

SeisComp3 at the Swiss National Seismic Network

**Tobias Diehl, John Clinton, Philipp Kästli, Carlo Cauzzi,
Stefan Heimers, and Roman Racine**



Schweizerischer Erdbebendienst
Swiss Seismological Service



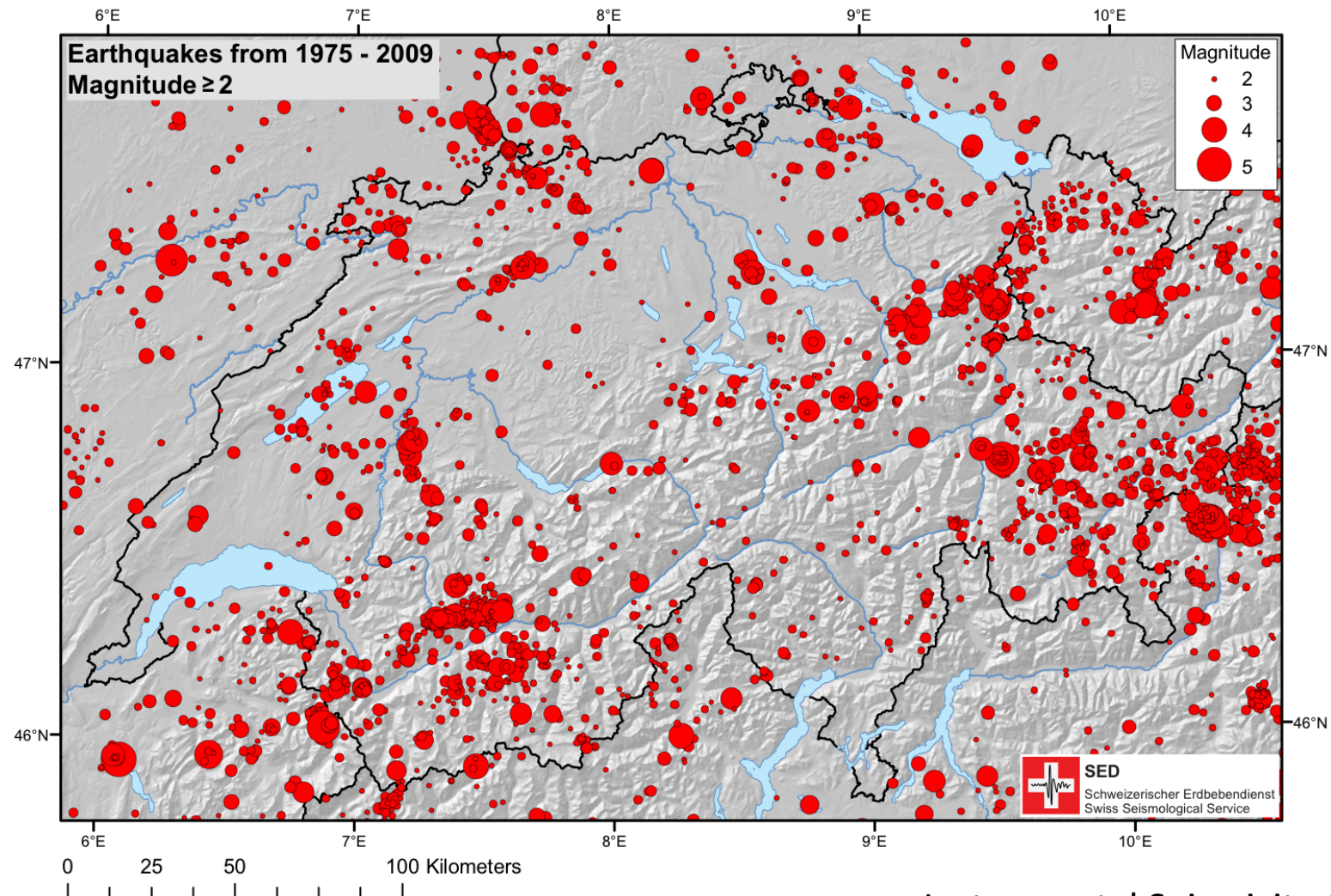
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Presentation Overview:

1. Introduction: Seismic Monitoring in Switzerland
2. SC3 Implementation at the SED: Where we are
3. Event review with *sco/v*
4. SED Developments & Contributions
5. Outstanding Problems & Outlook

