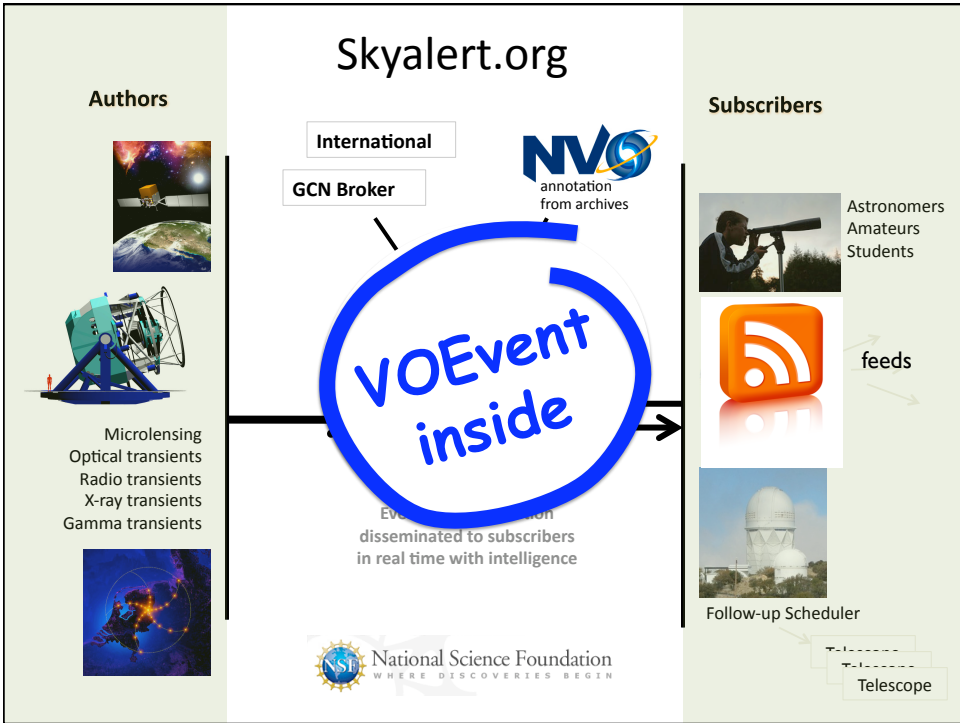


Skylert

astronomical events with intelligence and automation

Roy Williams
California Institute of Technology

George Djorgovski
Andrew Drake
Sarah Emery Bunn
Matthew Graham
Ashish Mahabal
Jon Myers, LSST
Rob Seaman, NOAO



Recent events from last hours, days

click event for drilldown

2010 May 17 @ 6.30am

| Object | Year | mo | day | RA | Dec | mag | filt |
|---------|-------|----|-----|-------|-------------|-------------|--------|
| RK26366 | C2010 | 05 | 17 | 41191 | 21 08 12.55 | -06 33 31.3 | 18.2 V |
| RK26366 | C2010 | 05 | 17 | 41702 | 21 08 12.66 | -06 33 33.3 | 17.8 V |
| RK26366 | C2010 | 05 | 17 | 42227 | 21 08 12.66 | -06 33 36.6 | 17.9 V |

| Year | day | h | min | RA | Dec | elong | mag | RA(sec/min) | Dec(sec/min) |
|------|-----|----|-----|------------|-----------|-------|------|-------------|--------------|
| 2010 | 05 | 17 | 11 | 21 08 13.0 | -06 33 55 | 98.7 | 18.1 | 0.13 | -0.40 |
| 2010 | 05 | 17 | 15 | 21 08 15.0 | -06 35 31 | 98.8 | 18.1 | 0.13 | -0.40 |
| 2010 | 05 | 17 | 19 | 21 08 17.0 | -06 37 08 | 99.0 | 18.1 | 0.12 | -0.40 |
| 2010 | 05 | 17 | 23 | 21 08 19.0 | -06 38 45 | 99.2 | 18.1 | 0.12 | -0.40 |
| 2010 | 05 | 18 | 03 | 21 08 20.9 | -06 40 22 | 99.3 | 18.1 | 0.12 | -0.41 |

Worldwide Telescope

view of all recent events

Skyalert Worldwide Telescope Display

These events are dynamically retrieved from SkyAlert.

