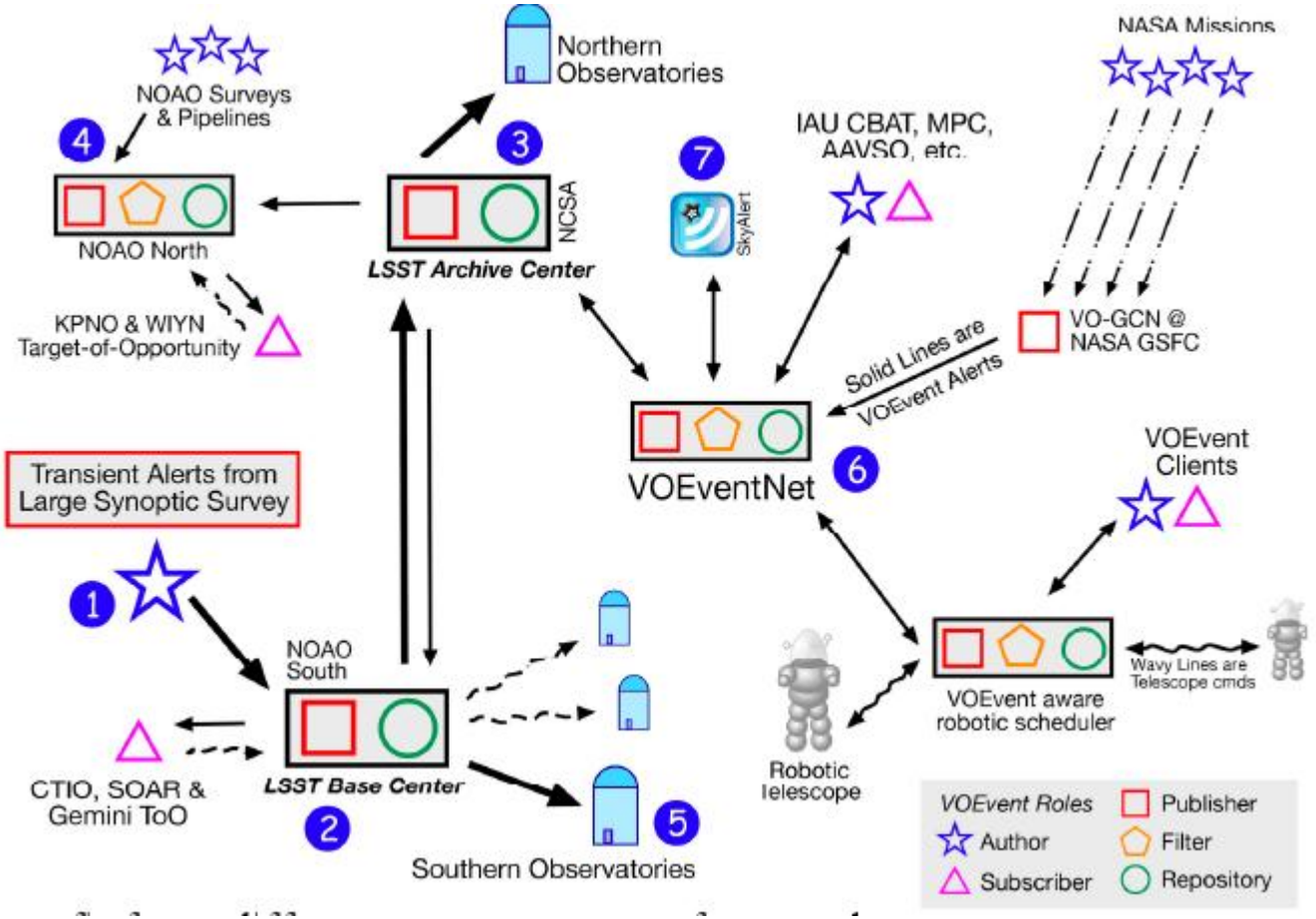
Skyalert Data I/O



Presenting on behalf of the large team of members

Ninan Sajeeth Philip,
St. Thomas College,
Kozhencheri

What is Skyalert?