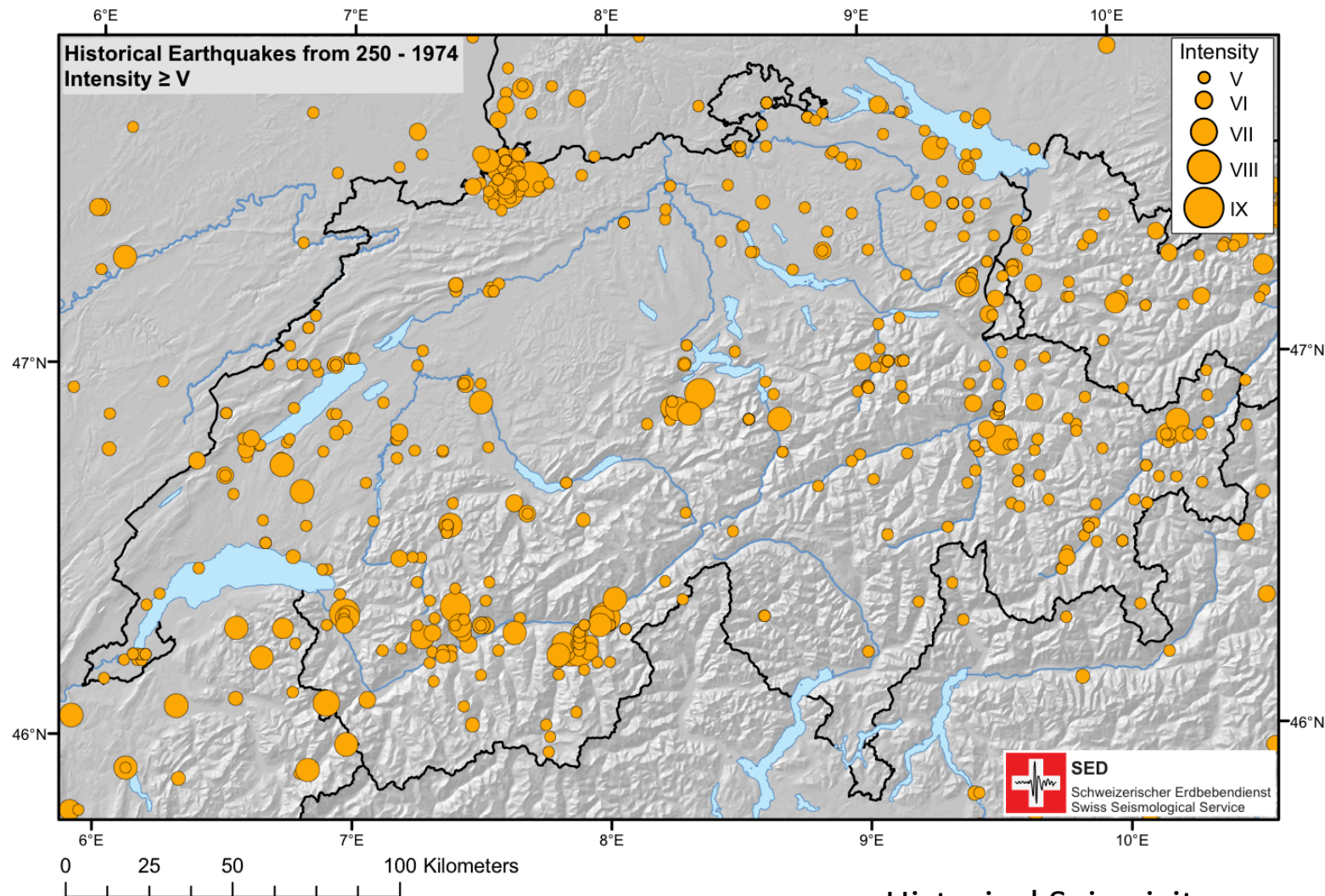


Introduction: Seismic Monitoring in Switzerland



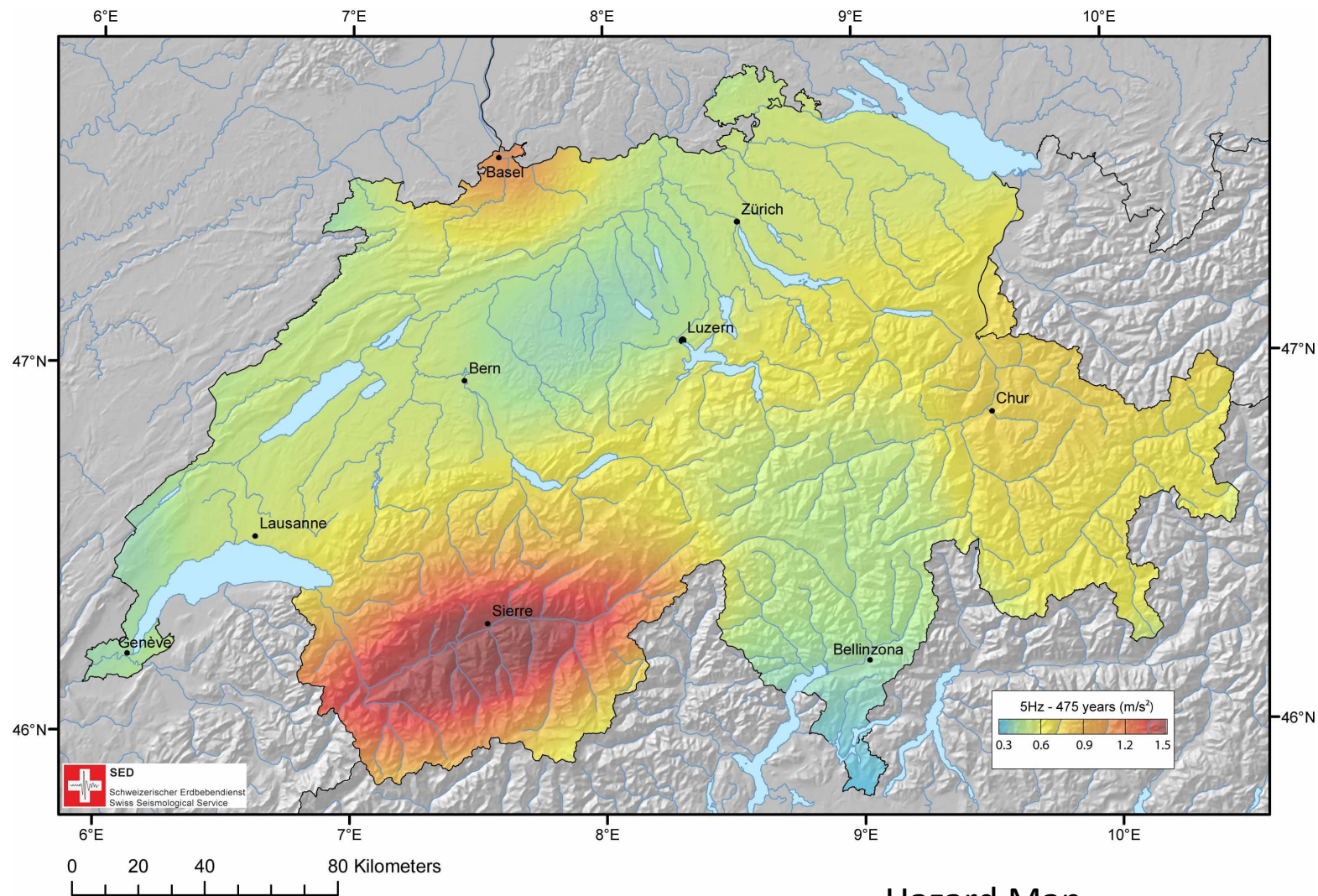
Instrumental Seismicity Catalog

Introduction: Seismic Monitoring in Switzerland

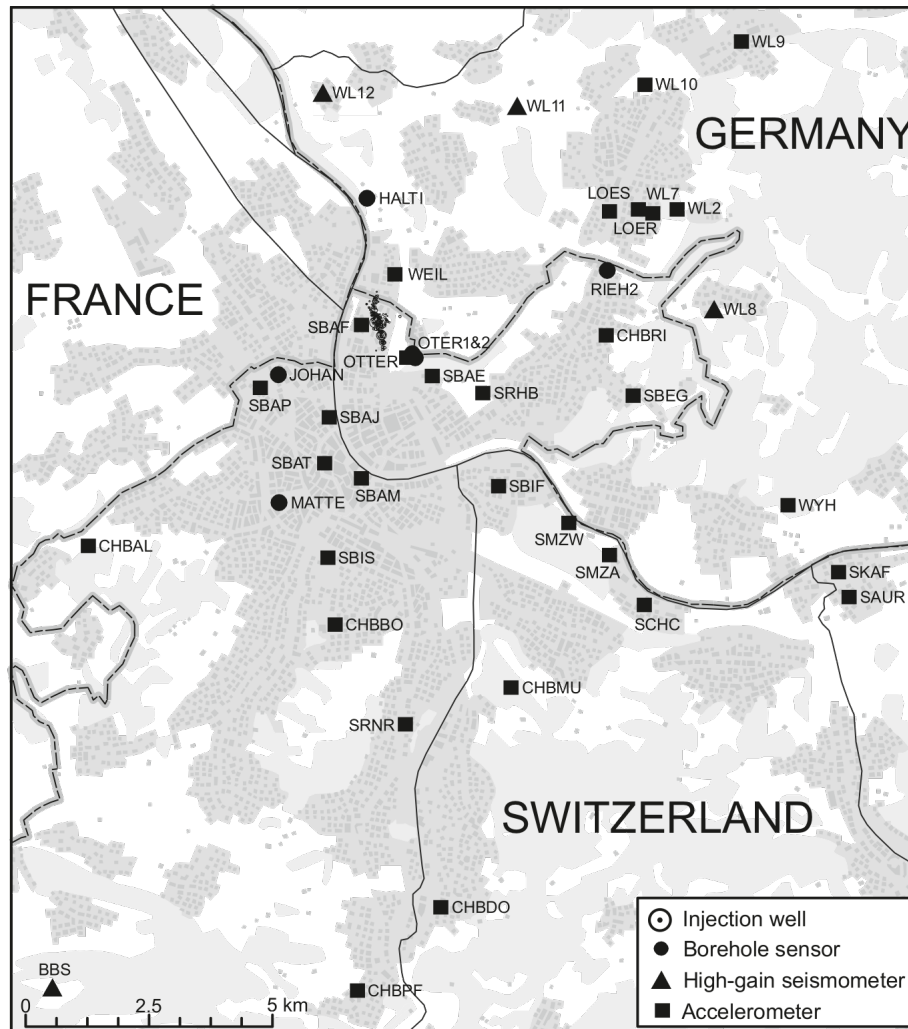


Historical Seismicity

Introduction: Seismic Monitoring in Switzerland



Introduction: Seismic Monitoring in Switzerland

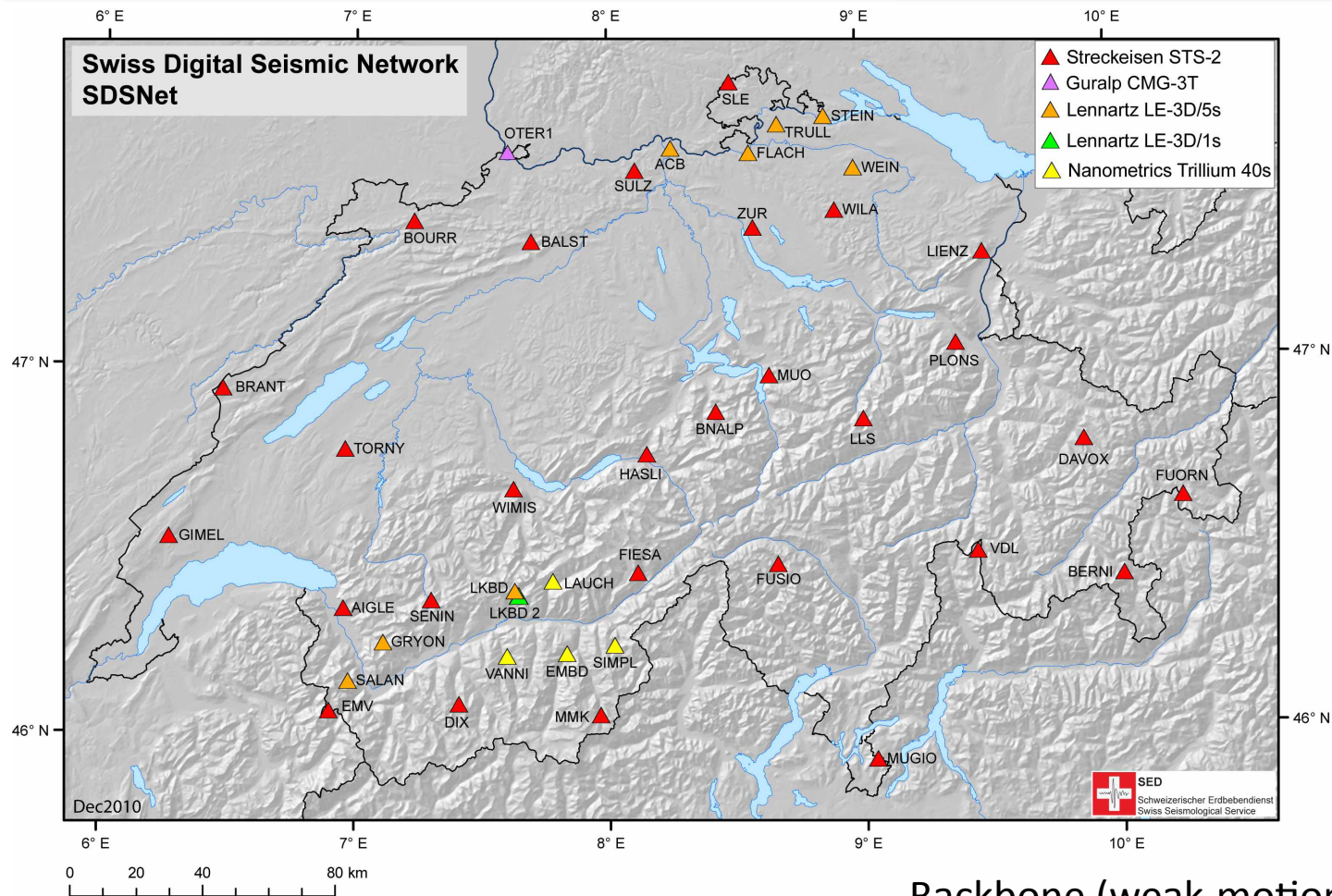


Deichmann & Ernst 2009

Monitoring of Microseismicity including:

- Geothermal projects (e.g. Basel)
- Construction sites (e.g. ALPTRANSIT)
- Assessment of potential sites for nuclear power plants and waste deposit

Introduction: Seismic Monitoring in Switzerland

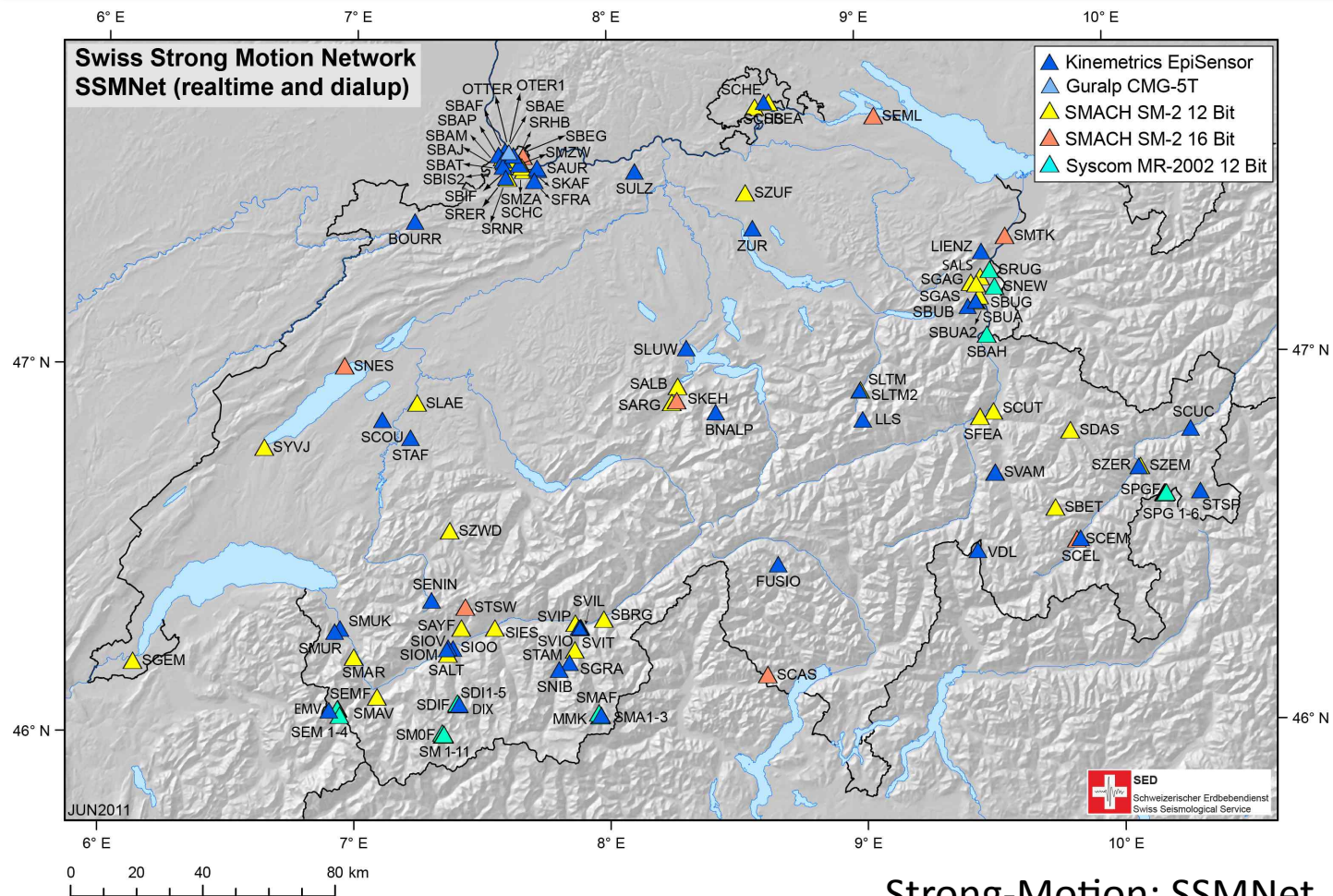


Backbone (weak-motion): SDSNet (real-time)

