IVOA Interop | Heidelberg | May 2013

LOFAR & MeerKAT Transients

John Swinbank

j.swinbank@uva.nl



30 to 240 MHz

32 MHz bandwidth

0.76 kHz spectral resolution

Multiple beams

Wide range of observing modes



30 to 240 MHz 32 MHz bandwidth

0.76 kHz spectral resolution

Multiple beams

Wide range of observing modes





30 to 240 MHz

32 MHz bandwidth

0.76 kHz spectral resolution

Multiple beams

Wide range of observing modes







30 to 240 MHz

32 MHz bandwidth

0.76 kHz spectral resolution

Multiple beams

Wide range of observing modes



30 to 240 MHz 32 MHz bandwidth 0.76 kHz spectral resolution **Multiple beams** Wide range of observing modes **Science** operations

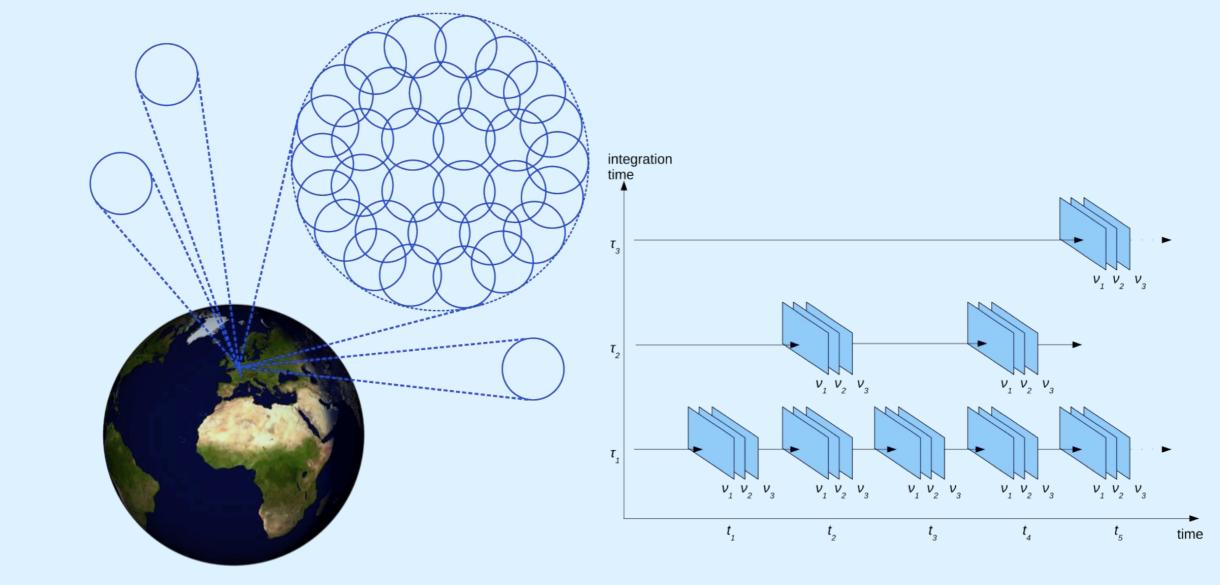
since December 2012



Swinbank | IVOA Interop | May 2013

Radio Sky Monitor

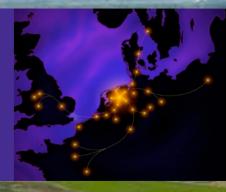




- Huge field of view
- 1-1000 second cadence

- 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



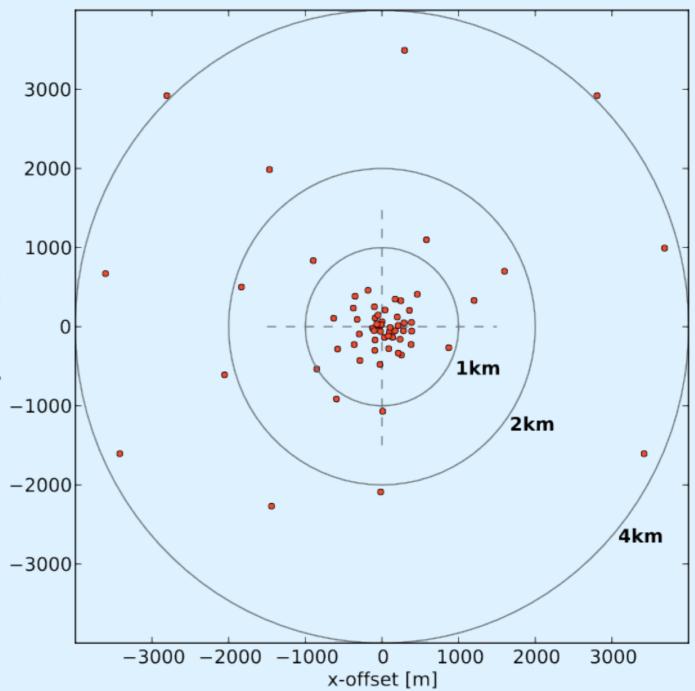




MeerKAT

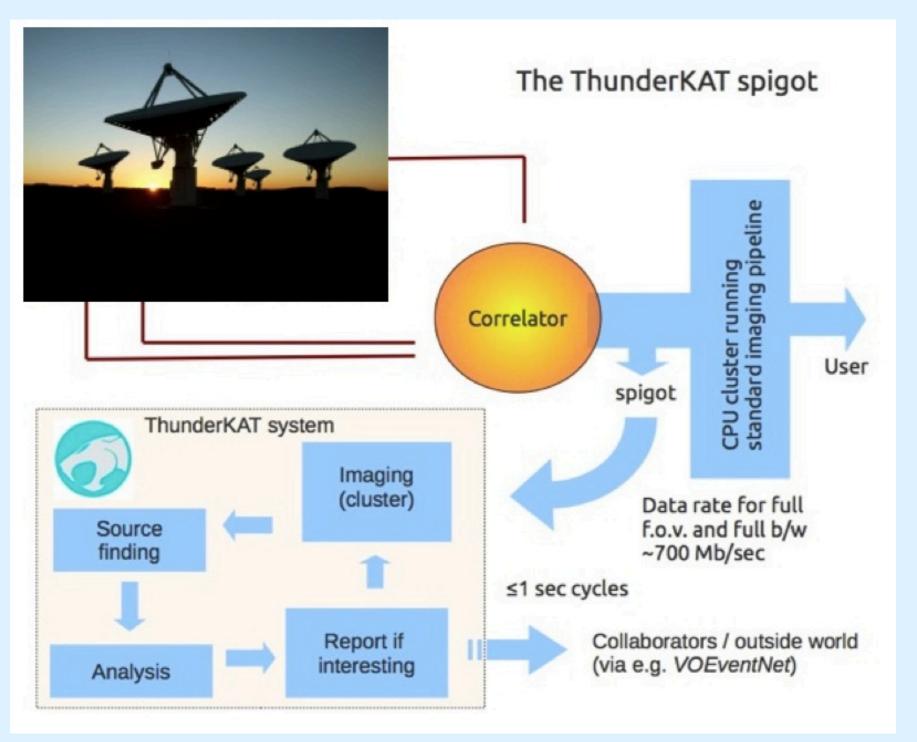


13.5 metre offset Gregorian 64 dishes, 8 km baseline y-offset [m] 0.9 to 1.7 GHz Most sensitive cm-wave instrument in the Southern Hemisphere Science operations 2016