SWIFT last 20 Fermi last 20 CRTS last 20 SantaSighting last 20 CRTS last 200

Click in the center of any event for window with detailed data. Initial display is CRTS most recent 20 events.

Digitized Sky Survey

- Hipparcos
- VLA Low-frequency Sky Survey
- WMAP Cosmic Microwave Background
- SFD Dust Map
- IRAS/IRS Infrared
- OMASS Infrared
- Hydrogen Alpha
- Sloan Digital Sky Survey
- Tycho
- USNOB
- Galex ultraviolet
- ROSAT X-ray
- Fermi Gamma

Portfolio view / massgfcgen / SWIFTBAT_QuickLook_Pos_414905-707

From the SWIFT event: SWIFT GRB alert: Position is RA:345.3762 ± 0.05 The particle released 2010-03-05 01:07:11

BAT_QuickLook_Pos_414905-707


SWIFT obj=47 RA: Dec: is (148.3454, 42.3762) ± 0.05. For full information on the meaning of the parameters in this packet, see [table](#) and search for 'TYPE=97'

CLICK

iPhone app data served from Skyalert

Transient Events By LSST Corporation View More By This Developer

Open iTunes to buy and download apps.



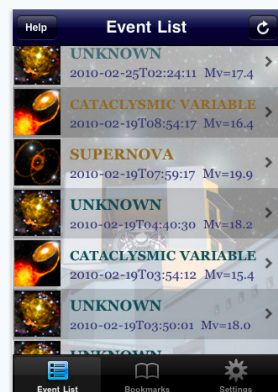
View in iTunes

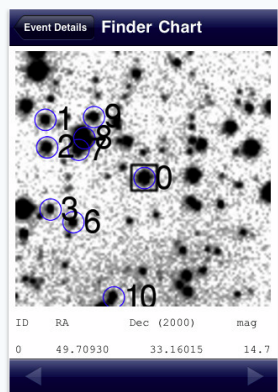
Free
Category: Reference
Updated: May 10, 2010
Current Version: 1.01
1.7 MB
Language: English
Seller: LSST
© 2010 LSST Corporation
Rated 4+

Requirements: Compatible with iPhone, iPod touch, and iPad. Requires iPhone OS 3.0 or later.

Customer Ratings

iPhone Screenshots





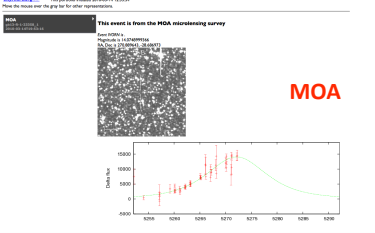
<http://itunes.apple.com/us/app/transient-events/id360158038>

5

Custom presentation

Portfolio Item: /mes/moa/transient_skyalert/1-8-1-23158_1

MOA



Portfolio Item: /pl.arizona.edu/css/RP0E10F

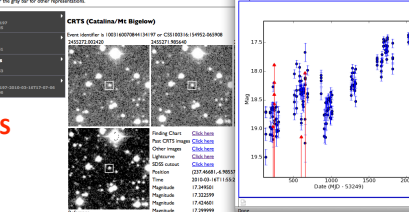
CSS_NEO

| Object | Year | no | day | RA | Dec | mag | F1(I) |
|---------|-------|----|-----|-------|-------------|-------------|--------|
| RP0E10F | C2010 | 03 | 16 | 10795 | 16 48 09.03 | +10 36 21.2 | 20.1 V |
| RP0E10F | C2010 | 03 | 16 | 10795 | 16 48 09.30 | +10 36 21.1 | 19.3 V |
| RP0E10F | C2010 | 03 | 16 | 10792 | 16 48 09.61 | +10 36 21.5 | 19.2 V |
| RP0E10F | C2010 | 03 | 16 | 10797 | 16 48 09.90 | +10 36 20.9 | 19.2 V |