> 30 BB Stations

> 10 EH+SH Stations

Introduction: Seismic Monitoring in Switzerland

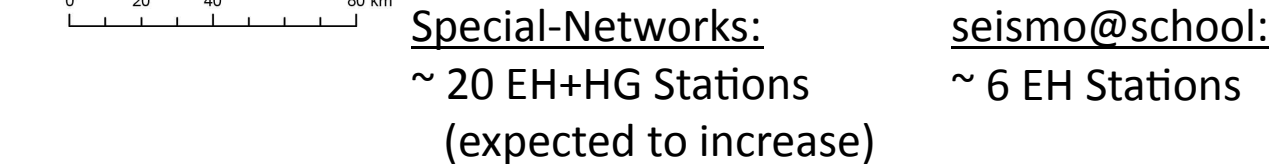


Strong-Motion: SSMNet

~ 30 Real-Time BB (24 bit) Stations

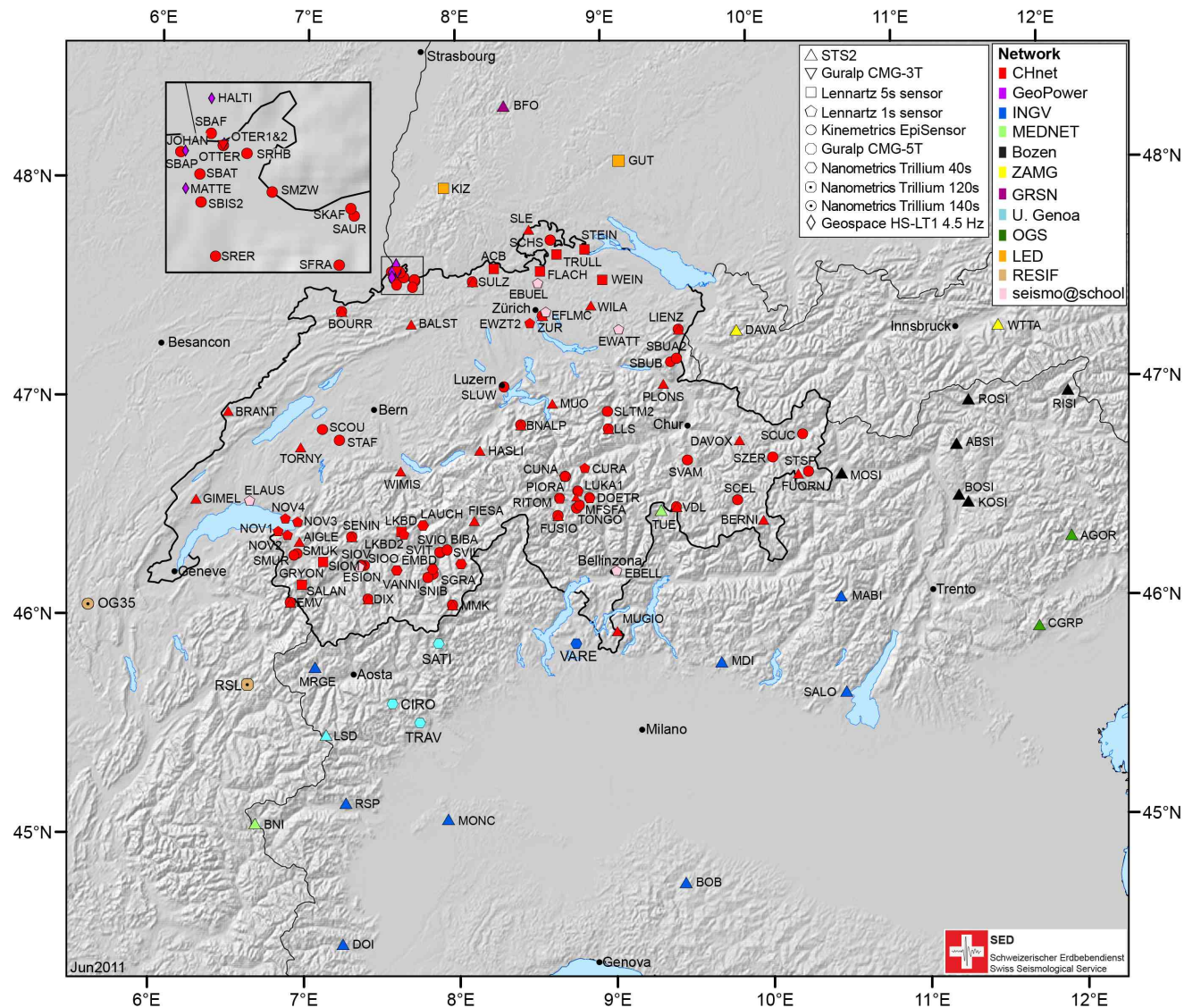
(70 more stations are planned)

~ 60 Dial-Up Stations (will be replaced)



Introduction: Seismic Monitoring in Switzerland

Continuous Real Time Stations Monitored by SED



Foreign Data:
~ 30 HH+EH Stations

In Total:
~ 190 Stations

Introduction: Seismic Monitoring in Switzerland

Variety of (real-time) monitoring duties demand:

- Upgrading and extension of the network with different sensor types. Replacement of triggered dial-up SM with continuous online SM stations.
 - Installation of permanent and temporary micro-networks (Special Network Group).
 - Flexible and extendable processing and analyzing software.
- ➔ Old “in-house” system was not capable of handling these growing tasks.
- ➔ Decision to implement SC3 as the new processing system at the SED.

SC3 Implementation at the SED: Where we are

Since about two years SC3 implementations are tested at the SED. Primary goals of testing and developments at the SED were:

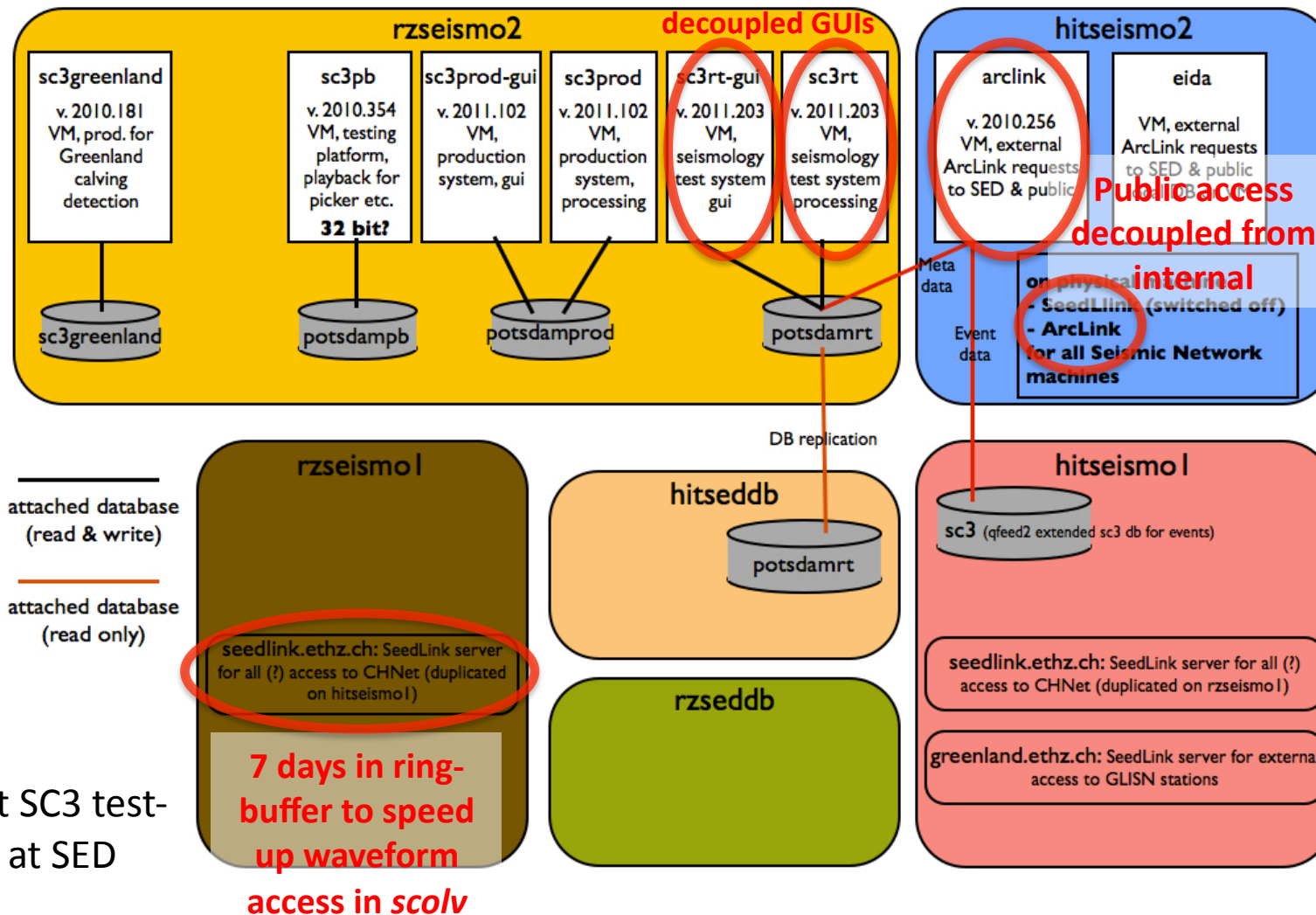
- ➔ Replicate (approved) methods used in the old system including algorithms for: automatic picking (**BK-picker**), event association, location procedure (**NLL**), magnitude determination (**MIh**), alerting, etc. Also important for consistency with existing catalog. Benchmark test in terms of latency of the SC3 system. Comparison of SC3 solutions with solutions derived from the old system. Mostly **FINISHED**.
- ➔ Replicate functionality of the old event-review tool (*SNAP*) in *sco/v*. **FINISHED**
- ➔ Strategies for data archiving and dissemination with arclink & eida. **FINISHED**.
- ➔ Strategies for reliable and stable SC3 implementation (redundancy, high availability, etc.). Under development.

Currently, the SC3 test-systems run parallel to the old system, which is still our primary system

SC3 Implementation at the SED: Where we are

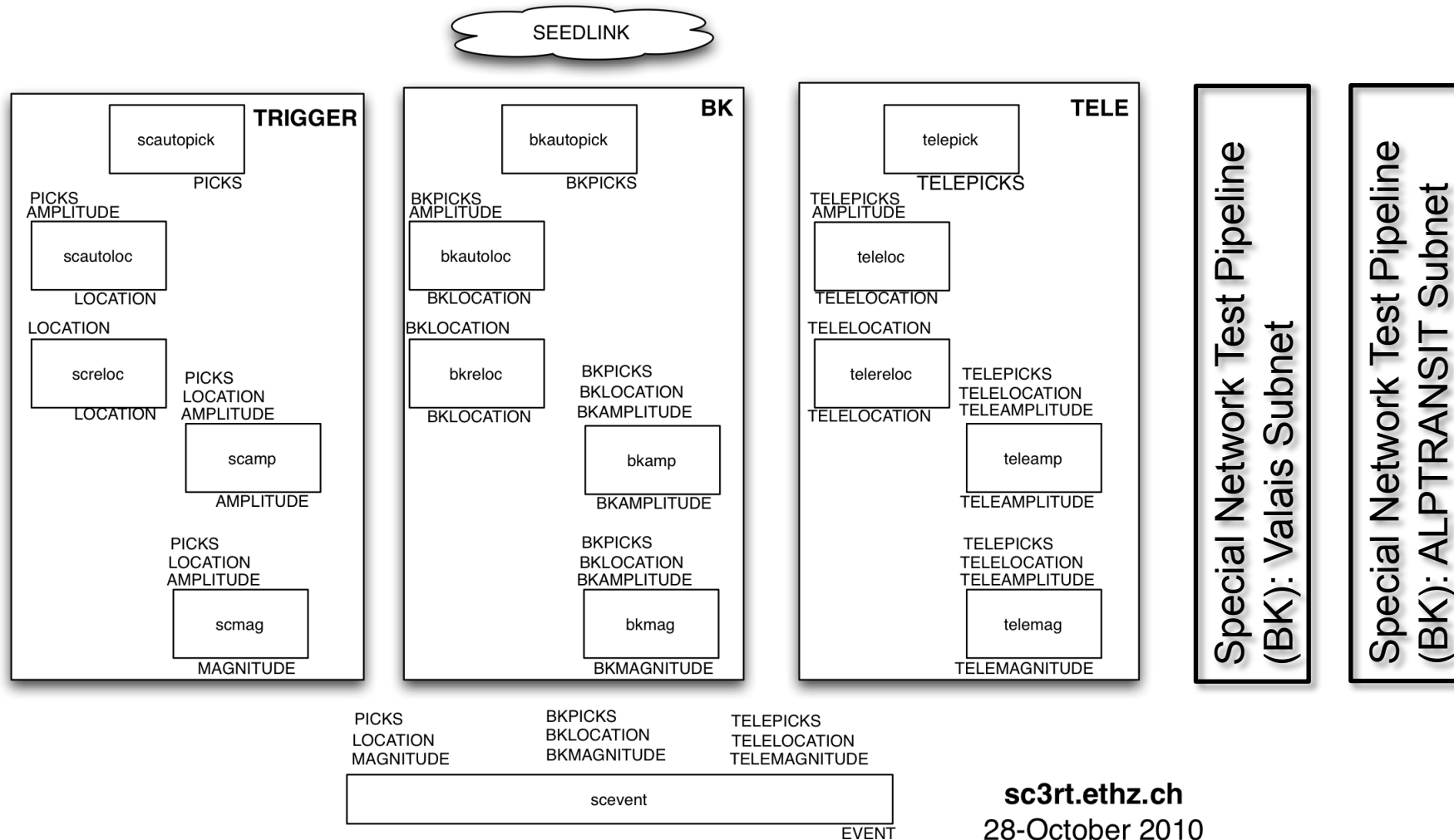
Seiscomp3 System Setup - Test - September 2011