Commensal ThunderKAT





Swinbank | IVOA Interop | May 2013

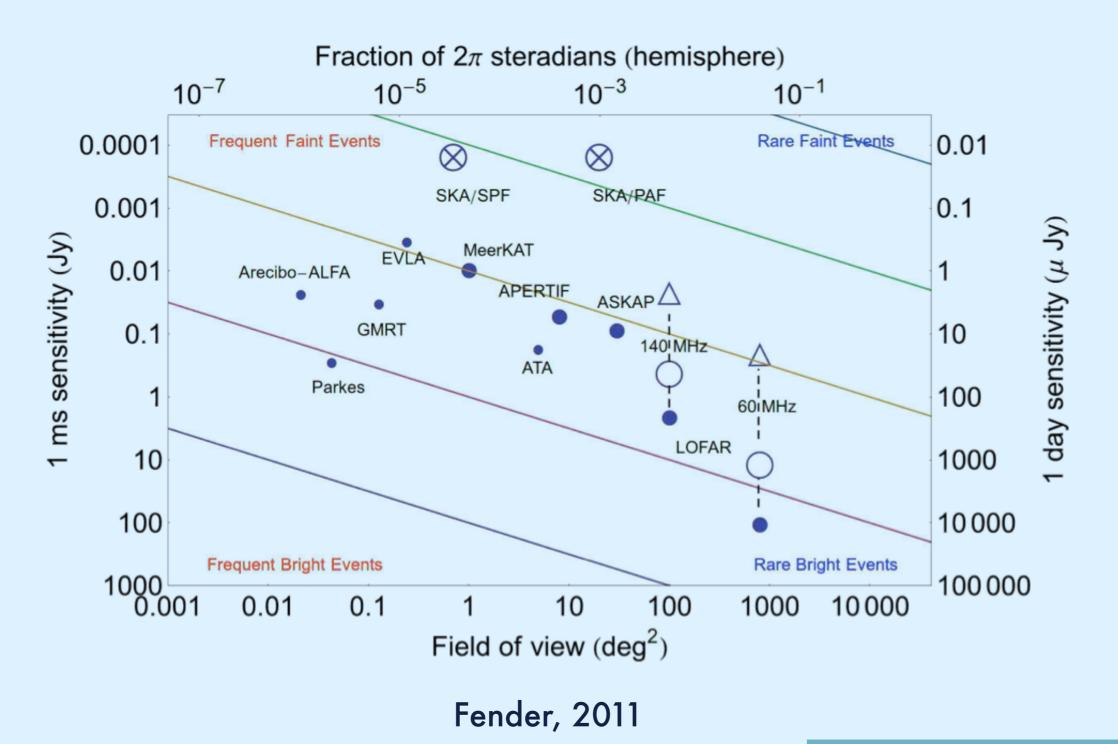
KAT-7



MeerKAT test array 7 × 12 m dishes 185 metre baseline 1.2 to 1.9 GHz 256 MHz bandwidth Observations ongoing