CSS_NEO

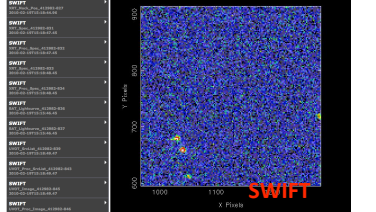
Portfolio Item: /mes.caboch/voeventmes/cats01/00070844134197

CRTS



Portfolio Item: /pl.arizona.edu/css/RP0E10F

SWIFT



3

Portfolio

Nothing nearby found in Zwickky Catalog
 Nothing nearby found in NETT
 Nothing nearby found in CSDMG
 Nothing nearby found in 2MASS extended sources
 Nothing nearby found in CRATES
 Nothing nearby found in IRGC
 Nothing nearby found in SDSS
 Nothing nearby found in GALEX
 Nothing nearby found in CGRASS
 Nothing nearby found in PGC
 Nothing nearby found in NED
 Nothing nearby found in Veron
VO lookup
 Nothing nearby found in PCC
 Nothing nearby found in SIMBAD
 Nothing nearby found in NVSS
 Nothing nearby found in ROSAT
 Nothing nearby found in Master Radio Catalog
 Nothing nearby found in VES
 Nothing nearby found in GCVS
 Nothing nearby found in UZC
 Nearby object in USNOB1 at 0.5 arcsec:

| | |
|-------------------|--------|
| Proper motion Dec | 0.0 |
| Proper motion RA | 0.0 |
| B1 | 18.990 |
| B2 | 20.050 |
| I2 | 0.000 |
| R1 | 18.270 |
| R2 | 19.800 |

Nothing nearby found in any

First report

CRTS Circular

No clear prior outbursts in CSS PQ or DSS. Some evidence of variability in CSS. The object corresponds to a blue object observed by SDSS. The object is most likely a CV. No clear NVSS radio source. Cataclysmic Variable

Classification: Circular

Primary: **Cataclysmic Variable** Estimated probability 0.90

Annotator

prob(asteroid) = 0.83

Event Portfolio

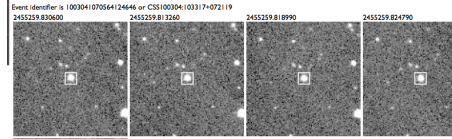
- Original data
 - links to images etc
- Archive data
 - Search VO at this location
 - SDSS, NED, Simbad, DSS, etc etc
- Data mining
 - Reduce complex data to classification
 - “Annotation components”
- Follow-up Results
 - From observation
- Comments

“Cyclic mashup workflow”

Worldwide Telescope

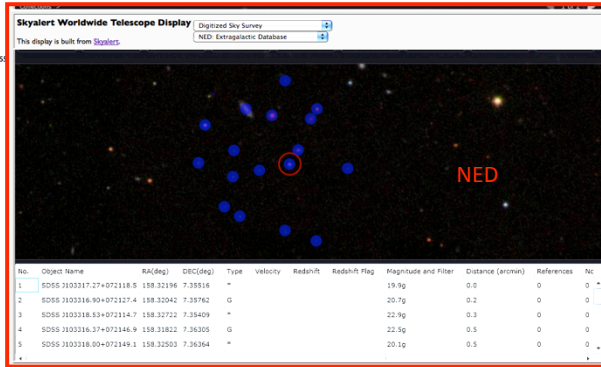
view of event location

CRTS (Catalina/Mt Bigelow)



Event identifier is 10030410705412464 or CSS100304103174072119
 2452259.830600 2452259.813260 2452259.818990 2452259.824790