TD September 12, 2011



SC3 Implementation at the SED: Where we are

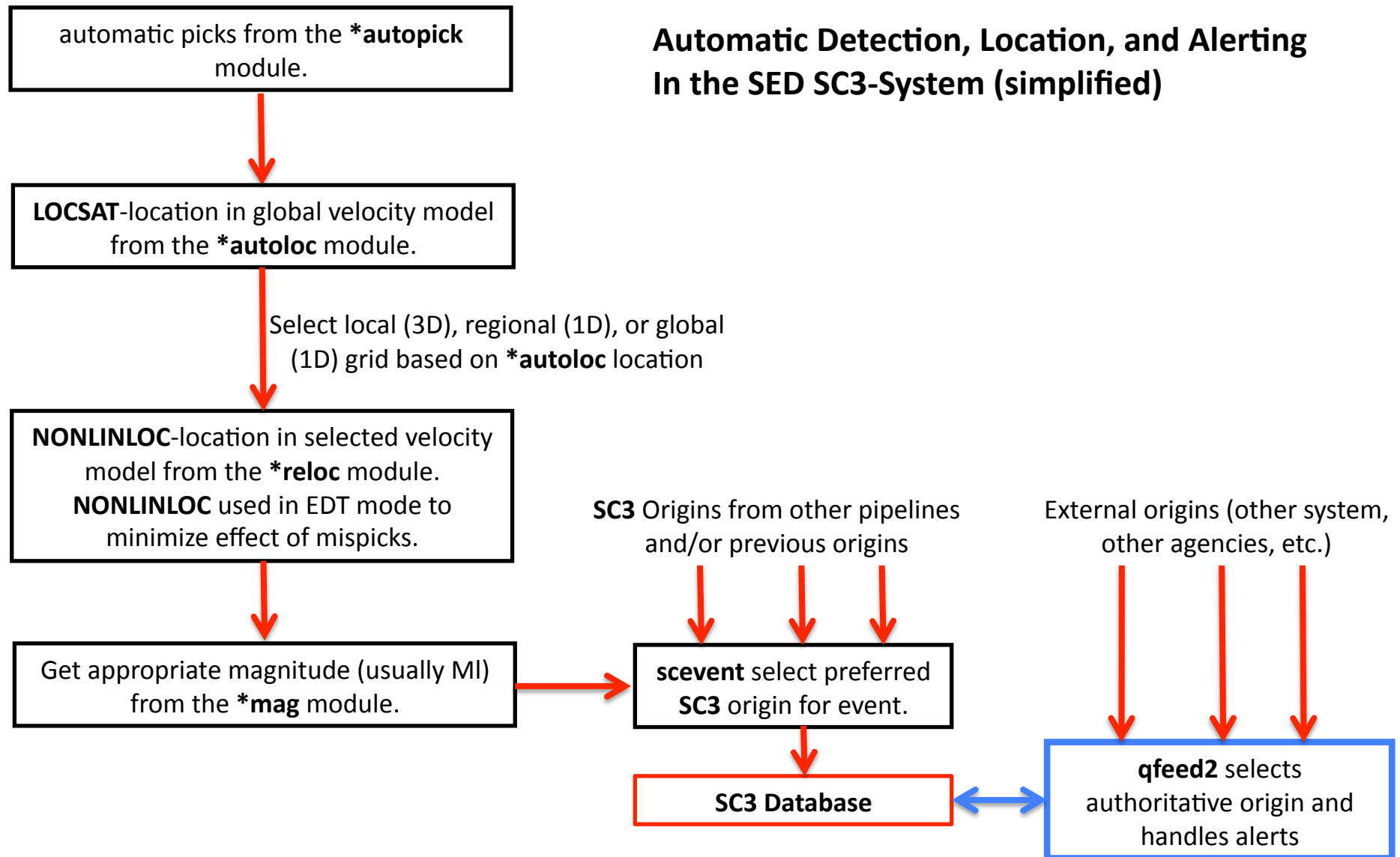
Multiple Processing Pipelines used in the SED SC3-System



sc3rt.ethz.ch
28-October 2010

SC3 Implementation at the SED: Where we are

Automatic Detection, Location, and Alerting In the SED SC3-System (simplified)



SC3 Implementation at the SED: Where we are

The screenshot displays the ArcLink@SED web interface. At the top, it says "ArcLink@SED" and "SWISS ARCHIVES ONLY! PLEASE SWITCH TO EIDA@SED FOR EUROPEAN BROADBAND ARCHIVES". Below this is a search bar and a "START QUERY" button. The main interface is divided into several sections:

- Select dates of interest:** A date range from 2000-01-15 to 2011-09-15.
- Select events from SED database:** Filters for Magnitude (> 2.0), Depth (km) (< 40), Latitude (deg.) (46.0 to 48.0), and Longitude (deg.) (8.0 to 10.0). A "Search" button is present.
- Select stations:** A section for selecting networks, stations, and streams. It includes a "Location Code" field and a "Search" button.
- Select time window:** A section for selecting a time window around the origin time, with options for "s before OT" and "s after Origin Time".
- Map:** A map of Switzerland showing seismic events. A double-click to zoom in and drag to pan instruction is provided. A coordinate box shows 10.95726, 46.69231.
- Event list:** A table with columns for Origin Time (UTC), Mag. ML, Lat. [°], Lon. [°], Depth [km], and Region Name. The table lists several events with checkboxes for selection.

Origin Time (UTC)	Mag. ML	Lat. [°]	Lon. [°]	Depth [km]	Region Name
2011-05-25 07:22:41	2.1	47.49	9.824	29.0	Egg / Austria
2011-04-27 03:31:36	2.1	46.907	9.896	7.0	Serneus / Switzerland
2011-04-21 11:36:38	2.9	46.719	8.019	7.0	Brienz / Switzerland
2011-03-10 08:42:20	2.3	47.495	9.836	30.0	Egg / Austria
2011-01-27 01:24:18	3.3	47.482	9.844	31.0	Egg / Austria
2011-01-14 18:45:22	2.1	46.516	9.559	8.0	Bivio / Switzerland
2010-12-21 02:27:08	2.1	47.052	9.542	6.0	Sargans / Switzerland
2010-12-03 10:11:30	2.4	46.296	8.073	2.0	Brig / Switzerland
2010-10-25 20:00:30	3.0	47.243	9.564	3.0	Feldkirch / Switzerland

Data Dissemination using Arclink:

- Events
- Metadata
- Waveforms (also triggered)

Based on GFZ interface, but local database

arclink.ethz.ch



SC3 Implementation at the SED: Where we are



EIDA at SED

http://eida.ethz.ch/arclink/query?sesskey=444370ea&start=2011-09-10 00:00:00&end=2011-09-11 23:59:59&typesel= arclink.ethz.ch

Latest Headlines LEO Google TobWeb Online-Banking Web-Mail Columbia USTx ETH NYC-Links Seismology Bookmarks

EIDA@SED

EUROPEAN BB ARCHIVES ONLY!

PLEASE SWITCH TO

ArcLink@SED

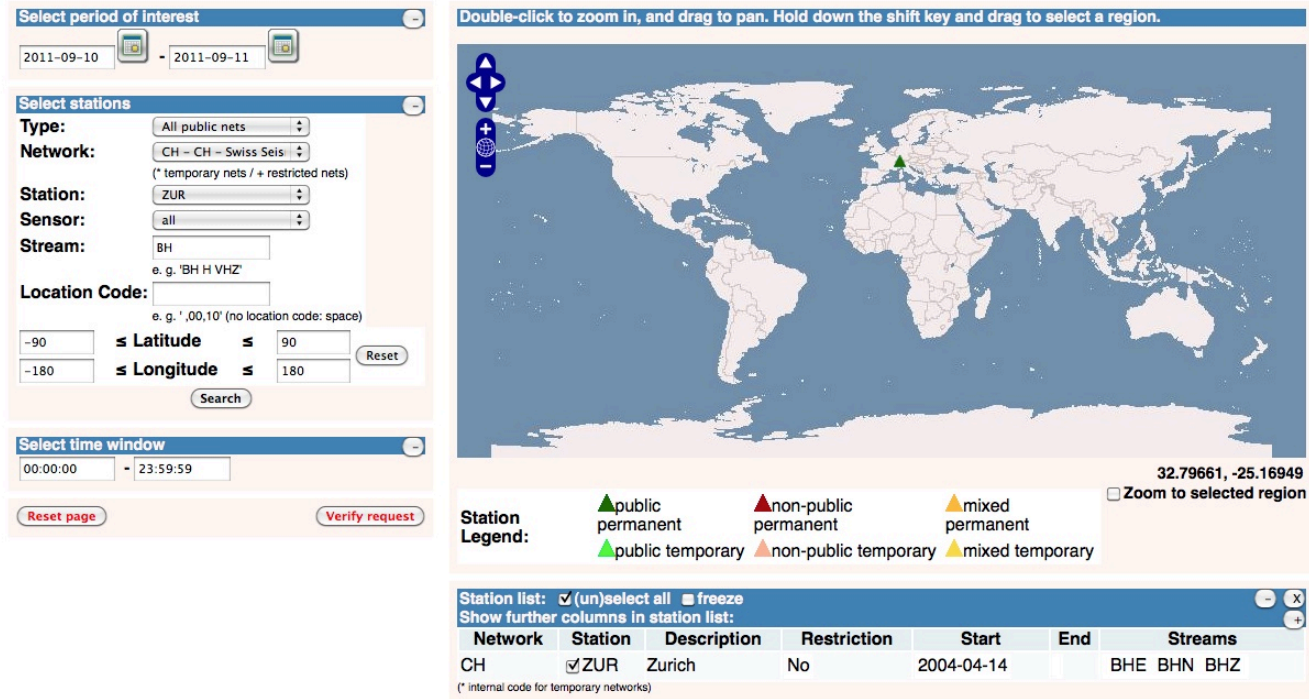
FOR SWISS ARCHIVES AND EVENT CATALOGUE.

This is the new ArcLink / EIDA interface at SED. Provide feedback via [e-mail](#).

START QUERY Home SED Guidelines for Usage

Data Dissemination via
EIDA-Node (European
Integrated Data Archive):

- Metadata
- Waveforms



Select period of interest

2011-09-10 - 2011-09-11

Select stations

Type: All public nets

Network: CH - CH - Swiss Seis

Station: ZUR

Sensor: all

Stream: BH

Location Code:

Select time window

00:00:00 - 23:59:59

Reset page Verify request

Double-click to zoom in, and drag to pan. Hold down the shift key and drag to select a region.

32.79661, -25.16949

Zoom to selected region

Station Legend:

- public permanent
- non-public permanent
- mixed permanent
- public temporary
- non-public temporary
- mixed temporary

Station list: ☒ (un)select all ☐ freeze

Show further columns in station list:

Network	Station	Description	Restriction	Start	End	Streams
CH	☒ ZUR	Zurich	No	2004-04-14		BHE BHN BHZ

(* internal code for temporary networks)

eida.ethz.ch



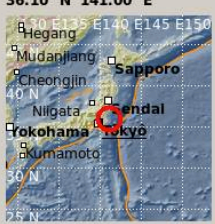
Event Review with *scolv*

scolv@sc3rt.ethz.ch

File Edit View Settings Help

Preferred | Current |

2011-09-15 - 20:36:00
26 min. and 16 sec. ago
M 5.4
Near east coast of Honshu, Japan
Depth 5 km
36.10° N 141.00° E