In context

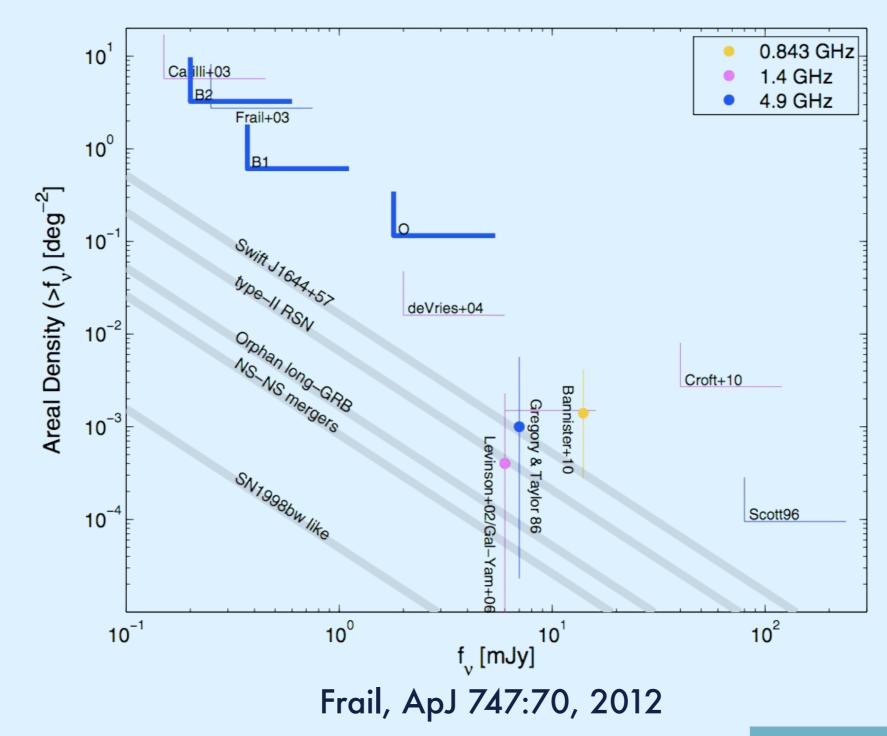




Swinbank | IVOA Interop | May 2013

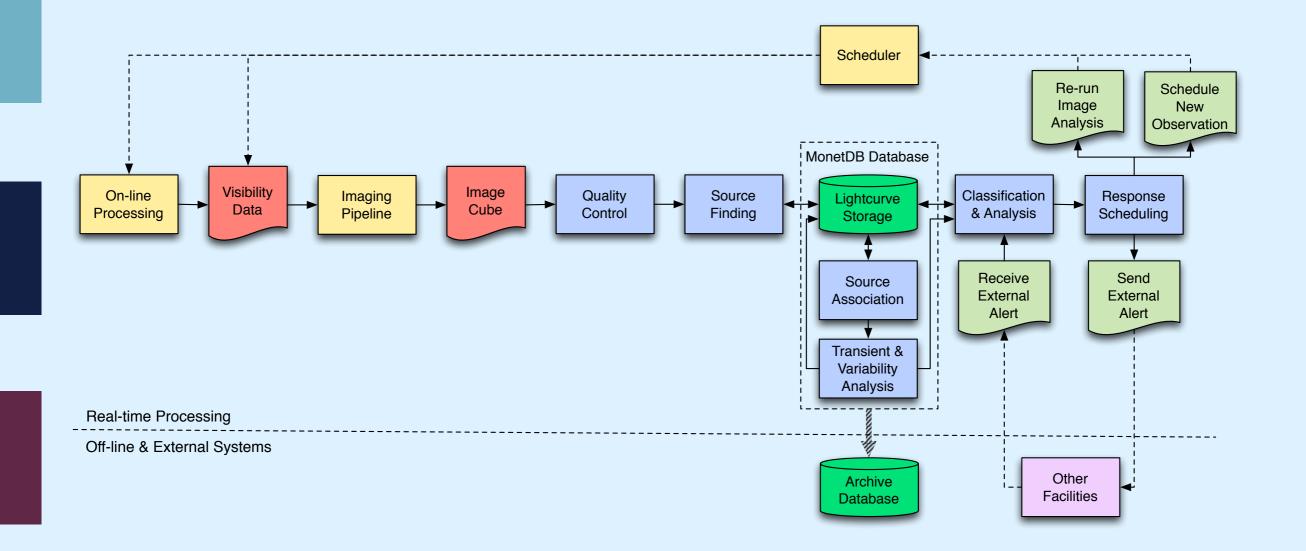
Expected rates





Transient Detection



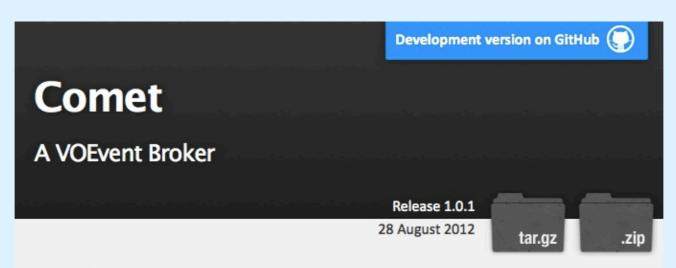


Data Products

- 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





Introduction

Comet is a Python implementation of the VOEvent Transport Protocol (VTP).

The core of Comet is a multi-functional VOEvent broker. It is capable of receiving events either by subscribing to one or more remote brokers or by direct connection from authors, and can then both process those events locally and forward them to its own subscribers.

In addition, Comet provides a tool for publishing VOEvents to a remote broker.

Comet is developed targeting Python 2.6 and 2.7. It depends upon Twisted, lxml and ipaddr-py.

