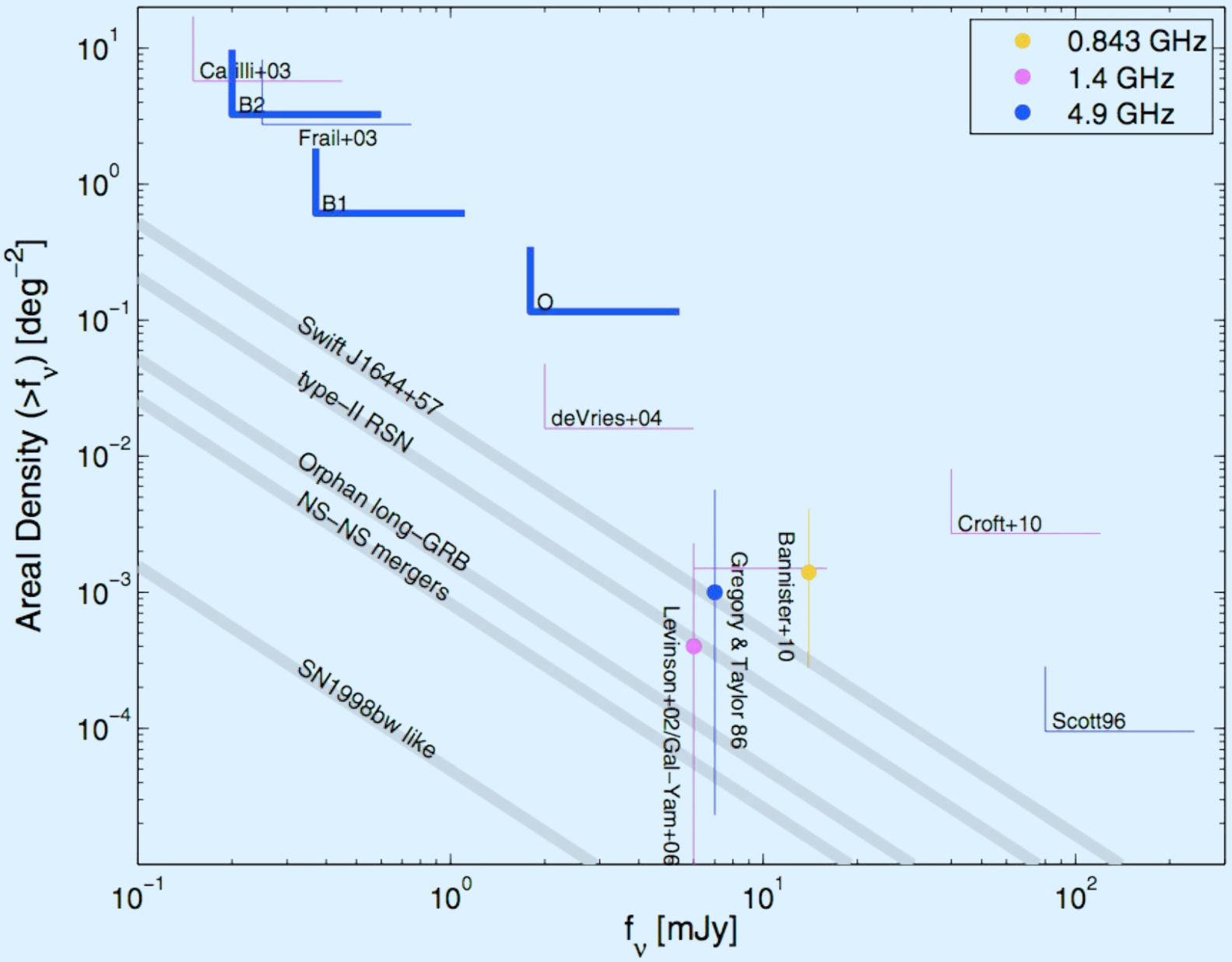
Observations ongoing

In context



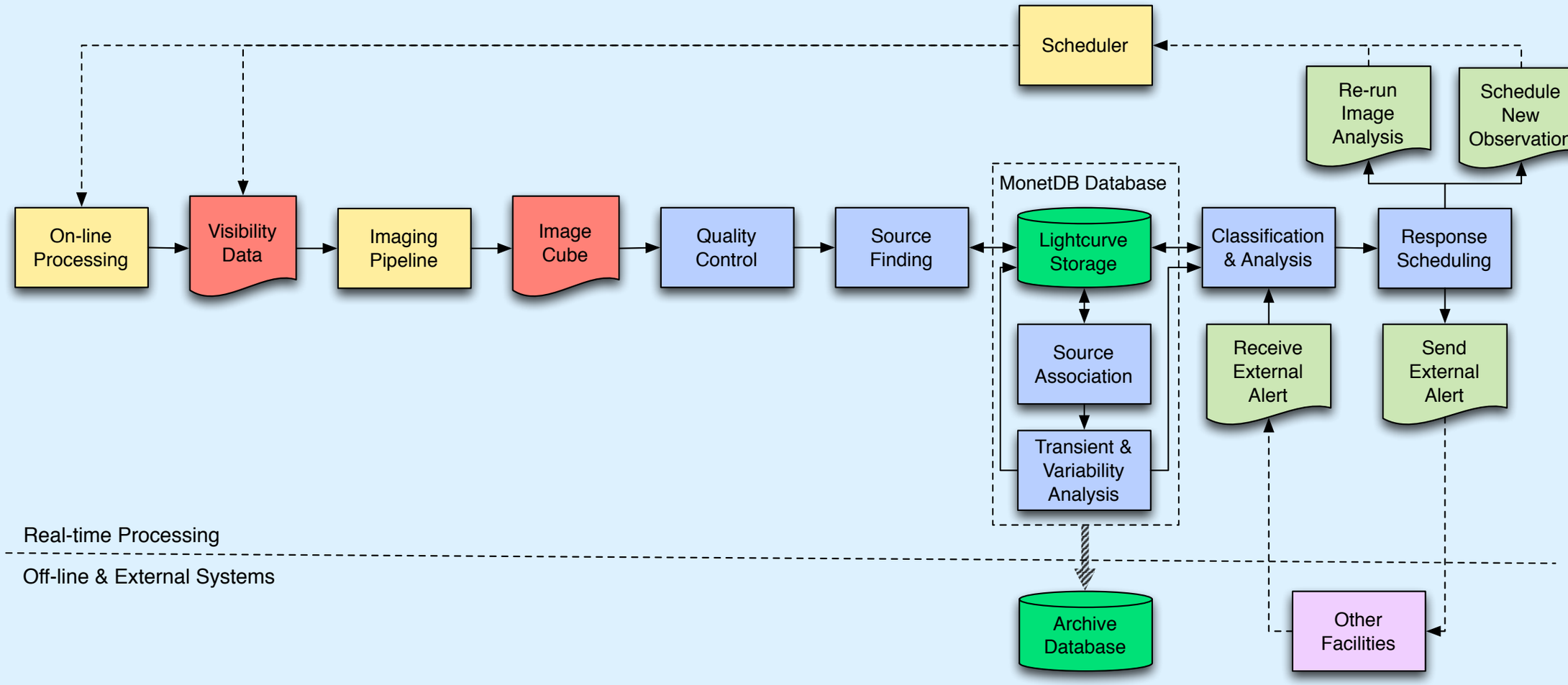
Fender, 2011

Expected rates



Frail, ApJ 747:70, 2012