M -
MLv -
mb -
mB -
Mw(mB) -

Phases: -
RMS Res.: -

Event ID: smi:ru.gsras/0
Agency ID: GSR
- automatic

OT(GMT)	M	TP	Qual	Phases	Lat	Lon	Depth	Stat	Agency	Region	ID
2011-08-22 14:55:10	1.4	MI	-	-	46.23 N	6.99 E	-1 km	M+	SED	Val d'Illiez / Switzerland	smi:ch.ethz.sed/KP201108221454.MANUPDE/20110824091847/ev
2011-08-22 13:39:54	2.6	M	-	-	36.58 N	13.80 E	9 km	M	ING	Mar di Sicilia	smi:it.ingv/out.30970-0.79007040492078/20110822140346/ever
2011-08-22 13:10:01	1.5	MI	-	-	46.04 N	6.86 E	3 km	M+	SED	Barberine / Switzerland	smi:ch.ethz.sed/KP201108221309.MANUPDE/20110824082923/ev
2011-08-22 12:17:05	4.8	M	-	-	36.01 N	141.84 E	28 km	A+	GFZ	Near East Coast of Honshu, Japan	smi:de.gfz-potsdam/out.30816-0.781944767942839/2011082214
2011-08-22 12:11:33	4.7	M	-	-	36.00 N	141.12 E	51 km	A+	GFZ	Near East Coast of Honshu, Japan	smi:de.gfz-potsdam/out.30815-0.871279522224995/2011082214
2011-08-22 11:23:38	5.9	M	-	-	36.11 N	141.70 E	34 km	M+	NEI	NEAR EAST COAST OF HONSHU, JAPAN	smi:gov.usgs/out.30810-0.648047139463223/2011082215011/e
2011-08-22 09:55:14	4.8	M	-	-	17.70 S	167.13 E	41 km	A	GFZ	Vanuatu Islands	smi:de.gfz-potsdam/out.30967-0.326641566868304/2011082211
2011-08-22 09:38:37	5.5	M	-	-	28.91 S	176.56 W	6 km	M+	NEI	KERMADEC ISLANDS REGION	smi:gov.usgs/out.30964-0.248230871036419/20110822095935/e
2011-08-22 09:25:05	-	-	D	6	46.17 N	8.20 E	95 km	A+	SED_Ti	Switzerland	sed2011qkw
2011-08-22 09:16:32	4.6	M	-	-	15.22 N	42.35 E	10 km	A	GFZ	Western Arabian Peninsula	smi:de.gfz-potsdam/out.30974-0.0431970168954585/201108221
2011-08-22 08:36:21	5.1	M	-	-	36.21 N	140.25 E	59 km	A+	GFZ	Near East Coast of Honshu, Japan	smi:de.gfz-potsdam/out.30961-0.0580960474808201/20110822C
2011-08-22 07:05:21	1.8	MI	-	-	46.69 N	8.55 E	6 km	M+	SED	Meiental / Switzerland	smi:ch.ethz.sed/KP201108220704.MANUPDE/20110822081005/ev
2011-08-22 06:04:57	5.8	M	-	-	17.47 S	167.24 E	35 km	M+	NEI	VANUATU	smi:gov.usgs/out.30803-0.478970008585911/20110822062644/e
2011-08-22 04:02:18	0.9	MI	-	-	46.04 N	6.89 E	4 km	M+	SED	Barberine / Switzerland	smi:ch.ethz.sed/KP201108220402.MANUPDE/20110822082139/ev
2011-08-22 03:01:22	4.5	mb	D	27	0.94 N	68.44 E	146 km	A	SED_Tt	Carlsberg Ridge	sed2011qjy
2011-08-22 02:52:32	5.0	M	-	-	18.57 S	167.84 E	48 km	A+	GFZ	Vanuatu Islands	smi:de.gfz-potsdam/out.30950-0.346285976561486/2011082203
2011-08-22 01:42:57	1.6	MI	-	-	46.04 N	6.88 E	4 km	M+	SED	Barberine / Switzerland	smi:ch.ethz.sed/KP201108220142.MANUPDE/20110822091602/ev
2011-08-22 00:47:52	4.3	Mb	-	-	49.90 N	156.50 E	33 km	M	GSR	Kuril Islands	smi:ru.gsras/out.30799-0.534774801168183/20110822031851/e
2011-08-22 00:07:07	4.8	Mb	-	-	42.60 N	143.30 E	33 km	M	GSR	Hokkaido, Japan region	smi:ru.gsras/out.30949-0.78783060542855/20110822025554/ev
2011-08-21 22:30:38	1.6	MI	-	-	46.03 N	6.88 E	4 km	M+	SED	Col de Balme / France	smi:ch.ethz.sed/KP201108212230.MANUPDE/20110821225150/e
2011-08-21 22:05:48	4.8	M	-	-	37.25 N	140.82 E	61 km	A+	GFZ	Eastern Honshu, Japan	smi:de.gfz-potsdam/out.30795-0.710528080369109/2011082122
2011-08-21 21:42:59	2.4	ML	-	-	39.01 N	15.58 E	223 km	M	ING	Costa Calabra occidentale	smi:it.ingv/out.30794-0.398185585262588/20110821220253/ev
2011-08-21 21:39:57	4.9	Mb	-	-	37.30 N	140.20 E	33 km	M	GSR	Eastern Honshu, Japan	smi:ru.gsras/out.30797-0.53230914037471/20110822022329/e
2011-08-21 21:14:11	4.6	M	-	-	4.84 N	95.14 E	77 km	A+	GFZ	Northern Sumatra, Indonesia	smi:de.gfz-potsdam/out.30943-0.86017229734647/20110821212
2011-08-21 20:55:14	-	-	C	6	46.02 N	6.90 E	2 km	A+	SED_BK	Switzerland	sed2011qjmd
2011-08-21 20:16:35	5.2	Mb	-	-	44.30 N	131.00 E	33 km	A	GSR	E. Russia-N.E. China bo	smi:ru.gsras/out.30792-0.748130616516075/20110821204514/e
2011-08-21 19:49:20	1.3	MLh	A	16	46.04 N	6.89 E	4 km	A+	SED_BK	Switzerland	sed2011qjly
2011-08-21 19:39:45	2.9	MI	-	-	46.04 N	6.90 E	9 km	M+	SED	Barberine / Switzerland	smi:ch.ethz.sed/KP201108211939.MANUPDE/20110821211903/ev
Origins											
2011-08-21 18:58:46	2.0	ML	-	-	40.67 N	15.40 E	8 km	M	ING	Irpina	smi:it.ingv/out.30789-0.61539957191556/20110821190947/ever
2011-08-21 16:54:19	5.1	M	-	-	7.63 S	106.62 E	10 km	A+	GFZ	Java, Indonesia	smi:de.gfz-potsdam/out.30942-0.245436100207954/2011082117
2011-08-21 16:00:24	2.5	ML	-	-	38.29 N	15.19 E	115 km	M	ING	Golfi di Patti e di Milazzo	smi:it.ingv/out.30940-0.632119716165914/20110821161539/ev
2011-08-21 15:20:28	4.0	Mb	-	-	42.50 N	43.00 E	10 km	M	GSR	Western Caucasus	smi:ru.gsras/out.30941-0.140744613451584/20110821164440/e
2011-08-21 15:01:53	1.7	MLh	C	5	45.24 N	8.81 E	40 km	A+	SED_Ti	Northern Italy	sed2011qjal
2011-08-21 13:04:08	5.8	M	-	-	5.58 S	151.01 E	40 km	M+	NEI	New Britain, Papua New Guinea, region	smi:gov.usgs/out.621871-0.299017034086678/20110821153518
2011-08-21 12:38:53	5.6	M	-	-	56.39 S	27.54 W	128 km	M+	NEI	SOUTH SANDWICH ISLANDS REGION	smi:gov.usgs/out.30932-0.760204494428294/20110821130054/e
2011-08-21 09:03:53	5.1	M	-	-	18.61 S	167.99 E	37 km	A+	GFZ	Vanuatu Islands	smi:de.gfz-potsdam/out.30780-0.985095686645806/2011082105
2011-08-21 08:18:16	5.0	M	-	-	4.74 N	94.95 E	10 km	A+	GFZ	Off West Coast of Northern Sumatra	smi:de.gfz-potsdam/out.30777-0.56459298295422/20110821082
2011-08-21 06:47:48	4.1	Mb	-	-	42.50 N	43.10 E	10 km	M	GSR	Western Caucasus	smi:ru.gsras/out.30928-0.646265845262501/20110821092435/e
2011-08-21 06:45:28	4.8	M	-	-	1.98 S	128.10 E	10 km	A+	GFZ	Halmahera, Indonesia	smi:de.gfz-potsdam/out.30773-0.582264009084376/2011082106
2011-08-21 06:19:46	2.5	MLh	D	22	45.82 N	9.49 E	4 km	A	SED_Tt	Northern Italy	sed2011qjff
2011-08-21 06:14:20	4.6	M	-	-	37.69 N	23.21 E	67 km	A+	GFZ	Southern Greece	smi:de.gfz-potsdam/out.30768-0.457955393202205/2011082106
2011-08-21 05:28:41	3.9	M	-	-	36.65 N	21.21 E	10 km	A	GFZ	Southern Greece	smi:de.gfz-potsdam/out.30917-0.965273429249716/2011082105
2011-08-21 05:09:26	4.8	M	-	-	27.08 S	70.88 W	22 km	A	GFZ	Near Coast of Northern Chile	smi:de.gfz-potsdam/out.30919-0.935132390450757/2011082106
2011-08-21 04:44:07	5.0	M	-	-	10.91 S	162.94 E	133 km	A+	GFZ	Solomon Islands	smi:de.gfz-potsdam/out.30914-0.924865428646367/2011082104
2011-08-21 04:25:50	4.3	M	-	-	15.01 N	41.89 E	10 km	A	GFZ	Red Sea	smi:de.gfz-potsdam/out.30920-0.692150133977538/2011082106
2011-08-21 03:20:20	4.6	M	-	-	19.20 S	177.94 W	450 km	A	GFZ	Fiji Islands Region	smi:de.gfz-potsdam/out.30774-0.358892011775382/2011082106
2011-08-21 02:36:25	4.5	Mb	-	-	9.40 N	126.20 E	130 km	M	GSR	Mindanao, Philippines	smi:ru.gsras/out.30923-0.114293625521171/20110821072328/e
2011-08-21 02:31:43	4.5	Mb	-	-	55.20 N	160.40 E	10 km	M	GSR	Kamchatka Peninsula, Ru	smi:ru.gsras/out.30772-0.179827486650726/20110821064919/e
2011-08-21 02:16:06	-	-	-	32	41.08 N	156.27 E	10 km	A	SED_Tt	North Pacific Ocean	sed2011qibf
2011-08-21 02:09:17	5.0	M	-	-	18.88 S	168.04 E	10 km	A+	GFZ	Vanuatu Islands	smi:de.gfz-potsdam/out.30764-0.00330808832370622/20110821

Clear Last days: 1 Read From: 2011/08/21 00:57:45 To: 2011/09/15 20:57:45 Read

☒ Hide other/fake events ☐ Show only SED events ☐ Show only latest/preferred origin per agency

A new origin arrived at 2011-09-15 20:59:17 (localtime)



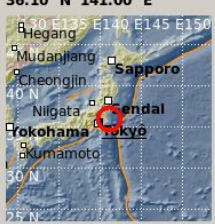
Event Review with *scolv*

scolv@sc3rt.ethz.ch

File Edit View Settings Help

Preferred | Current |

2011-09-15 - 20:36:00
32 min. and 55 sec. ago
M 5.4
Near east coast of Honshu
Depth 5 km
36.10° N 141.00° E