- A *web-based event broker*, allowing subscription so that events are delivered in near-real time.
- A *web-based publishing system*, so that authenticated users can inject events that may be delivered to others.
- An *event repository*, storing all events that come through the broker, and allowing bulk queries and drill-down.
- An *interoperable event broker*, conforming to international (IVOA) standards for event services.
- Allow authorised users to create *streams* – define events of interest.
- Storing a collection of data relating to an event called *portfolio* through a citation mechanism.
- Use *annotators* to analyse existing portfolios and add new data to it.
- Open-source software to *allow local implementations* as well as the web-based application.

How to get data?

Skyalert.org

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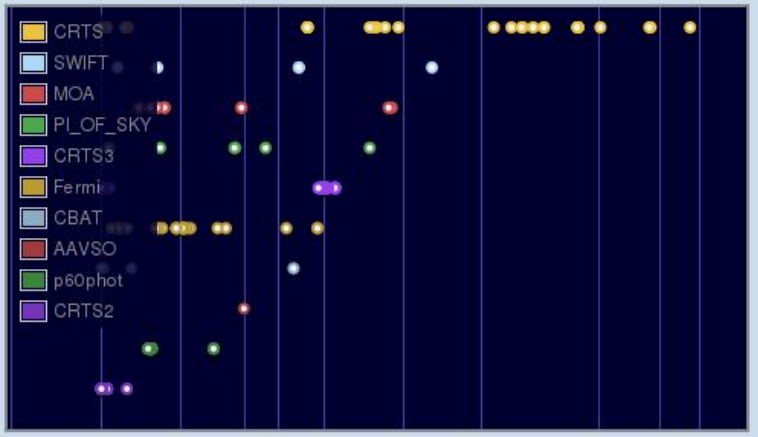
Browse Event Streams | Browse Skyalert Feeds | **my** Feeds and Alerts

Log in here, or register here.

Recent Events

In the picture below, time is measured with "right now" at the right. Ages of recent events -- the last 200 received -- are shown by stream. Click on an event to bring up a new window with detailed portfolio.



<-- Time since now (2011/10/17 6:17 PDT)

Browse Event Streams | Browse Skyalert Feeds | **my** Feeds and Alerts

About Skyalert

SkyAlert collects and distributes astronomical **events** in near-real time. Each event belongs to a **stream** of events that come from a common source, with a common vocabulary of parameters for each event. You can browse event streams and the events themselves, at the links below. You can set up "alerts" which decide which events you find interesting, that comes with an Atom feed of those that pass the selection. You get only the events you want -- no more, no less.

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You can view it online

Skyalert.org

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Portfolio ivo://nvo.caltech/voeventnet/catot#1110171320414138366

From the CRTS stream.
Catalina Real-time Transient Survey
Position is 130.87565,33.72479 ± 999.0
This portfolio initiated 2011-10-17 04:20:44
Also available is the JSON representation of this portfolio.

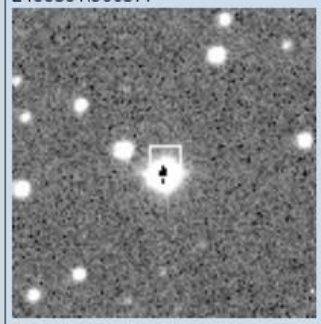
Each event of the portfolio can be shown as Overview, Params, or XML. Click at the left to select the view.

Overview
Params
XML
None

CRTS (Catalina/Mt Bigelow)

Event identifier is 1110171320414138366 or CSS111017:084330+334329

2455851.966877 | 2455851.942539 | 2455851.950659 | 2455851.958771



Finding Chart	Click here
Past CRTS images	Click here
Other images	Click here
Lightcurve	Click here
SDSS cutout	Click here
Position	(130.87565,33.72479)
Time	2011-10-17T11:00:37 (MJD 55851.4587616)
Magnitude	0
Magnitude	13.096800
Magnitude	12.946900

Can I get it as a table?