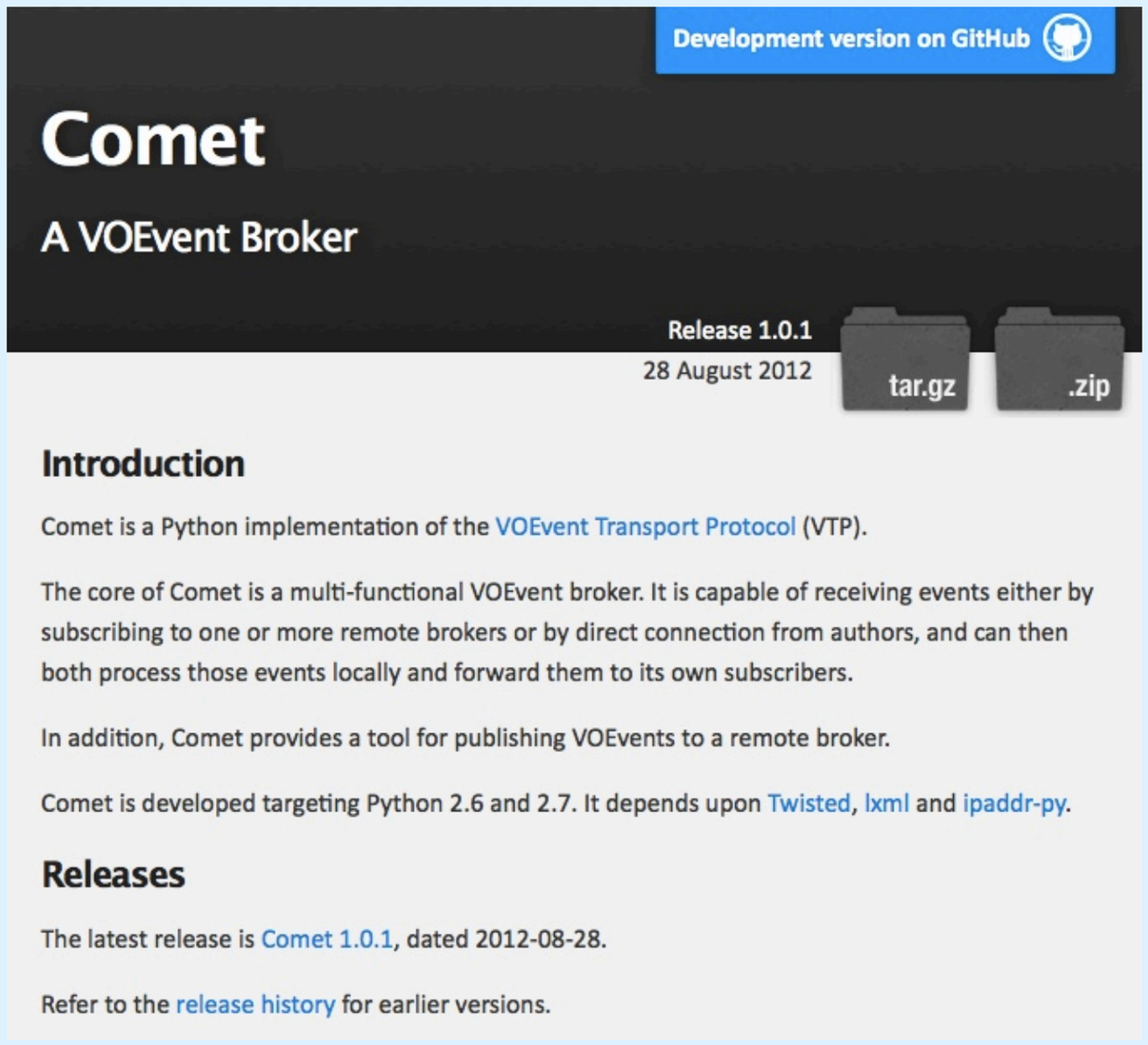
Transient Detection



Data Products

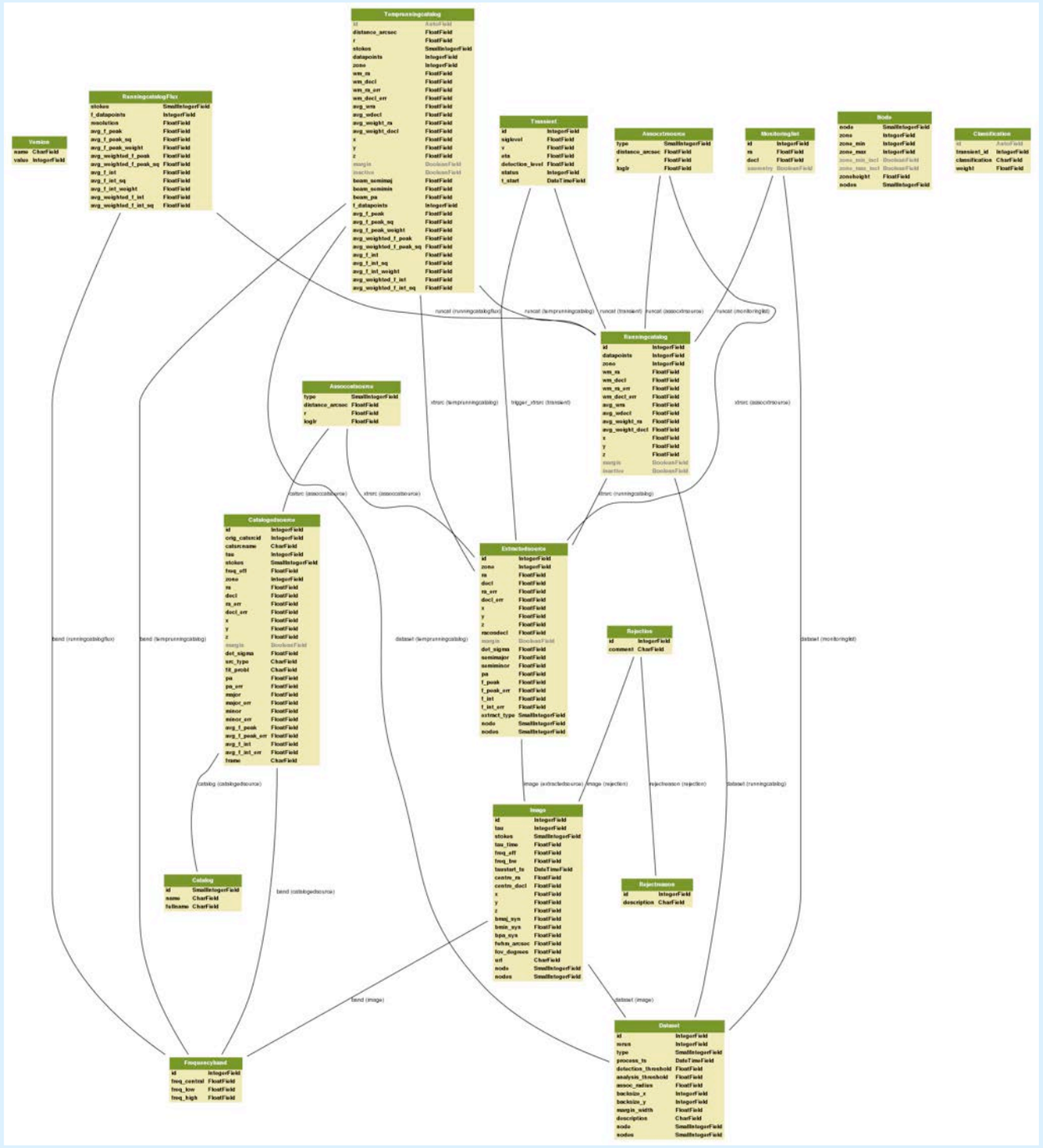
- Public VOEvent stream
  - 10s-100s/day when fully operational
- Public lightcurve archive
  - Multi-frequency, full polarization, all point sources observed by LOFAR
- Not visibilities/images
  - But we might point you to the generic LOFAR archive