M -
MLv -
mb -
mB -
Mw(mB) -

Phases: -
RMS Res.: -

Event ID: sml:ru.gsras/0
Agency ID: GSR
- automatic

OT(GMT)	M	TP	Qual	Phases	Lat	Lon	Depth	Stat	Agency	Region	ID
2011-08-21 19:39:45	2.9	MI	-	-	46.04 N	6.90 E	9 km	M+	SED	Barberine / Switzerland	sml:ch.ethz.sed/KP201108211939.MANUPDE/20110821211903/en
Origins											
... 19:39:45	-	-	-	-	46.04 N	6.90 E	9 km	M	SED	Switzerland	sml:ch.ethz.sed/KP201108211939.MANUPDE/20110821211903/or
... 19:37:59	-	-	-	-	46.04 N	6.89 E	4 km	M	SED	Switzerland	sml:ch.ethz.sed/KP201108211937.MANUPDE/20110821211138/or
... 19:39:45	-	-	-	-	46.04 N	6.90 E	9 km	M	SED	Switzerland	sml:ch.ethz.sed/KP201108211939.MANUPDE/20110821204737/or
... 19:39:44	-	-	A	49	46.03 N	6.89 E	9 km	M	SED	Switzerland	NLL.20110821200858.511829.14394
... 19:37:58	-	-	-	-	46.03 N	6.92 E	8 km	M	ING	Switzerland	sml:it.ingv/out.30790-0.478862591470005/20110821194838/ori
... 19:39:44	-	-	C	49	46.04 N	6.87 E	9 km	A	SED BK	Switzerland	NLL.20110821194710.926745.16015
... 19:39:45	-	-	D	50	46.04 N	6.89 E	3 km	A	SED TI	Switzerland	NLL.20110821194705.734358.16598
... 19:39:45	-	-	-	-	46.01 N	6.83 E	10 km	A	SED	Switzerland	Origin#20110821194706.291766.219511
... 19:39:45	-	-	-	-	46.02 N	6.84 E	5 km	A	SED	Switzerland	Origin#20110821194704.577821.233958
... 19:37:59	-	-	C	25	46.04 N	6.88 E	4 km	A	SED BK	Switzerland	NLL.20110821194548.294481.16009
... 19:37:59	-	-	D	26	46.04 N	6.83 E	2 km	A	SED TI	Switzerland	NLL.20110821194545.87427.16592
... 19:38:00	-	-	-	-	45.99 N	6.86 E	5 km	A	SED	France	Origin#20110821194547.798466.218580
... 19:38:01	-	-	-	-	46.03 N	6.82 E	5 km	A	SED	Switzerland	Origin#20110821194545.314266.233023
... 19:39:45	-	-	D	48	46.04 N	6.89 E	3 km	A	SED TI	Switzerland	NLL.20110821194230.488397.15997
... 19:39:45	-	-	C	49	46.04 N	6.88 E	9 km	A	SED BK	Switzerland	NLL.20110821194209.66686.16580
... 19:39:45	-	-	C	48	46.04 N	6.88 E	9 km	A	SED BK	Switzerland	NLL.20110821194210.635122.15995
... 19:39:47	-	-	C	49	46.04 N	6.89 E	9 km	A	SED BK	Switzerland	NLL.20110821194202.864655.3439
... 19:39:45	-	-	C	47	46.04 N	6.89 E	9 km	A	SED BK	Switzerland	NLL.20110821194141.53288.15992
... 19:39:45	-	-	D	49	46.04 N	6.89 E	3 km	A	SED TI	Switzerland	NLL.20110821194140.879779.16578
... 19:39:47	-	-	C	46	46.04 N	6.88 E	9 km	A	SED BK	Switzerland	NLL.20110821194131.287622.3431
... 19:39:45	-	-	D	46	46.04 N	6.88 E	9 km	A	SED BK	Switzerland	NLL.20110821194113.357568.15982
... 19:39:45	-	-	C	47	46.04 N	6.89 E	9 km	A	SED TI	Switzerland	NLL.20110821194114.258542.16571
... 19:39:48	-	-	-	-	46.08 N	6.84 E	10 km	A	SED TI	Switzerland	Origin#20110821194125.424104.2564673
... 19:39:45	-	-	-	-	46.02 N	6.84 E	10 km	A	SED	Switzerland	Origin#20110821194123.318649.217295
... 19:39:47	-	-	D	50	46.09 N	6.89 E	0 km	A	SED TI	Switzerland	NLL.20110821194052.45507.3412
... 19:39:45	-	-	C	41	46.04 N	6.89 E	3 km	A	SED TI	Switzerland	NLL.20110821194042.500922.16560
... 19:39:46	-	-	-	-	46.03 N	6.85 E	5 km	A	SED	Switzerland	Origin#20110821194113.291416.230490
... 19:39:45	-	-	C	39	46.04 N	6.88 E	9 km	A	SED BK	Switzerland	NLL.20110821194047.766366.15975
... 19:39:45	-	-	-	-	46.01 N	6.85 E	10 km	A	SED	Switzerland	Origin#20110821194105.176336.216269
... 19:39:48	-	-	-	-	46.09 N	6.85 E	5 km	A	SED TI	Switzerland	Origin#20110821194104.554925.2563382
... 19:39:45	-	-	-	-	46.01 N	6.85 E	10 km	A	SED	Switzerland	Origin#20110821194055.148343.215350
... 19:39:45	-	-	-	-	46.02 N	6.85 E	5 km	A	SED	Switzerland	Origin#20110821194050.315045.229491
... 19:39:45	-	-	C	26	46.04 N	6.89 E	4 km	A	SED BK	Switzerland	NLL.20110821194025.242713.15948
... 19:39:46	-	-	D	30	46.07 N	6.89 E	0 km	A	SED TI	Switzerland	NLL.20110821194023.810227.3385
... 19:39:45	-	-	C	19	46.05 N	6.89 E	3 km	A	SpNV	Switzerland	NLL.20110821194028.781053.8223
... 19:39:45	-	-	-	-	46.01 N	6.86 E	10 km	A	SED	Switzerland	Origin#20110821194045.05174.214424
... 19:39:47	-	-	-	-	46.08 N	6.86 E	5 km	A	SED TI	Switzerland	Origin#20110821194043.185004.2556649
... 19:39:45	-	-	C	25	46.04 N	6.89 E	3 km	A	SED TI	Switzerland	NLL.20110821194020.19557.16535
... 19:39:45	-	-	-	-	46.02 N	6.86 E	5 km	A	SED	Switzerland	Origin#20110821194040.27341.226985
... 19:39:45	-	-	-	-	46.01 N	6.88 E	10 km	A	SED	Switzerland	Origin#20110821194034.25473.208284
... 19:39:45	-	-	-	-	46.02 N	6.87 E	5 km	A	SED	Switzerland	Origin#20110821194030.214829.221752
... 19:39:43	-	-	-	-	46.04 N	6.81 E	10 km	A	SED	Switzerland	Origin#20110821194027.387335.137885
... 19:39:45	-	-	C	15	46.04 N	6.89 E	3 km	A	SpNV	Switzerland	NLL.20110821194014.187005.8217
... 19:39:44	-	-	-	-	46.02 N	6.88 E	10 km	A	SED	Switzerland	Origin#20110821194023.643927.200104
... 19:39:45	-	-	A	14	46.04 N	6.88 E	4 km	A	SED BK	Switzerland	NLL.20110821194011.932879.15929
... 19:39:46	-	-	-	-	46.09 N	6.88 E	5 km	A	SED TI	Switzerland	Origin#20110821194022.932793.2539463
... 19:39:44	-	-	-	-	46.03 N	6.89 E	10 km	A	SED	Switzerland	Origin#20110821194019.596471.211708
... 19:39:45	-	-	C	13	46.04 N	6.88 E	4 km	A	SED TI	Switzerland	NLL.20110821194008.178079.16520
... 19:39:43	-	-	-	-	46.01 N	6.82 E	6 km	A	SED	Switzerland	Origin#20110821194013.360187.135532

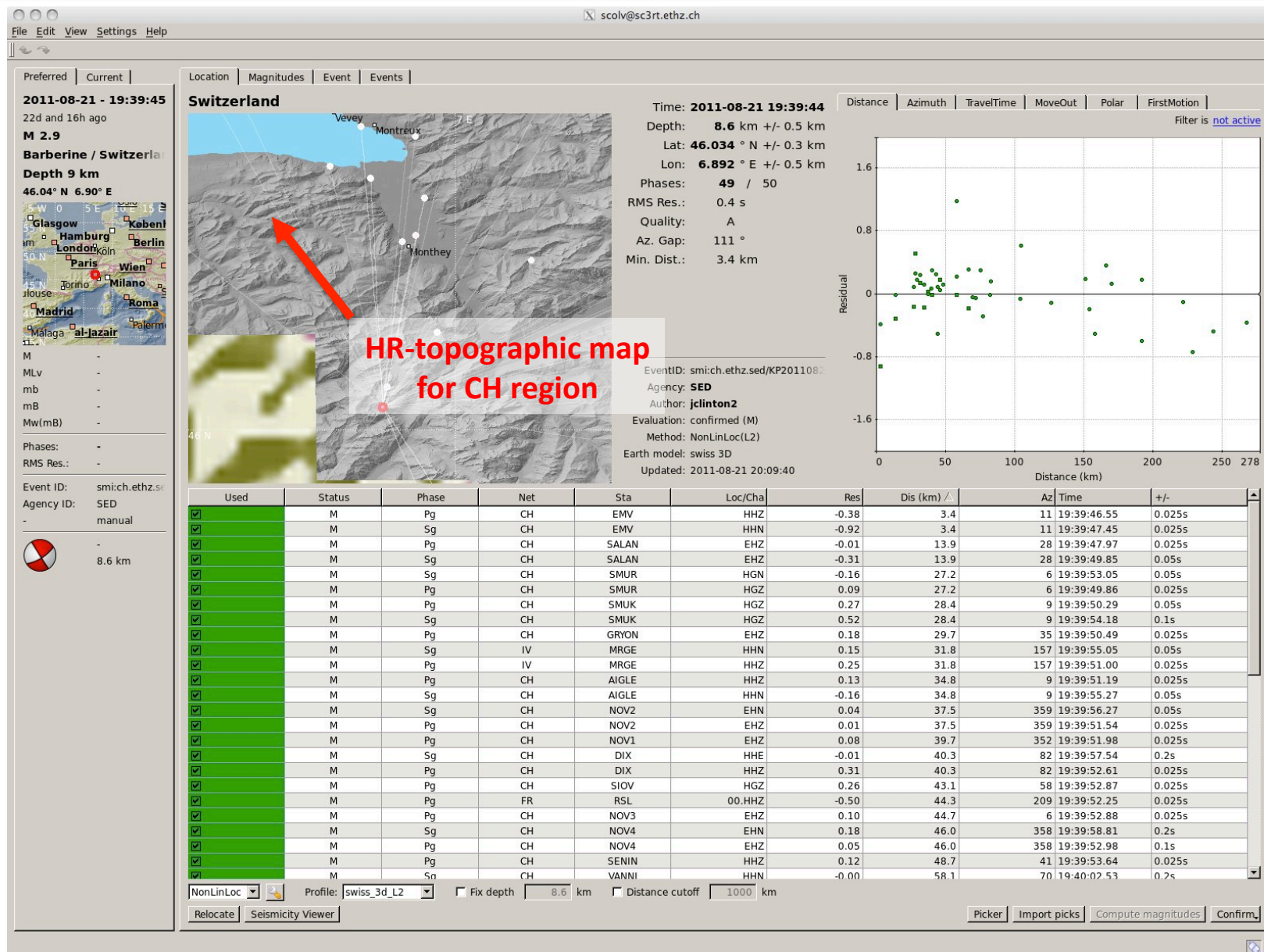
Location quality from NonLinLoc solutions (difference between max. likelihood and center of error ellipsoid)

Clear Last days: 1 Read From: 2011/08/21 00:57:45 To: 2011/09/15 20:57:45 Read

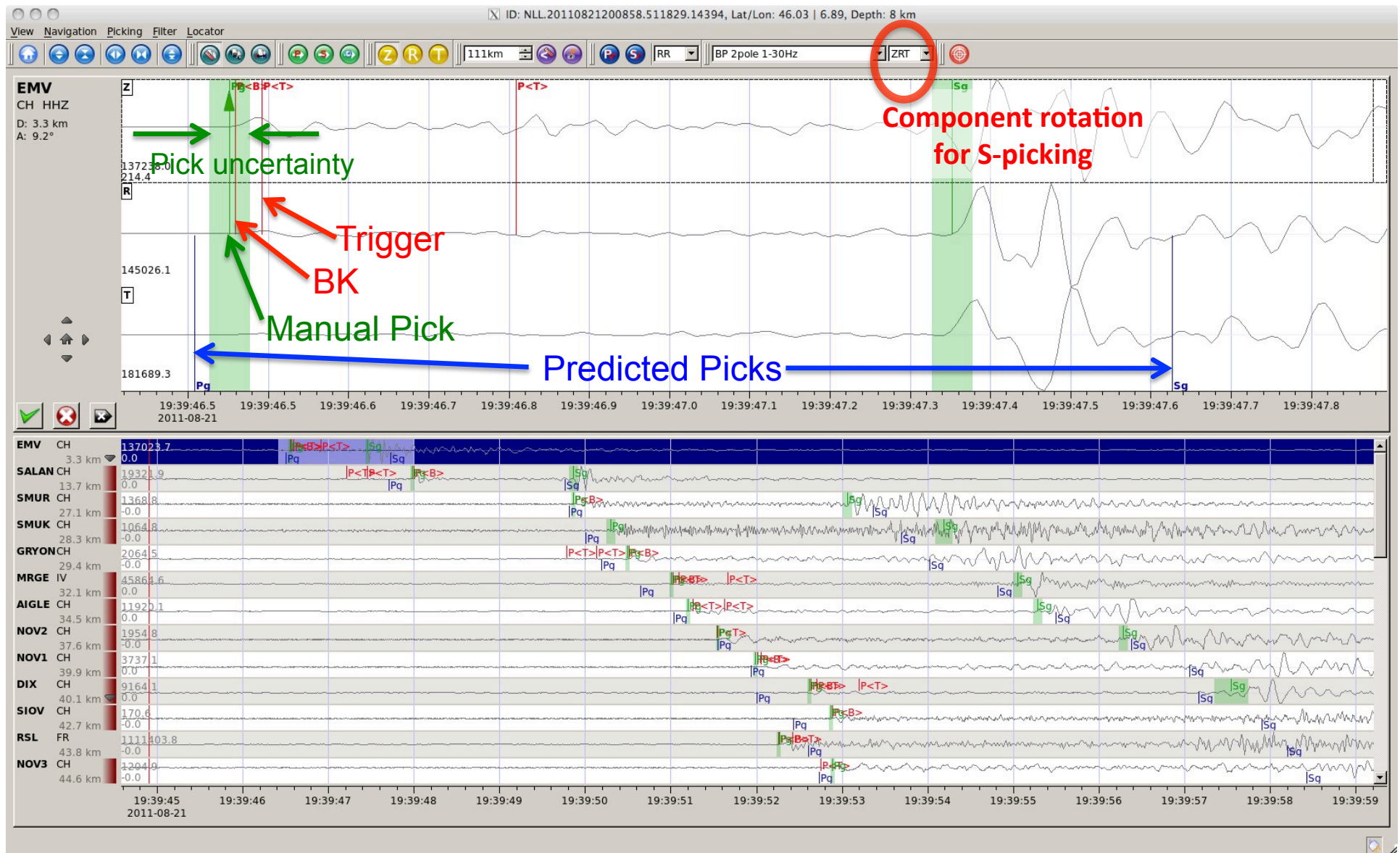
☒ Hide other/fake events ☐ Show only SED events ☐ Show only latest/preferred origin per agency