Skyalert.org

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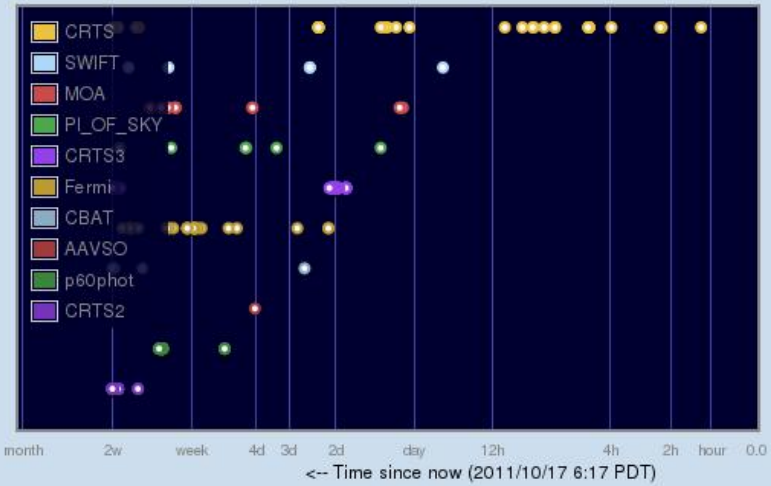

<-- Time since now (2011/10/17 6:17 PDT)

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Yes

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Portfolios

This page lists event portfolios whose first event is from this stream.

All portfolios

Click on the column header to sort. Table rows with gray background represent "test" events that do not represent anything in the sky.

detail meta.link	IVORN meta.id	RA pos.eq.ra deg	Dec pos.eq.dec deg	ISOtime time.epoch
detail	1110171090534127312	148.9028	10.63126	2011-10-17T12:04:18
detail	1110171320384108451	122.19251	31.51833	2011-10-17T11:03:06
detail	1110171320414138366	130.87565	33.72479	2011-10-17T11:00:37
detail	1110170040194113879	52.82662	-4.47526	2011-10-17T09:20:07
detail	1110171230114124208	30.84585	24.32588	2011-10-17T08:21:09
detail	1110171230114124222	30.85058	24.32202	2011-10-17T08:21:09
detail	1110171230114121980	31.01292	24.17724	2011-10-17T08:21:09
detail	1110171210104112638	28.74408	20.73849	2011-10-17T08:17:50
detail	1110170040134121551	33.93879	-3.87201	2011-10-17T06:27:43
detail	1110170040134121569	33.94067	-3.87003	2011-10-17T06:27:43
detail	1110171010144102350	38.78836	0.18239	2011-10-17T05:44:51
detail	1110171010114132885	30.56305	2.67931	2011-10-17T04:59:45
detail	1110171150094126930	23.6982	16.23967	2011-10-17T04:53:58
detail	1110170181134103889	329.10932	-19.45152	2011-10-17T04:04:59
detail	1110170041194139877	334.21308	-3.26527	2011-10-17T02:30:27
detail	BAT_GRB_Pos_505646-011	153.806	27.4756	2011-10-16T18:37:04.52

How to set an alert stream?

Skyalert.org

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Browse Event Streams | Browse Skyalert Feeds | **my** Feeds and Alerts

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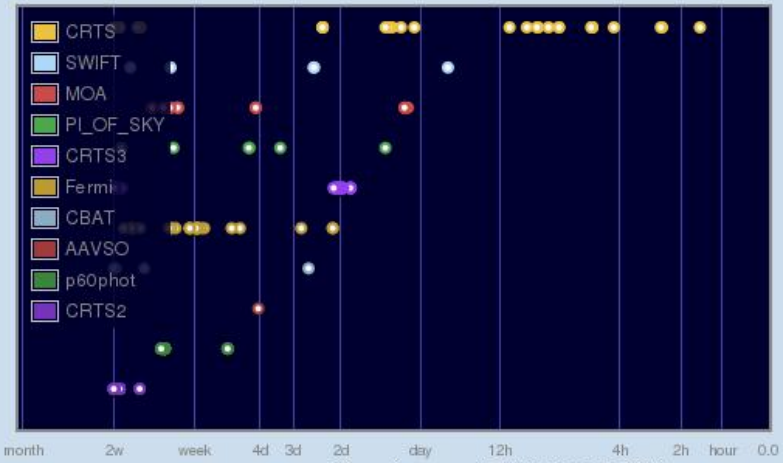

<-- Time since now (2011/10/17 6:35 PDT)

Browse Event Streams | Browse Skyalert Feeds | **my** Feeds and Alerts

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How to set an alert stream?