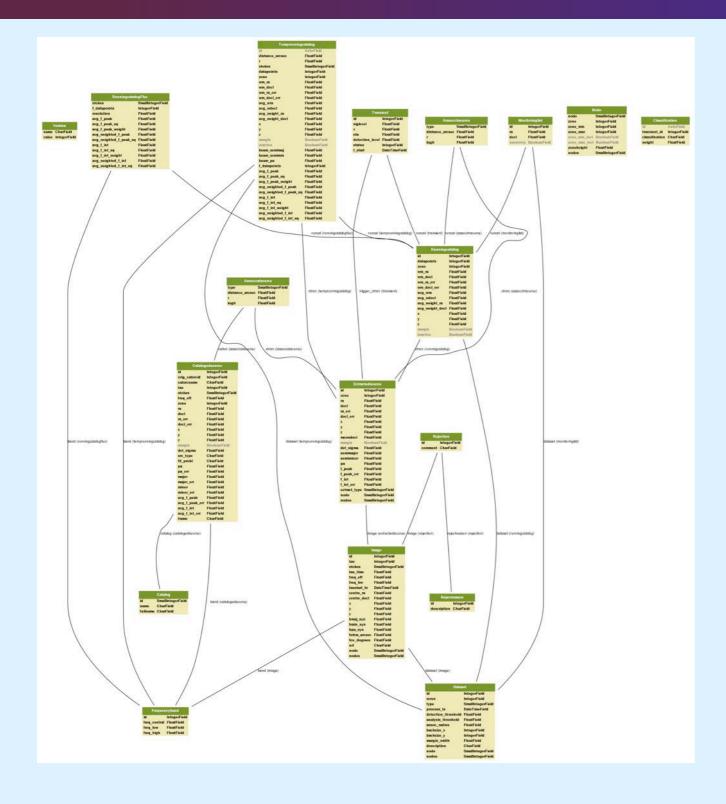
Releases

The latest release is Comet 1.0.1, dated 2012-08-28.

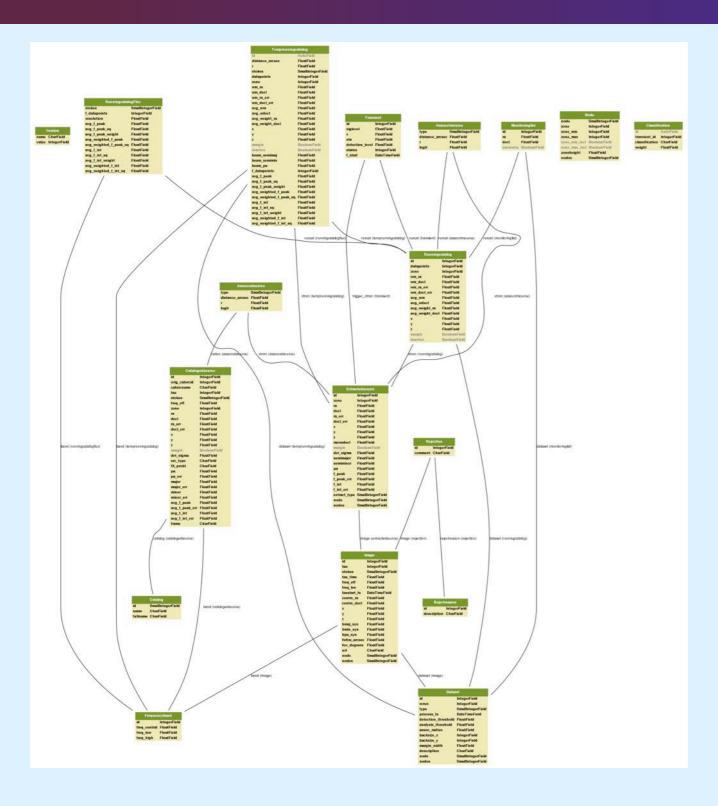
Refer to the release history for earlier versions.