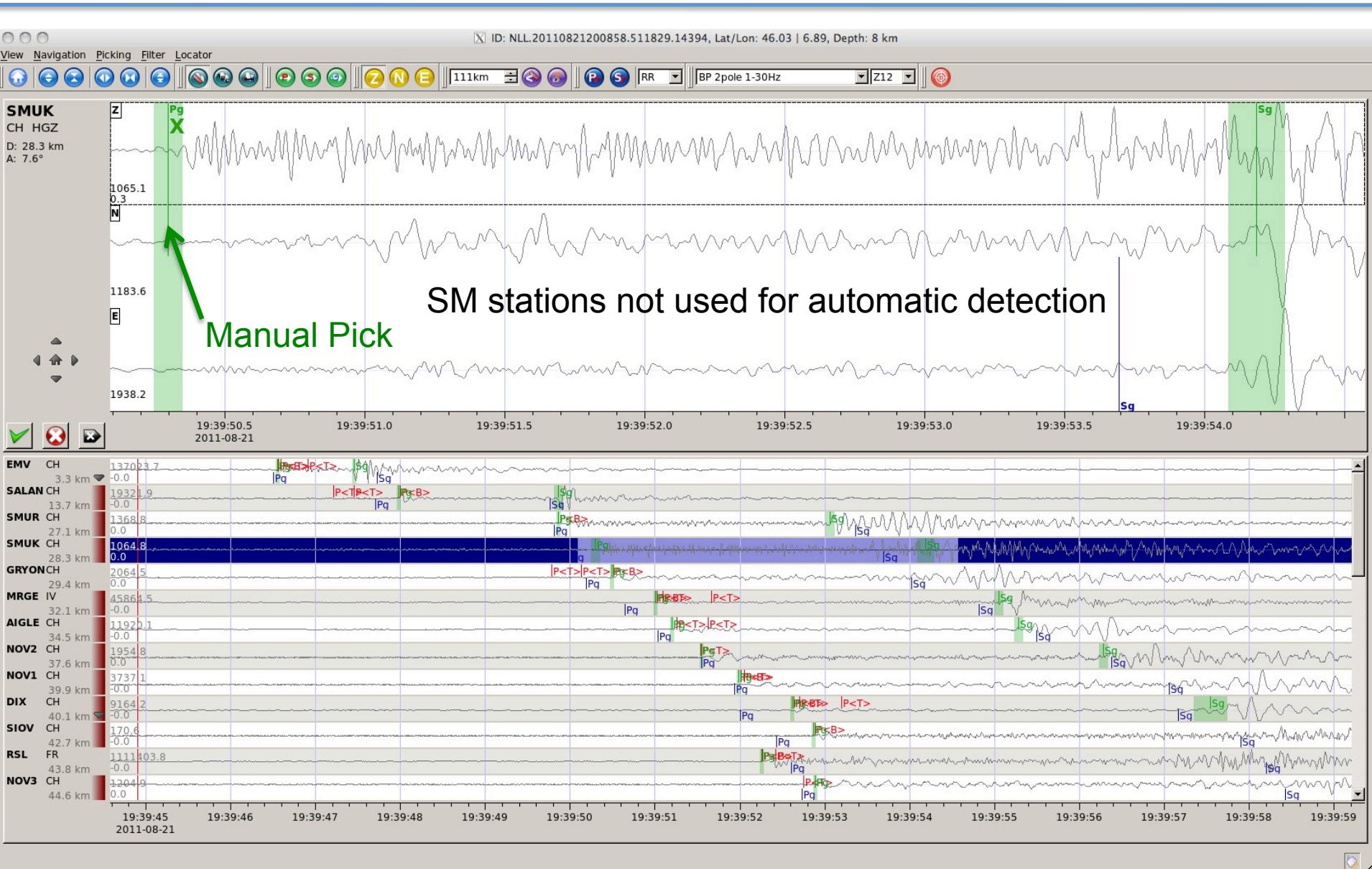


Event review with *scolv*

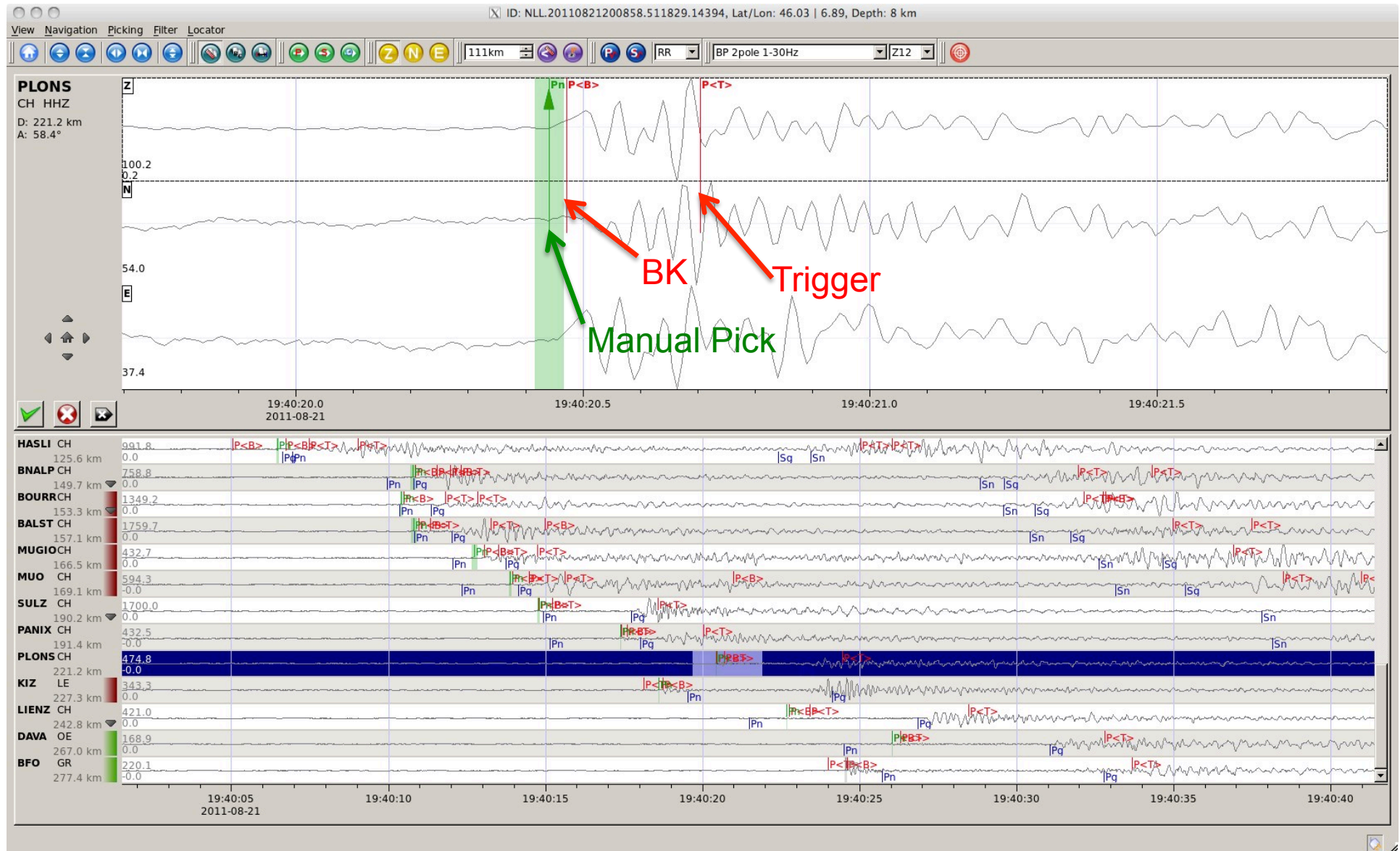


Event review with *scolv*

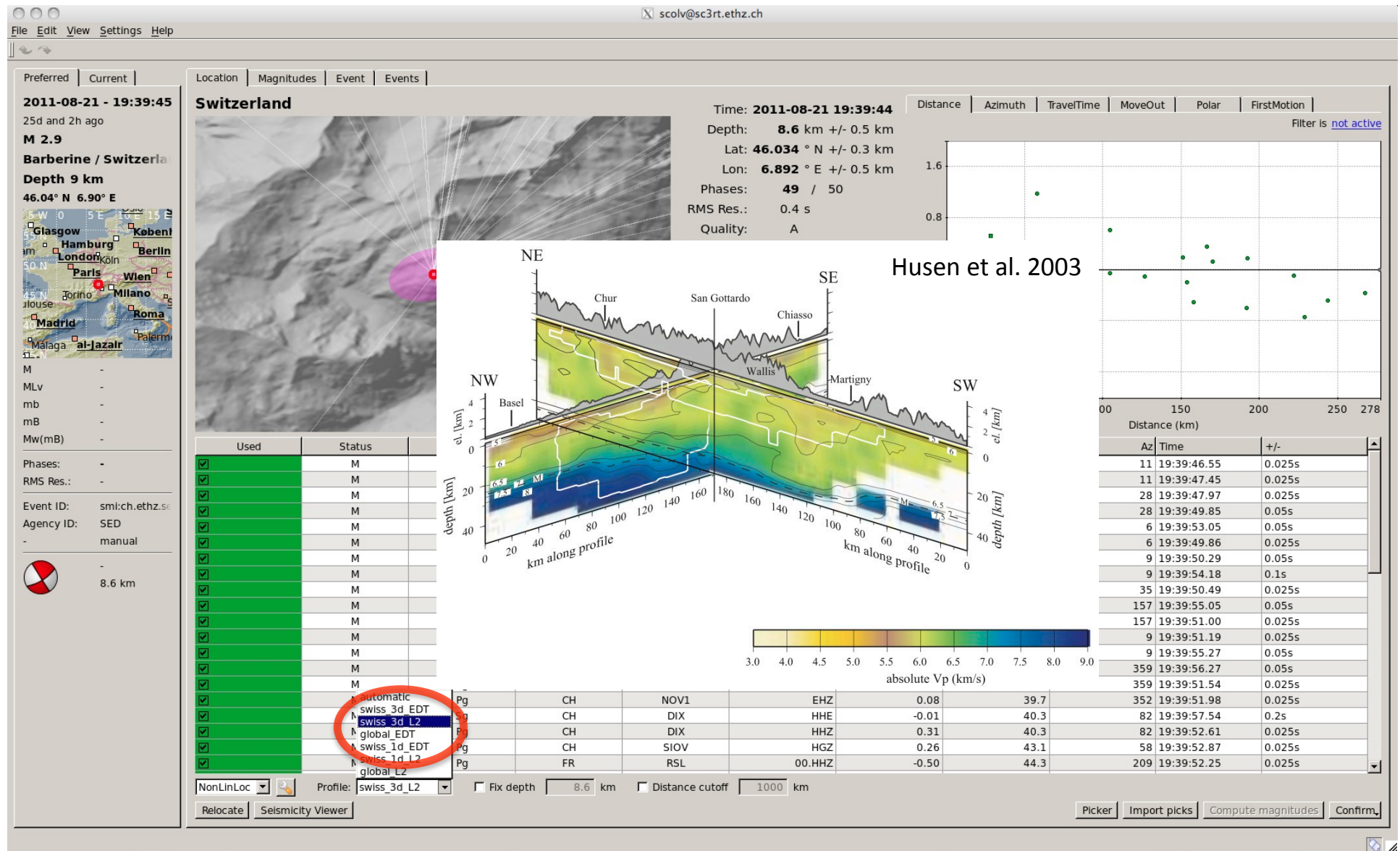