Sample VOEvent for Skyalert

The example below is a typical VOEvent. If you would like to construct your own, with your own information, please look carefully, especially the yellow boxes. The XML version is available here.

Please **be sure to mouse-over the yellow highlights** as these have instructive text.

```
<?xml version='1.0' encoding='UTF-8'?>
<voe:VOEvent
xsi:schemaLocation="http://www.ivoa.net/xml/VOEvent/v2.0 http://www.ivoa.net/xml/VOEvent/VOEvent-v2.0.xsd"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:voe="http://www.ivoa.net/xml/VOEvent/v2.0" version="2.0"
role="observation"
ivorn="ivo://normandy.edu/events/supernovae#E4654"
>
<Who>
  <Author>
    <title>Banana Supernova Search</title>
    <contactName>William the Conqueror</contactName>
    <contactEmail>william@normandy.edu</contactEmail>
  </Author>
  <Date>2008-10-24T08:58:12</Date>
</Who>

<WhereWhen>
<ObsDataLocation>
  <ObservatoryLocation id="TOPOCEN"/>
  <ObservationLocation>
  <AstroCoordSystem id="UTC-FK5-TOPO"/>
  <AstroCoords coord_system_id="UTC-FK5-TOPO">

  <Time unit="s"> <TimeInstant>
    <ISOTime>2008-10-24T08:51:38</ISOTime>
  </TimeInstant> </Time>

  <Position2D unit="deg">
    <Value2>
      <C1>268.248592</C1>
      <C2>-30.148056</C2>
    </Value2>
    <Error2Radius>0.01</Error2Radius>
  </Position2D>

</AstroCoords> </ObservationLocation> </ObsDataLocation>
</WhereWhen>

<What>
  <Param name="Run" value="B17069"/>
  <Param name="Field" value="gb4"/>
  <Param name="Filter" ucd="instr.filter" value="R"/>
  <Param name="Magnitude" ucd="phot.mag" value="19.54545" dataType="float">
    <Description>The magnitude of the supernova</Description>
```

How to set an alert request?

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Browse Event Streams | Browse Skyalert Feeds | my Feeds and Alerts

Logged in as: sajeethphilip
(Ninan Sajeeth Philip)
(logout)

For a New Alert

Click Here

Existing Alerts

Here are your existing alerts:
Click the "detail" to view and edit.

newCRTS	(detail)	(feed)	(json)	(delete)	True

Back to main page

How to set an alert request?

Skyalert.org

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Browse Event Streams | Browse Skyalert Feeds | my Feeds and Alerts

Logged in as: sajeethphilip
(Niran Sajeeth Philip)
(logout)

Alert Detail

for the alert named newCRTS

Primary Stream:**CRTS (ivo://nvo.caltech/voeventnet/catot)**

Name of Alert:	newCRTS
Active alert?:	1
Action type:	alert_email
Action detail:	nspp@iucaa.ernet.in
Private alert?:	1

What can I do here?

You can create a decision trigger in the box below, which is an expression that evaluates to true or false, for example **`SWIFT["Dec"] > 70`**, which is true only for events from the SWIFT stream whose declination is greater than 70. When an event comes in, it is run immediately against your trigger, and if it passes, then the action is executed. Currently the only action available is sending email ('alert_email'). Another decision formula might be **`CATOT["First Detection params"]["magnitude"] < 18`** to select by magnitude.

How to make an alert:

- **Step 1**: Give your alert a name, and make sure the email address is correct. Click the **Save** button.
- **Step 2**: Change the default trigger ("True") to the criterion you want. Clicking on the red dots by names of parameters will insert the correct code. Make sure your expression is a boolean expression.
- **Step 3**: Click "Save"
- **Step 4**: Click on "See Events" to see which historical events satisfy your trigger.