[Finding Chart](#) [Click here](#)
[Past CRTS images](#) [Click here](#)
[Other images](#) [Click here](#)
[Lightcurve](#) [Click here](#)
[SDSS outshot](#) [Click here](#)
 Position (J2000.0) 158.32188, 7.35518
 Time 2010-03-04T07:47:41 (MJD 55110.31875)
 Magnitude 14.849300
 Magnitude 14.819600
 Magnitude 14.921400
 Magnitude 14.909200
 Reference Magnitude



Event dissemination

twitter Home Profile Find People Settings Help

skyalert Location Pasadena, California Web <http://skyalert.org> Bio Bringing instant notificat astronomical events. 0 following 71 followers 8 listed

✓ Following Lists Settings

CRTS event <http://skyalert.org/events/11277> is a likely Blazar Outburst. The transient corresponds to the known QSO IVS_B0815+326 which i... about 2 hours ago via API

CRTS event <http://skyalert.org/events/11279> is a likely Supernova. The detection corresponds to a clear galaxy seen in SDSS data. The tra... about 2 hours ago via API

Event from SWIFT. At 2010-05-11T11:50:39.01 UT in Hercules. Link <http://skyalert.org/events/11253> about 20 hours ago via API

facebook Home

SkyAlert

skyalert: CRTS event <http://skyalert.org/events/11277> object is slightly offset f...
 skyalert: CRTS event <http://skyalert.org/events/11279> object is slightly offset fro...
 Yesterday at 5:34am · C...

Actions: block skyalert, report for spam
 Following: RSS feed of skyalert's tv

Select → Feed, Action

Alert Detail
for the alert named nearestGalaxy

Primary Stream: [CRTS \(ivo://nvo.caltech/voeventnet/catot\)](#)
Secondary Stream: [SDSS \(ivo://nvo.caltech/voeventnet/sdssFollowup\)](#)

Name of Alert: nearestGalaxy
Active alert?: 1
Action type: asteroid-detection
Alert detail: 0.13

Trigger Expression
CRTS["First Detection params"]["magnitude"] < 18 and
SDSS["nearest_gal"]["distance"] < 5.0

Annotations:
 - Selection builds custom Feed (points to Trigger Expression)
 - Annotator (points to data mining, data fetching from VO, messaging)
 - New event → Run annotator (points to prob(asteroid) = 0.83)

Visuals: Four small astronomical images showing a star field with a white box highlighting a specific object. Below them is the text "prob(asteroid) = 0.83".

Feeds

System Feeds

- Bright CRTS from stream CRTS
- Fermi GBM from stream Fermi
- SWIFT BAT GRB from stream SWIFT
- MOA from stream MOA
- CRTS and SDSS Galaxy from stream CRTS
- Bright CRTS from stream CRTS2
- Bright CSS NEO from stream CSS_NEO
- CRTS Blazar from stream CRTS** (circled in red)
- SWIFT X-ray Outburst from stream SWIFT

Event 100415... (circled in red)

Event List:

| | | |
|------------------|---------------|------------------|
| Event 100415... | Andrew Dra... | Apr 14, 6:04 PM |
| Event 100413... | Andrew Dra... | Apr 12, 9:04 PM |
| Event 100413... | Andrew Dra... | Apr 12, 6:04 PM |
| Event 1004051... | Andrew Dra... | Apr 5, 4:04 AM |
| Event 1004041... | Andrew Dra... | Apr 3, 4:04 PM |
| Event 100325... | Andrew Dra... | Mar 24, 9:03 PM |
| Event 100320... | Andrew Dra... | Mar 19, 5:03 PM |
| Event 100315... | Andrew Dra... | Mar 14, 7:03 PM |
| Event 100315... | Andrew Dra... | Mar 14, 6:03 PM |
| Event 100314... | Andrew Dra... | Mar 13, 12:03 PM |
| Event 100217... | Andrew Dra... | Feb 16, 8:02 PM |

Event Details for 100415:

Event identifier is 1004150010694108608 or CS: 2455301.844770

Source: SkyAlert/CRTS: CR...