VOEvent Transport

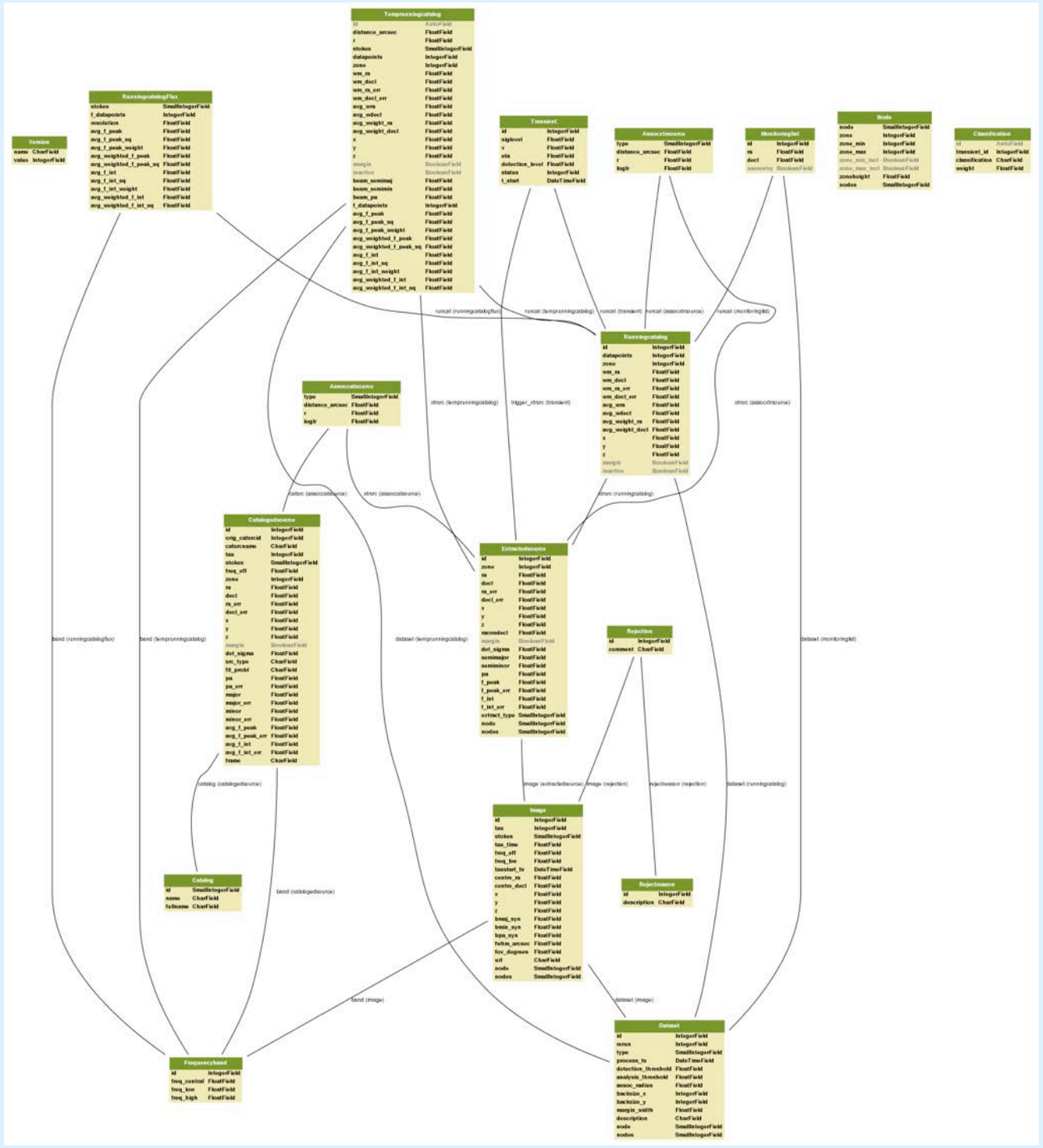


http://comet.transientskp.org/
http://tinyurl.com/20130513vtp

Data Products: Lightcurves