Trigger Expression

```
True
```

This button first checks the syntax of the expression above, then saves the whole alert.
The form of the trigger is python syntax. Each event type (stream) is given a dictionary of its parameters. The 'math' and 'string' libraries are also available in trigger construction.

How to set an alert request?

Step 3: Click to save --> Save

This button lets you see past events that would satisfy your trigger, if executed now.
Note: you must "Save" the alert with the button above before using this function!.

Step 4: Click to see past events that satisfy this alert --> See past events

---

Primary Stream: CRTS

Click on a red dot to insert that parameter into your Decision Formula above. When you are happy with the formula, click Save.

group	*Name*	*UCD*	*dataType*	*Description*
Skyalert Standard Parameters				
	RA•	pos.eq.ra	float	Right Ascension of event
	Dec•	pos.eq.dec	float	Declination of event
	positionalError•	stat.error;pos.eq	float	Positional error of event
	ISOtime•	time.epoch		Time (UTC) of event
	MJDtime•	time.epoch	float	Time (MJD) of event
	role•	meta.code		Is this event test or observation
	contactName•			Contact name
	contactEmail•			Contact email
	contactPhone•			Contact phone
CRTS Specific Parameters				
Asteroid params	Aperture reject•	stat.probability	float	
Asteroid params	Apparent motion•	pos.pm	float	
Asteroid params	CSSID•	meta.id	string	
Asteroid params	Ecliptic Inclination•	pos.posAng	float	
Asteroid params	Ecliptic Latitude•	pos.ecliptic.lat	float	
Asteroid params	Ecliptic Longitude•	pos.ecliptic.lon	float	
Asteroid params	imgmaster•	meta.ref.url	string	
Asteroid params	Inner motion•	pos.pm	float	
Asteroid params	Known Asteroid•	stat.probability	float	
Asteroid params	Motion uncertainty Dec•	stat.error.sys	float	
Asteroid params	Motion uncertainty RA•	stat.error.sys	float	
Asteroid params	New Asteroid•	meta.cryptic	float	
Asteroid params	Opposition angle•	pos.posAng	float	
Asteroid params	Outer motion•	pos.pm	float	

How to set an alert request?

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Browse Event Streams | Browse Skyalert Feeds | my Feeds and Alerts

Logged in as: sajeethphilip
(Nirian Sajeeth Philip)
(logout)

Portfolios

This page lists event portfolios whose first event is from this stream.

those allowed by the trigger rule 'newCRTS' from *sajeethphilip* (True)

Click on the column header to sort. Table rows with gray background represent "test" events that do not represent anything in the sky.

detail meta.link	IVORN meta.id	RA pos.eq.ra deg	Dec pos.eq.dec deg	ISOtime time.epoch	Magnitude phot.mag;em.opt.R
detail	1110030210114134707	32.42262	-20.1809	2011-10-03T08:54:16	19.685200
detail	1110030210104128541	28.59722	-20.55152	2011-10-03T08:50:17	20.031000
detail	1110030210104139261	27.94635	-19.88747	2011-10-03T08:50:17	19.989300
detail	1110030260084132942	23.48485	-25.86954	2011-10-03T08:47:04	18.676300
detail	1110030230014127069	0.42744	-23.46576	2011-10-03T07:25:37	19.646900
detail	1110030180014137859	1.50264	-17.19149	2011-10-03T07:24:00	19.582001
detail	1110031211194112612	351.54691	20.54144	2011-10-03T06:40:35	19.761900
detail	1110010040214117710	58.32609	-3.81312	2011-10-01T10:19:12	15.133800
detail	1110010070204112496	55.12617	-7.42043	2011-10-01T10:15:54	17.623100
detail	1110010010214105136	56.55213	-2.31092	2011-10-01T10:23:15	16.092100
detail	1110011070194135097	51.85018	8.17493	2011-10-01T09:29:16	19.052601
detail	1110011010184115318	48.67884	1.144	2011-10-01T09:37:28	17.697901
detail	1110010010144113842	37.75999	-1.7829	2011-10-01T08:55:32	19.359501
detail	1110010010164108208	43.33748	-2.19947	2011-10-01T08:53:56	20.053101
detail	1110010040154108586	41.56774	-4.99524	2011-10-01T08:52:19	14.351900

