



GUADELOUPE

GUYANE

MARTINIQUE

ST-BARTHELEMY

ST-MARTIN



Observatoirevolcanologique et sismologique de Martinique INSTITUT DE PHYSIQUE DU GLOBE DE PAR









Integrating SeisComP3 in the framework of French Volcanological and **Seismological Observatories**

Jean-Marie SAUREL – Stephen ROSELIA **OVSM/IPGP** SeisComP3 User Group – Potsdam 2013





Introduction

The IPGP Volcanological and Seismological Observatories of the Antilles and Reunion Island, in partnership with the local universities and the regional and departmental authorities, work permanently monitoring the Soufriere of Guadeloupe, Mount Pelée in Martinique and the Piton de la Fournaise on Reunion Island.

In the French Antilles, they also monitor the local and regional seismic activity.

SeisComP3 in French Observatories

- Overall data acquisition and processing scheme
- SeisComP3 within the framework
- Duration magnitude plugin
- Hypo71 plugin
- ew2sc3 EarthWorm client application
- Scbev graphical bulletin application
- Some screenshots
- Future ??

Overall data acquisition and processing scheme



SeisComP3 within the framework





SeisComP 2.6

SeisComP3 Zurich

SeisComP3 based developments

Other softwares

A weird network topology in the Antilles

- Seismicity outside of the network
- Network is very longitudinal, it has no very little 'longitude depth'
- Network much more denser around the volcanoes



Duration magnitude plugin

- No available « amplitude » type magnitude in French Observatories
- Long use of duration magnitude
- For volcanoe quakes, the magnitude can be very small
- Lots of analog stations, usually not very well calibrated

Duration magnitude plugin

- Implements a new Amplitude Processor 'Md'
- Implements a new Magnitude Mrocessor 'Md'
- Follows seiscomp core source coding style



Hypo71 plugin

- Very long historical use of Hypo71 in French Observatories (more than 30 years)
- Only a 1D local velocity model available in FWI
- Modified Hypo71 to take into consideration volcanic event which can be above stations elevation
- Several runs at different depths to determine the best one
- Final run around the best depth
- Several velocity model and profiles

Hypo71 plugin

- Implements a new Locator Interface 'Hypo71'
- Each run is archived for eventual reviewing
- Follows seiscomp core source coding style



ew2sc3 EarthWorm client application

- Almost 10 years of automatic detection using EarthWorm on French volcanoes
- STA/LTA detection
- Automatic picking and location
- Need to import the automatic detections and locations inside SeisComP3
- The more detection systems you use, the higher chance you've got to detect any events

ew2sc3 client application

- Works as a backend application
- Reads Hyp2000 detection from earthworm ew_export module
- Follows seiscomp core source coding style



Scbev graphical bulletin application

- Publication of phases bulletins and catalogs for a given time period (monthly, weekly, etc)
- Historical use of Hypo71 phase format
- Need for some more internationaly used formats : GSE, IMS, QuakeML
- Allows dissamination to other datacenters
- Follows seiscomp core source coding style
- Uses Qt4 library

OVPF – La Réunion Island

- 300 volcanic quakes in 2012 when the volcanoe is not erupting (more than 3000 in 3 days during 1998 eruption)
 - 119 of them are locatable (the other are too small just a few seconds of signal)
- 101 tectonic local quakes in 2012
 - 66 manually localized
- 75 seismic channels, and 20 more to come
 - 41 stations (SP vertical, SP 3 components, BB)

Some examples : OVPF usage



From: 2012/12/09 09:13:13 🛨 To: 2013/01/08 09:13:13 🛨 Read

Faible

Faible

3.6 s

6.6 s

HIM WF

VF

SNE 2013-01-07 17:40:51.25 1 × Effondrement

SNE 2013-01-07 17:20:54.04 1 × Effondrement

Hide other/fake events
 F Show only own events
 Show only latest/preferred origin per agency

Clear

Last days: 1 🛨 Read

R

OVSM – Martinique Island

- 850 tectonic events in 2012
 - More than 800 manually localized
 - 11 felt (II-III MSK)
- 200 volcanic quakes in 2012
 - More than 150 manually localized
- 65 seismic channels (and 20 more to come)
 - 19 inland stations (SP vertical, SP 3 components, BB)
 - 23 contributed stations

Some examples : OVSM usage



Ongoing developments

- GUI client to export sc3xml files in a variety of formats (IMS1.0, GSE2.1, QuakeML)
- Database will soon holds a lot of data with manually revised location
 - Opportunity for some data-meaning
 - Scemv client to display some statistics

Scq2bv graphical bulletin application

- Publication of bulletins by using sc3xml files
- Supported output formats : Hypo71, GSE2.1, IMS1.0, QuakeML
- Follows seiscomp core source coding style
- Uses Qt4 library

📓 🕑	Bulletin generator		\odot \odot \otimes
. <u>F</u> ile <u>H</u> elp			
QML entry			
1 xml version="1.0" et</td 2 □ <seiscomp pict<="" td="" xmlns="htt</td> 3 □ <EventParameters> 4 □ <pick publicID="> 5 □ <time> 6 <value>2012-12- 7 <uncertainty>0.5 8 </uncertainty></value></time> 9 <waveformid netw<="" td=""> 10 <phasehint>P 11 <evaluationmode> 12 <evaluationstatus:< td=""> 13 □ <creationinfo> 14 <agencyid>ovsm 15 <author> ew2sc3</author></agencyid></creationinfo></evaluationstatus:<></evaluationmode></phasehint></waveformid></seiscomp>	ncoding="UTF-8"?> p://geofon.gfz-potsdam.de/ns/seiscomp3-schema/0.6" version="0.6"> k#20130102124054.321609.4"> 28T17:00:12.0000Z orkCode="MQ" stationCode="BAM" locationCode="91" channelCode="EHZ"/> laseHint> automatic >preliminary		
IMS 1.0 short IMS 1.0 short IMS 1.0 short IMS 1.0 short Image: State of the stat	BAM EP 0 12122817 012.00 GBM EP 0 12122817 013.00 MLM EP 0 12122817 017.00 10	d=	20121228_1700

Scemv client application

- No available tool GUI for physically delete wrong/fake events and clean up the database
- Displays epicenters on map
- Generates statistics : latitudes, longitudes, depth, rms, magnitudes uncertainties and phases numbers.
- Still in early development stage
- Follows seiscomp core source coding style
- Uses Qt4 librairy

Questions about the future

- Do we need to upgrade from Zurich to Seattle ?
- How can we make the plugins and produced code durable ?
- Use of SeisComP3 auto-location features ?