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

Data Products: Lightcurves



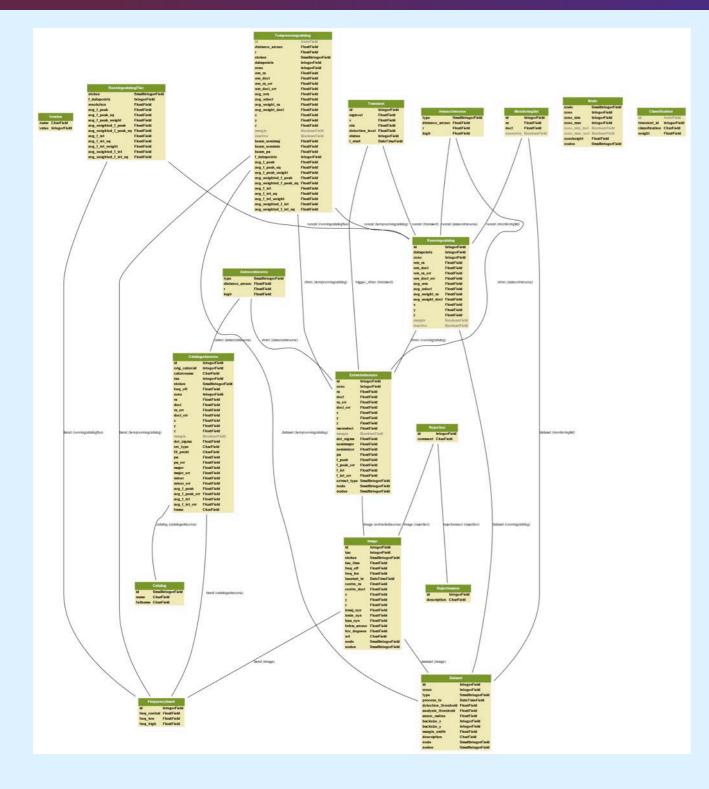
Data Products: Lightcurves



• Tens of TB/yr

Data Products: Lightcurves





- Tens of TB/yr
- Uhm... help?

Swinbank | IVOA Interop | May 2013

Data Access



Swinbank | IVOA Interop | May 2013

Data Access

LOFAR transients database

Datasets

d	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
0	None	L30582	4	2012-04-22T18:33:55	18
.1	None	L30582	5	2012-04-23T14:57:00	4
2	None	L30582	6	2012-04-24T11:21:47	4
.3	None	L30582	7	2012-04-24T11:25:44	9
.4	None	L30582	8	2012-04-24T12:42:13	7
5	None	L30582	9	2012-04-24T12:46:59	11
6	None	L30582	10	2012-04-24T12:51:56	8
7	None	L30582	11	2012-04-25T16:51:37	0
8	None	L30582	12	2012-05-05T17:04:32	0
9	None	april_simulation	4	2012-05-09T10:00:26	9
20	None	L30582	13	2012-05-10T23:15:12	0
1	None	L30582	14	2012-05-10T23:16:46	25



Data Access

LOFAR transients da Dataset #15, L30582

Properties

Datasets

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

Reprocessing step: 9

description: None

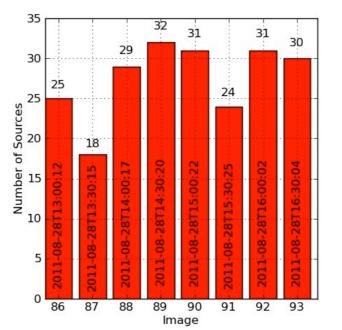
processing finished: 2012-04-24T12:46:59

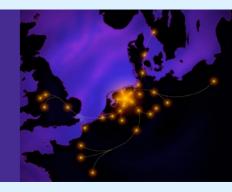
Details

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

Quality control checks

Number of sources per image





Swinbank | IVOA Interop | May 2013



LOFAR transients da Dataset #15, L30582

Properties

Datasets

id	description	in name	Repr st	
1	None	flare_stars		C
2	None	april_simulation		L
3	None	april_simulation		
4	None	L30582		
5	None	L30582		
6	None	april_simulation		
7	None	april_simulation		
8	None	L30582		C
9	None	L30582		N
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		

Transient #106

Properties

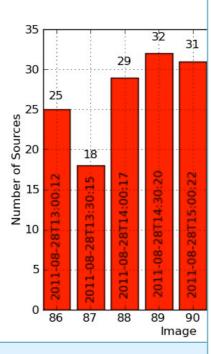
Reprocessing step: 9 processing finished: 2012-04-24T12:4

description: None

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

Quality control checks

Number of sources per image

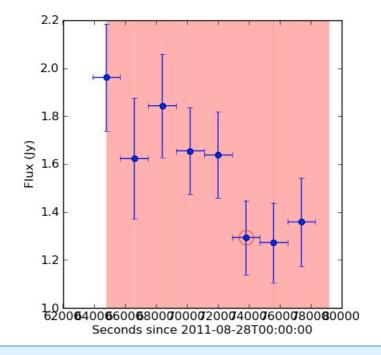


Position: (207.940°, 55.300°) ± (4.002", 2.771")

- Significance level: 1.0 nv: 1.58195359405
 - Vy: 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.