Getting data

```
#!/usr/bin/python
import simplejson
import sys
import urllib

# CRTS and CRTSCircular["First"]["eventClass"] == "Supernova"
if (len(sys.argv) < 2):
    query = "353"
else:
    query = sys.argv[1]
url = "http://skyalert.org/events/jtable/%s/" % query
fout = open("CRTS_tmp.list", "w")
while 1:
   f = urllib.urlopen(url)
   result = f.read()
   jsonresult = simplejson.loads(result)
   list = jsonresult["list"]
   print "Found %d portfolios" % len(list)
   for pf in list:
       ivorn = pf[1]
       tok = ivorn.split('#')
      # print tok[1]
       fout.write(tok[1]+"\n")
   url = jsonresult["next"]
   if url == "finished": break
print "Finished"
fout.close()
```

Publish VOEvents

How to Publish VOEvents to Skyalert

VOEvents are XML documents containing information about astronomical events. More precisely, it is a report about an observation of an astronomical event. Some examples of astronomical events are Gamma Ray Bursts, Supernovae, Microlensing events, or variable star outbursts. VOEvents are structured reports about such things that can be sent to Skyalert. Further, there is an inference that rapid follow-up observation is what is needed. The Skyalert system connects producers with consumers, gives each event a portfolio and a web page, and allows complete automation of decision.

There is a lot of information at http://hotwireduniverse.org/, including *What is VOEvent?* and *Event Handling with SkyAlert*.

This document assumes that you have a source of events now or in the future, and want to load them into a Skyalert server.

Before sending events, we need to know the meaning of the numbers and strings in your events. They are called **Params**.

Step 1: Design a Stream

Think carefully about what data you want to expose in the event. Some parameters are numbers and strings, and can be used to make decisions; some parameters are URLs that link to complex data objects (eg FITS). To help you design a stream:

- Look at the existing event streams at skyalert.org (OGLE, Catalina, SWIFT, etc). At the bottom of each stream detail page is a sample event from that stream.
- Look at the annotated sample VOEvent. All the gray text is boilerplate, the essentials are highlighted in yellow. Make sure you move the mouse over each highlight to see the explanation.
- Work with the Skyalert Team (write to help@skyalert.org) to create a sample event that shows your parameters, each with description, unit, semantic descriptor (UCD), data type (int, float, string).
- You can include complex data objects with a Param whose value is a URL link. In this case, make sure the UCD of that Param is `meta.code.url` so that Skyalert knows it is a URL.
- Use the VOEvent validation tool to test your ideas and produce a valid VOEvent. You can also write to help@skyalert.org who can help you build a valid VOEvent that has your science content.

Step 2: Upload your stream

This will be done by Skyalert staff (write to help@skyalert.org), using the agreed sample event, which has all the metadata. You will be asked to check that your stream appears correctly in the web interface. If you are running your own Skyalert system, you can login as an account with staff status.

Step 3: Test Events

Build code that can create events from your event stream: it can of course be done with print statements, or with the VOEventLib python library. It is VERY IMPORTANT that test events be labeled `role="test"` in the first element of the VOEvent, so they are not mixed with real astronomy.