Visuals: Two astronomical images showing a star field with a white box highlighting a specific object. To the right is a "Finding Chart" with labels: Past CRTS images, Lightcurve, SDSS outout, Position, Time, Magnitude.

Feeds



Feed mashup tools



```
time taken: 3.284746s Refresh
> Event 1005051351034113918 from CRTS
> Event R2956AA from CSS_NEO
> Event 1005051400624118443 from CRTS
> Event R295368 from CSS_NEO
> Event R21FFB6 from CSS_NEO
> Event R21EC3B from CSS_NEO
> Event R208CB from CSS_NEO
> Event R20C08 from CSS_NEO
```

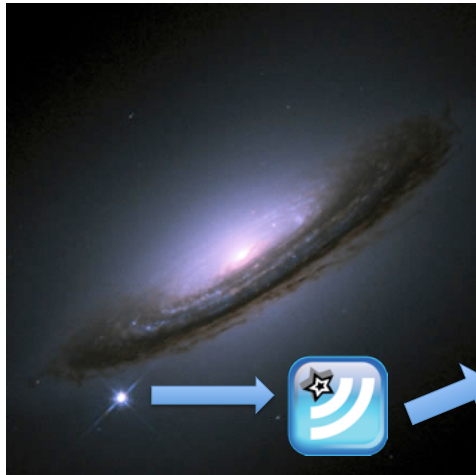
Google FeedBurner



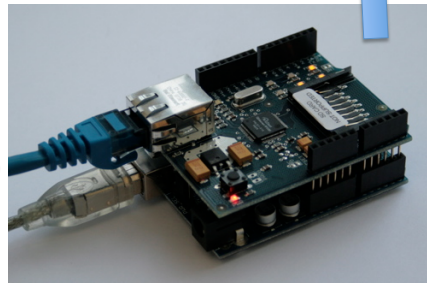
combine many feeds into one, then sort, filter and translate it.



Supernova Maker Art ...



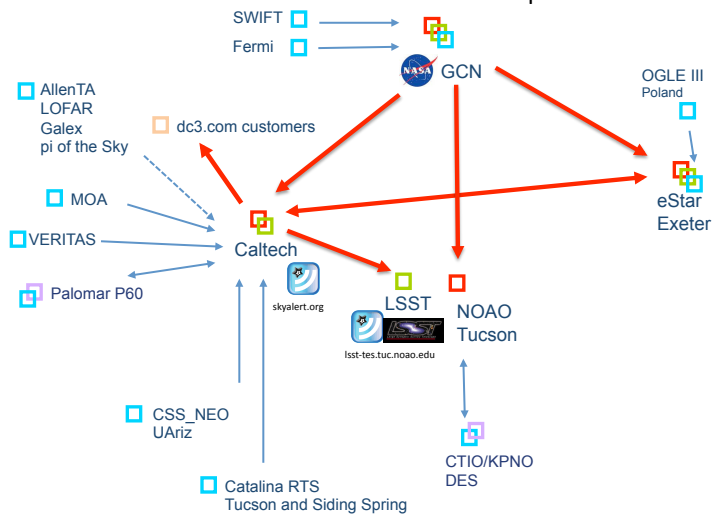
art from event feeds



Arduino

Global Network

IVOA could help



Collaborators wanted

- **Event streams**
 - Always looking for new streams!
- **Robotic telescopes**
 - Drive from Atom or XMPP or email?
- **Annotators**
 - Data mining modules on event portfolios
- **Global network**
 - Large scale, real-time messaging – XMPP, APP, etc
- **New Skylert installations**
 - Now have two ... how to synchronize
 - `svn checkout svn://svn.us-vo.org/us-vo/nvo /voevent`
- **Art projects**
 - Your ideas welcome



skylert.org