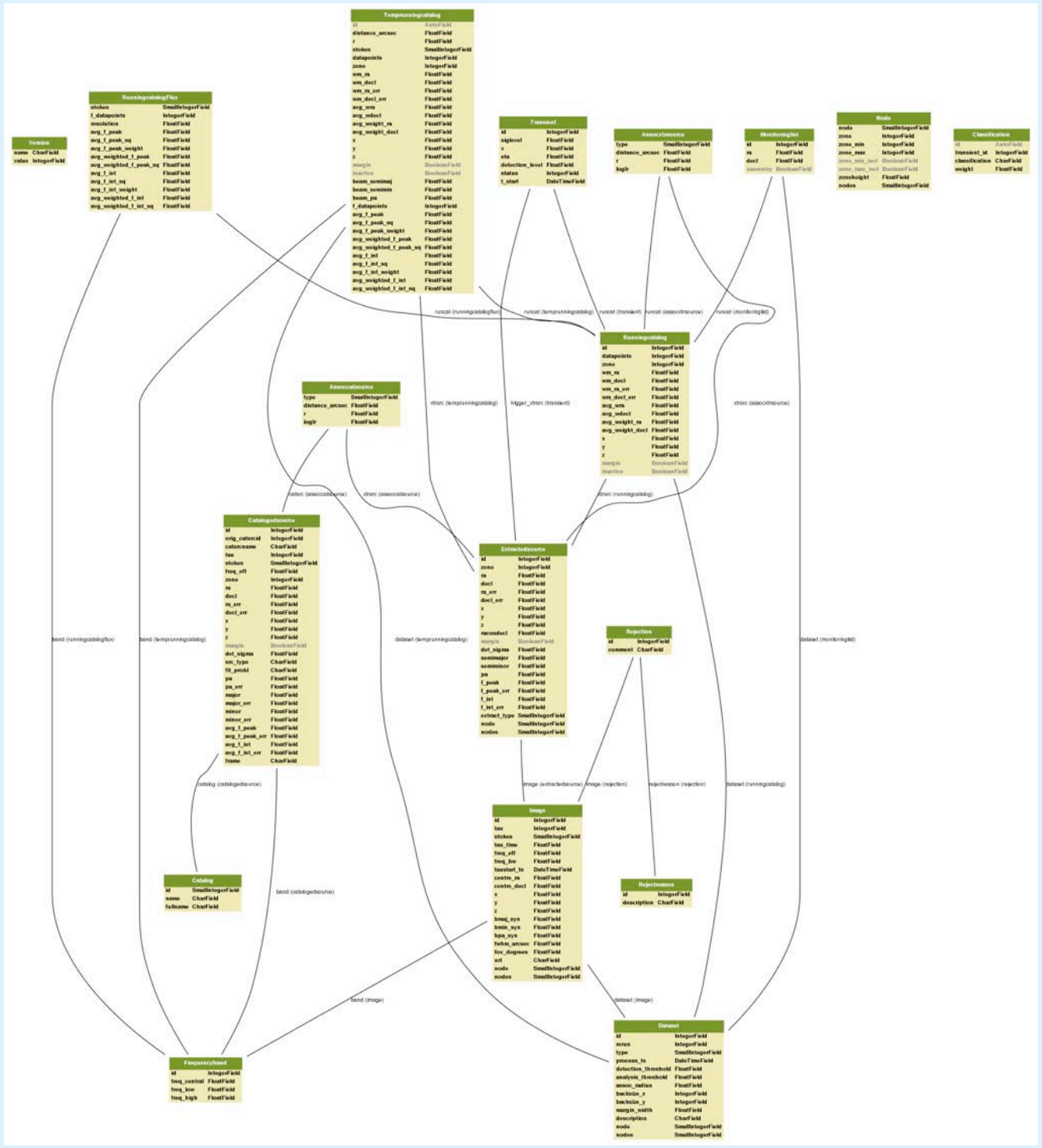


Data Products: Lightcurves



- Tens of TB/yr

Data Products: Lightcurves



- Tens of TB/yr
- Uhm… help?