Step 4: Send events to Skyalert

There are two ways to ingest events to Skyalert:

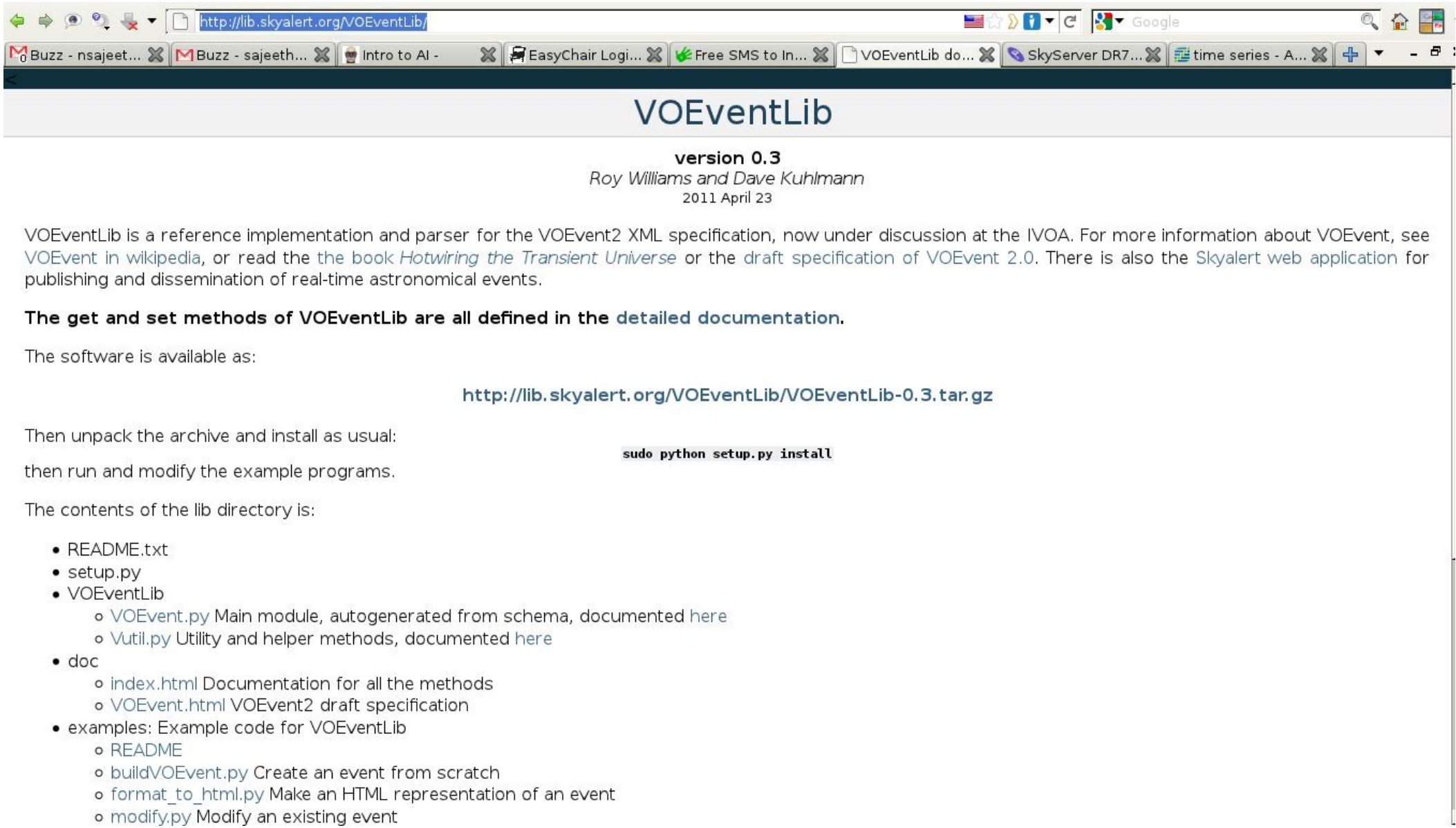
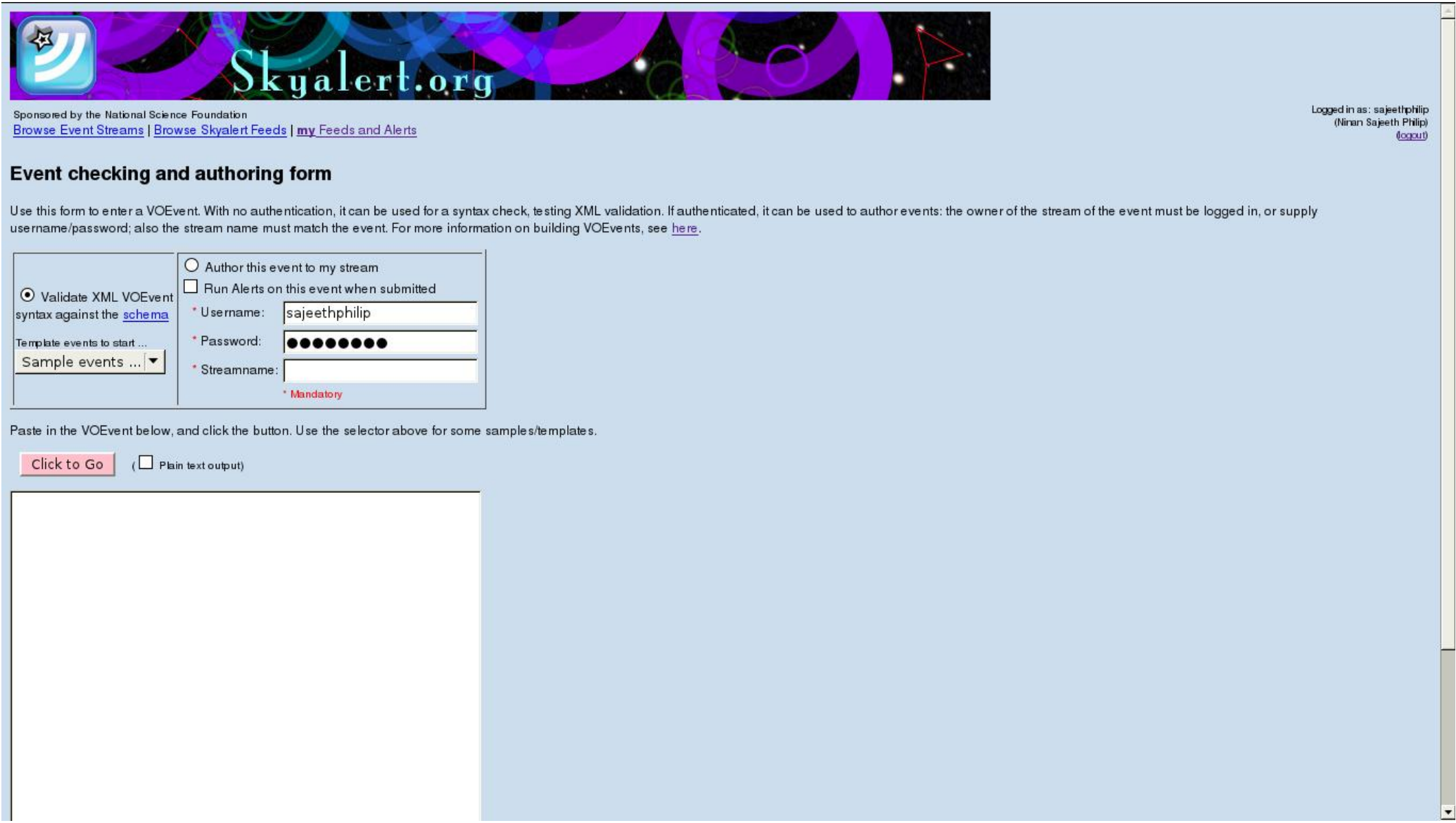
- Local ingestion: You need "staff" status in the Skyalert system in order to do this, and to log in to the server, then execute: `python loader.py file <voevent.xml>`, where the last argument is a file name for the VOEvent.
- Global ingestion: You can send events, by arrangement, to a remote Skyalert server, using the VOEvent submission tool: for security, there must be the short-name of the stream from which the event comes, and the username and password of the owner of tha stream. This can be done from a program as an http POST: see code snippets here.

Step 5: Annotators

You can now build rules against your stream that use the Params to make decisions and take actions. These can be, for example fetching archival data, followup with a robotic telescope, or messaging (sending email). Here is a sample of an annotator to show the structure.

Thank you for using Skyalert! If you have questions or problems, write to help@skyalert.org

Publish VOEvents



Publish VOEvents