Swinbank | IVOA Interop | May 2013

183.859

Data Access

LOFAR transients da Dataset #15, L30582

Properties

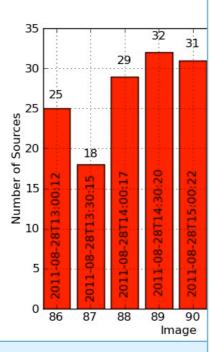
Datasets

id	description	in name	Repr st	
1	None	flare_stars		
2	None	april_simulation		1
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		

- description: None Reprocessing step: 9 processing finished: 2012-04-24T12:4
- 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

- Significance level: 1.0

 - Start date: -
- # of datapoints: 8
- Associated source: # 2815
 - Dataset: # 15

Lightcurve

2.2

3006

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.

2011-08-28T16:30:04

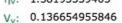
_						
i	ID	Date (UTC)	Integration time (s)	Flux (mJy)	Flux error (mJy)	Thumbnail
	2815	2011-08-28T13:00:12	3600.0	1961.607	223.329	
	2832	2011-08-28T13:30:15	3600.0	1623.010	251.735	
	2860	2011-08-28T14:00:17	3600.0	1843.823	216.020	
	2893	2011-08-28T14:30:20	3600.0	1655.320	180.417	
	2923	2011-08-28T15:00:22	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	

3600.0

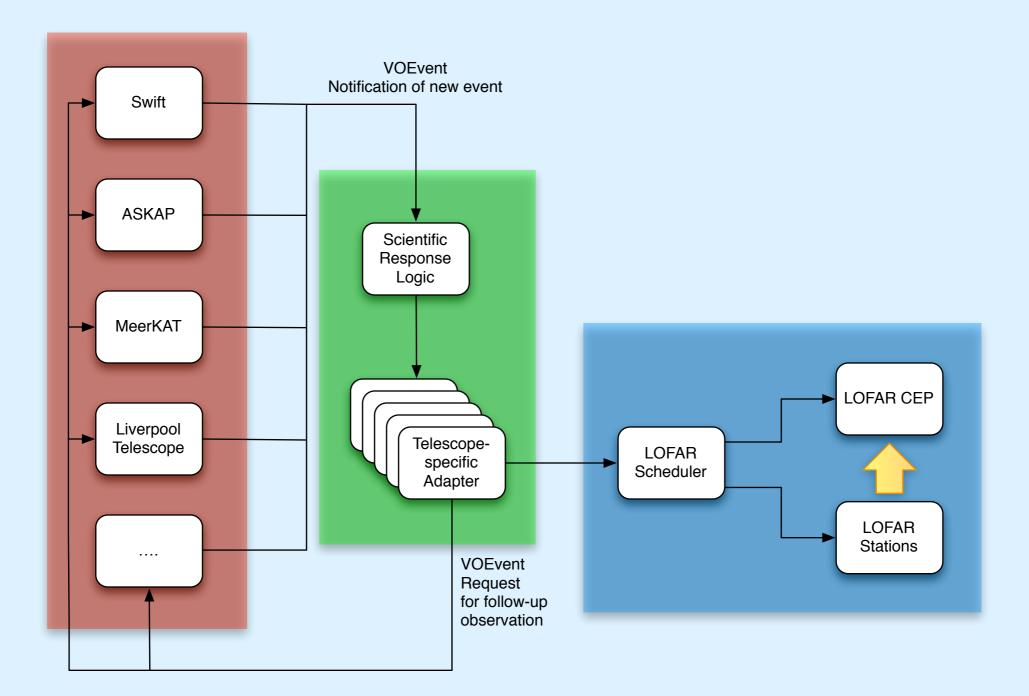
1358.708

Position: (207.940°, 55.300°) ± (4.002", 2.771")

nv: 1.58195359405



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/