Data Access

Data Access

LOFAR transients database

Datasets

id	description	in name	Reprocessing step #	Processing finished	Number of transients
1	None	flare_stars	0	2012-04-18T08:32:57	31
2	None	april_simulation	0	2012-04-18T10:56:43	0
3	None	april_simulation	1	2012-04-18T16:52:47	8
4	None	L30582	0	2012-04-18T18:08:25	0
5	None	L30582	1	2012-04-18T19:44:47	3
6	None	april_simulation	2	2012-04-19T08:08:22	0
7	None	april_simulation	3	2012-04-19T08:09:11	0
8	None	L30582	2	2012-04-19T14:06:50	9
9	None	L30582	3	2012-04-19T18:45:03	7
10	None	L30582	4	2012-04-22T18:33:55	18
11	None	L30582	5	2012-04-23T14:57:00	4
12	None	L30582	6	2012-04-24T11:21:47	4
13	None	L30582	7	2012-04-24T11:25:44	9
14	None	L30582	8	2012-04-24T12:42:13	7
15	None	L30582	9	2012-04-24T12:46:59	11
16	None	L30582	10	2012-04-24T12:51:56	8
17	None	L30582	11	2012-04-25T16:51:37	0
18	None	L30582	12	2012-05-05T17:04:32	0
19	None	april_simulation	4	2012-05-09T10:00:26	9
20	None	L30582	13	2012-05-10T23:15:12	0
21	None	L30582	14	2012-05-10T23:16:46	25

Data Access

LOFAR transients da

Datasets

id	description	in name	Repr st
1	None	flare_stars	
2	None	april_simulation	
3	None	april_simulation	
4	None	L30582	
5	None	L30582	
6	None	april_simulation	
7	None	april_simulation	
8	None	L30582	
9	None	L30582	
10	None	L30582	
11	None	L30582	
12	None	L30582	
13	None	L30582	
14	None	L30582	
15	None	L30582	
16	None	L30582	
17	None	L30582	
18	None	L30582	
19	None	april_simulation	
20	None	L30582	
21	None	L30582	

Dataset #15, L30582

Properties

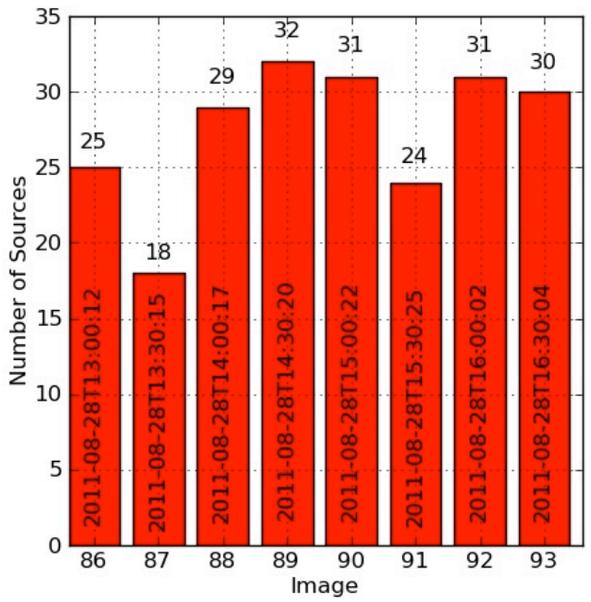
description: None
Reprocessing step: 9
processing finished: 2012-04-24T12:46:59

Details

- 11 detected transients
- 8 available images
- 61 unique sources
- 220 total detected sources
- Monitoring list

Quality control checks

Number of sources per image



Data Access

LOFAR transients da

Datasets

id	description	in name	Repr st
1	None	flare_stars	
2	None	april_simulation	
3	None	april_simulation	
4	None	L30582	
5	None	L30582	
6	None	april_simulation	
7	None	april_simulation	
8	None	L30582	
9	None	L30582	
10	None	L30582	
11	None	L30582	
12	None	L30582	
13	None	L30582	
14	None	L30582	
15	None	L30582	
16	None	L30582	
17	None	L30582	
18	None	L30582	
19	None	april_simulation	
20	None	L30582	
21	None	L30582	

Dataset #15, L30582

Properties

description: None
Reprocessing step: 9
processing finished: 2012-04-24T12:

Details

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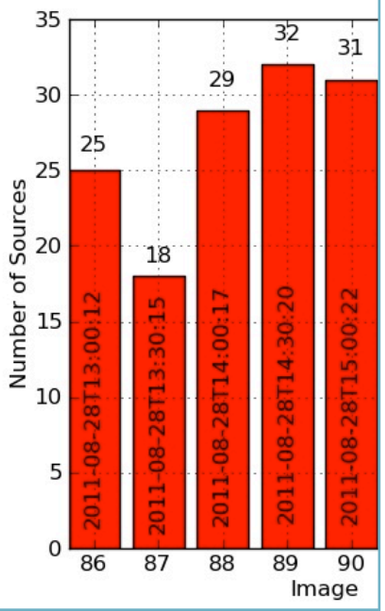
Quality control checks

Number of sources per image



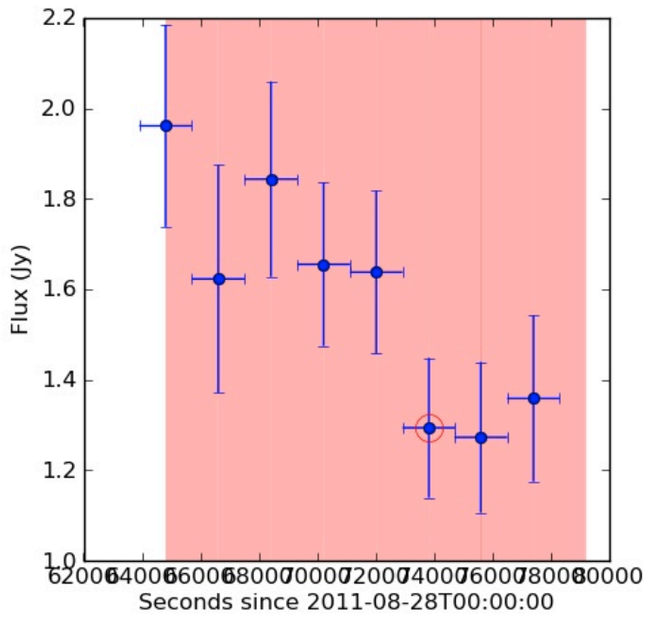
Transient #106

Properties

Position: (207.940°, 55.300°) ± (4.002″, 2.771″)
Significance level: 1.0
η_v: 1.58195359405
V_v: 0.136654955846
Start date: -
# of datapoints: 8
Associated source: # 2815
Dataset: # 15

Lightcurve

Light curve for this transient; horizontal error bars indicate the integration time. Red bars indicate the timestamps of all available images; their width again indicates the image integration time for the image.



Data Access

LOFAR transients da

Datasets

id	description	in name	Repr st
1	None	flare_stars	
2	None	april_simulation	
3	None	april_simulation	
4	None	L30582	
5	None	L30582	
6	None	april_simulation	
7	None	april_simulation	
8	None	L30582	
9	None	L30582	
10	None	L30582	
11	None	L30582	
12	None	L30582	
13	None	L30582	
14	None	L30582	
15	None	L30582	
16	None	L30582	
17	None	L30582	
18	None	L30582	
19	None	april_simulation	
20	None	L30582	
21	None	L30582	

Dataset #15, L30582

Properties

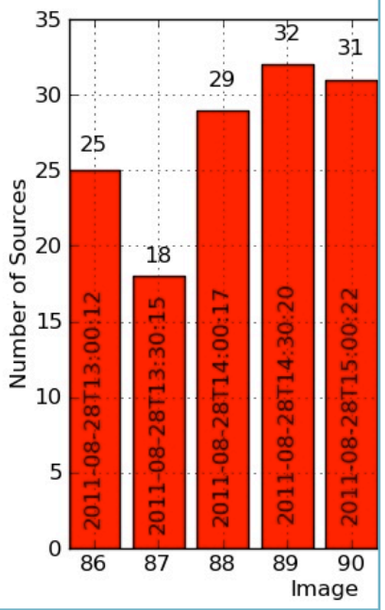
description: None
Reprocessing step: 9
processing finished: 2012-04-24T12:

Details

- 11 detected transients
- 8 available images
- 61 unique sources
- 220 total detected sources
- Monitoring list

Quality control checks

Number of sources per image



Transient #106

Properties

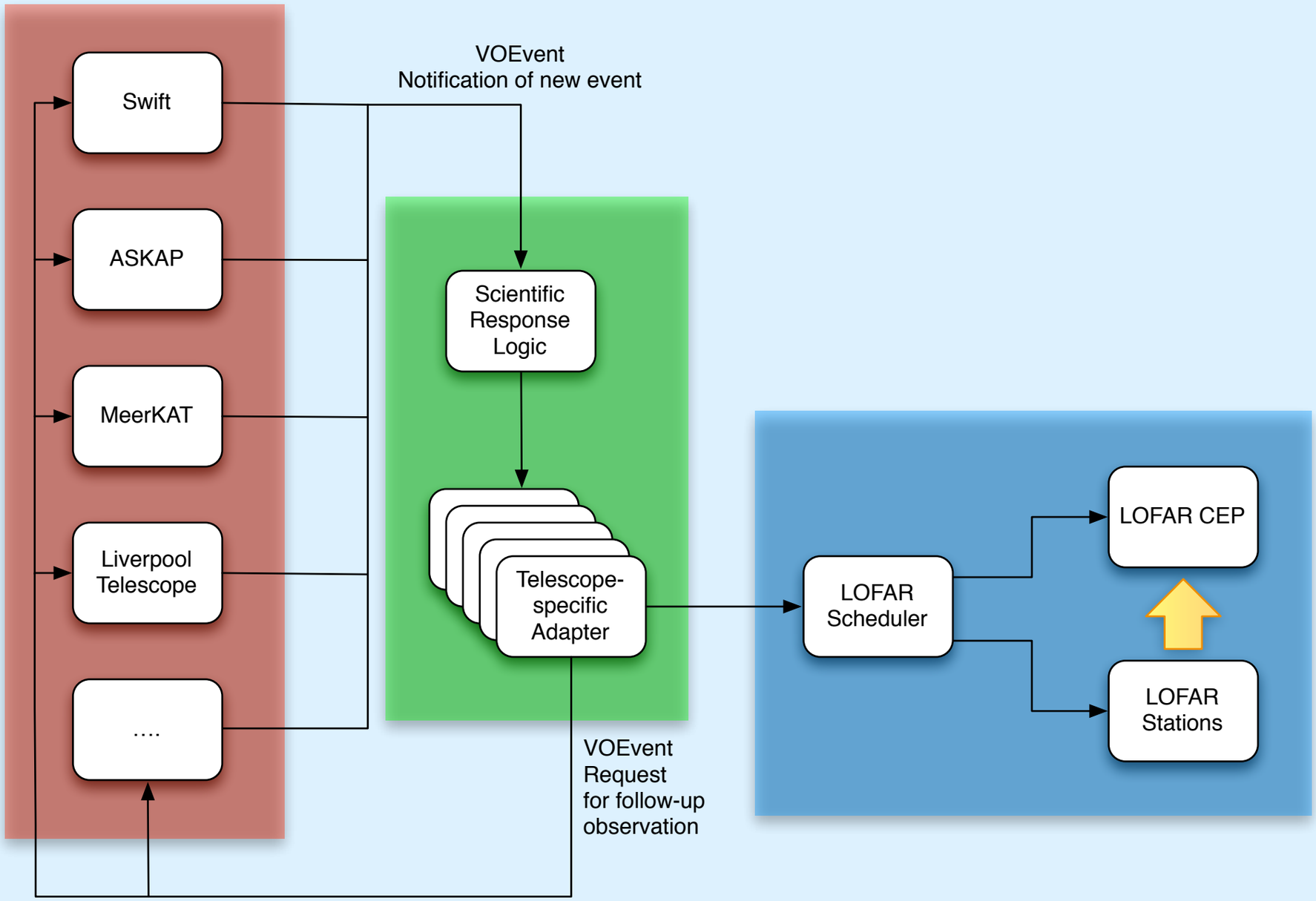
Position: (207.940°, 55.300°) ± (4.002″, 2.771″)
Significance level: 1.0
η_v: 1.58195359405
V_v: 0.136654955846
Start date: -
# of datapoints: 8
Associated source: # 2815
Dataset: # 15

Lightcurve

Light curve for this transient; horizontal error bars indicate the integration time. Red bars indicate the timestamps of all available images; their width again indicates the image integration time for the image.

ID	Date (UTC)	Integration time (s)	Flux (mJy)	Flux error (mJy)	Thumbnail
2815	2011-08-28T13:00:12	3600.0	1961.607	223.329	
2832	2011-08-28T13:30:15	3600.0	1623.010	251.735	
2860	2011-08-28T14:00:17	3600.0	1843.823	216.020	
2893	2011-08-28T14:30:20	3600.0	1655.320	180.417	
2923	2011-08-28T15:00:22	3600.0	1637.902	180.212	
2946	2011-08-28T15:30:25	3600.0	1293.867	154.623	
2976	2011-08-28T16:00:02	3600.0	1272.817	166.479	
3006	2011-08-28T16:30:04	3600.0	1358.708	183.859	

Response System Concept



References

http://www.transientskp.org/

http://www.aartfaac.org/

http://www.ast.uct.ac.za/transients/

http://comet.transientskp.org/

http://tinyurl.com/20130513vtp

http://www.hotwireduniverse.org/