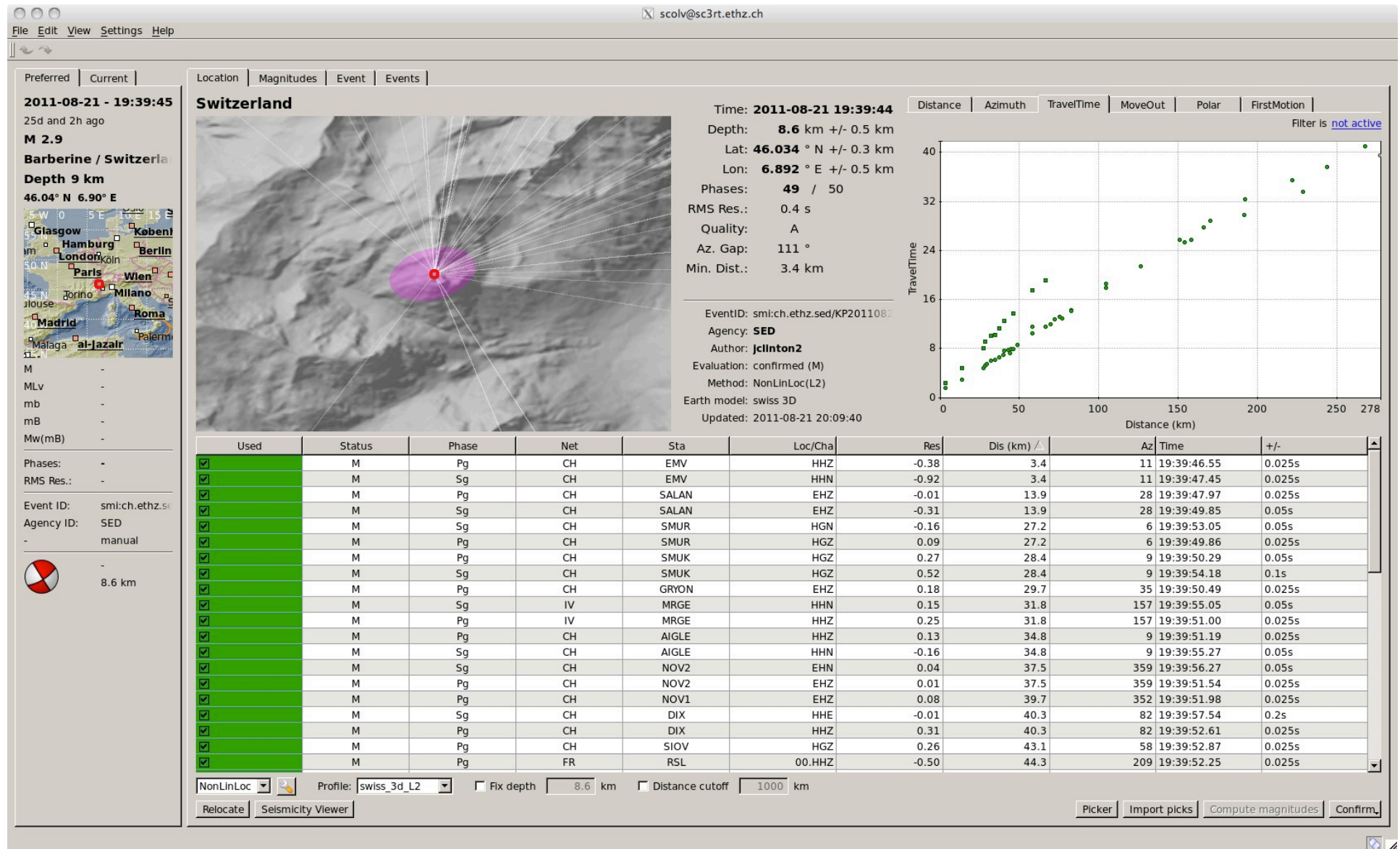
Event review with *scolv*



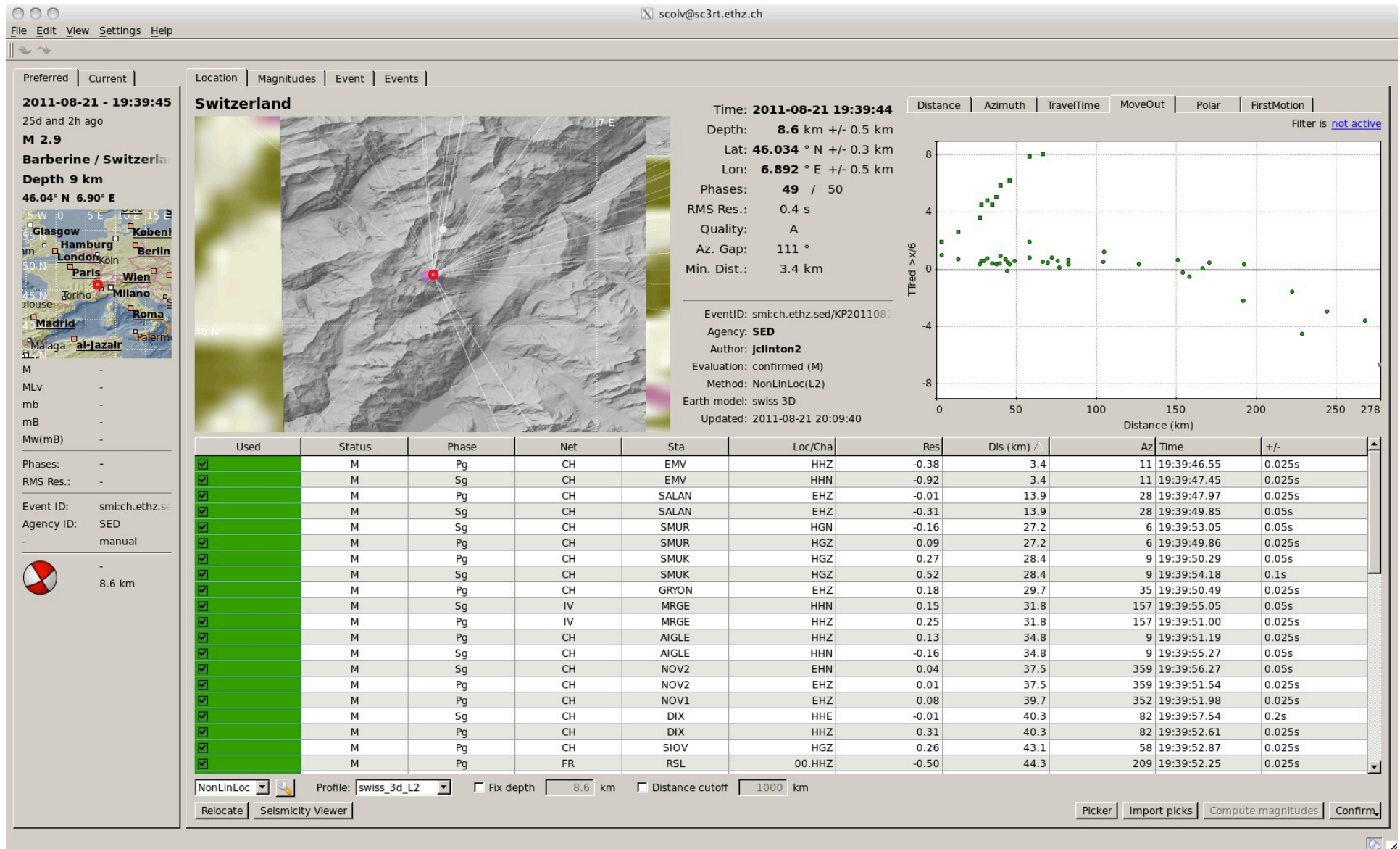
Event review with *scolv*



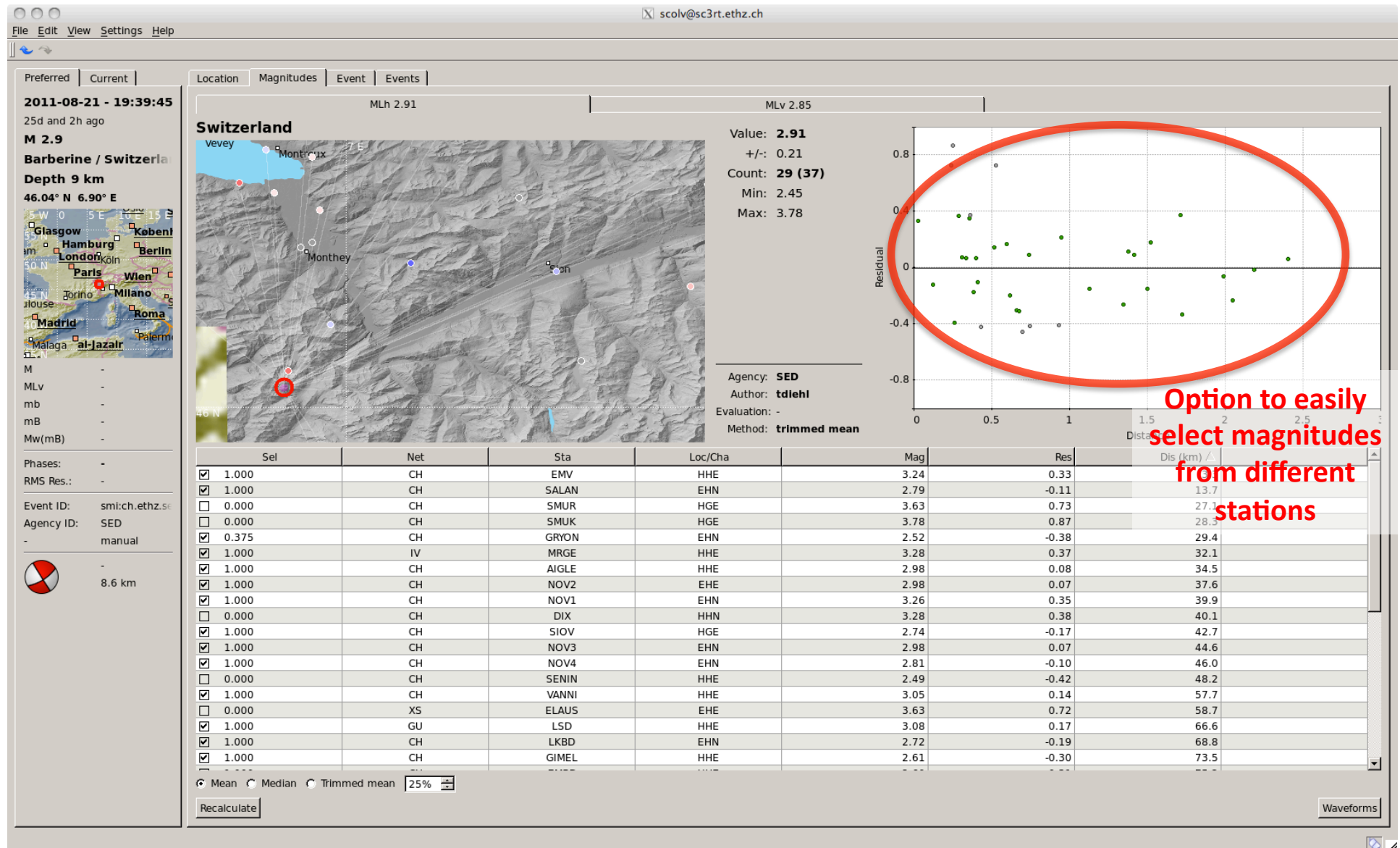
Event review with *scolv*



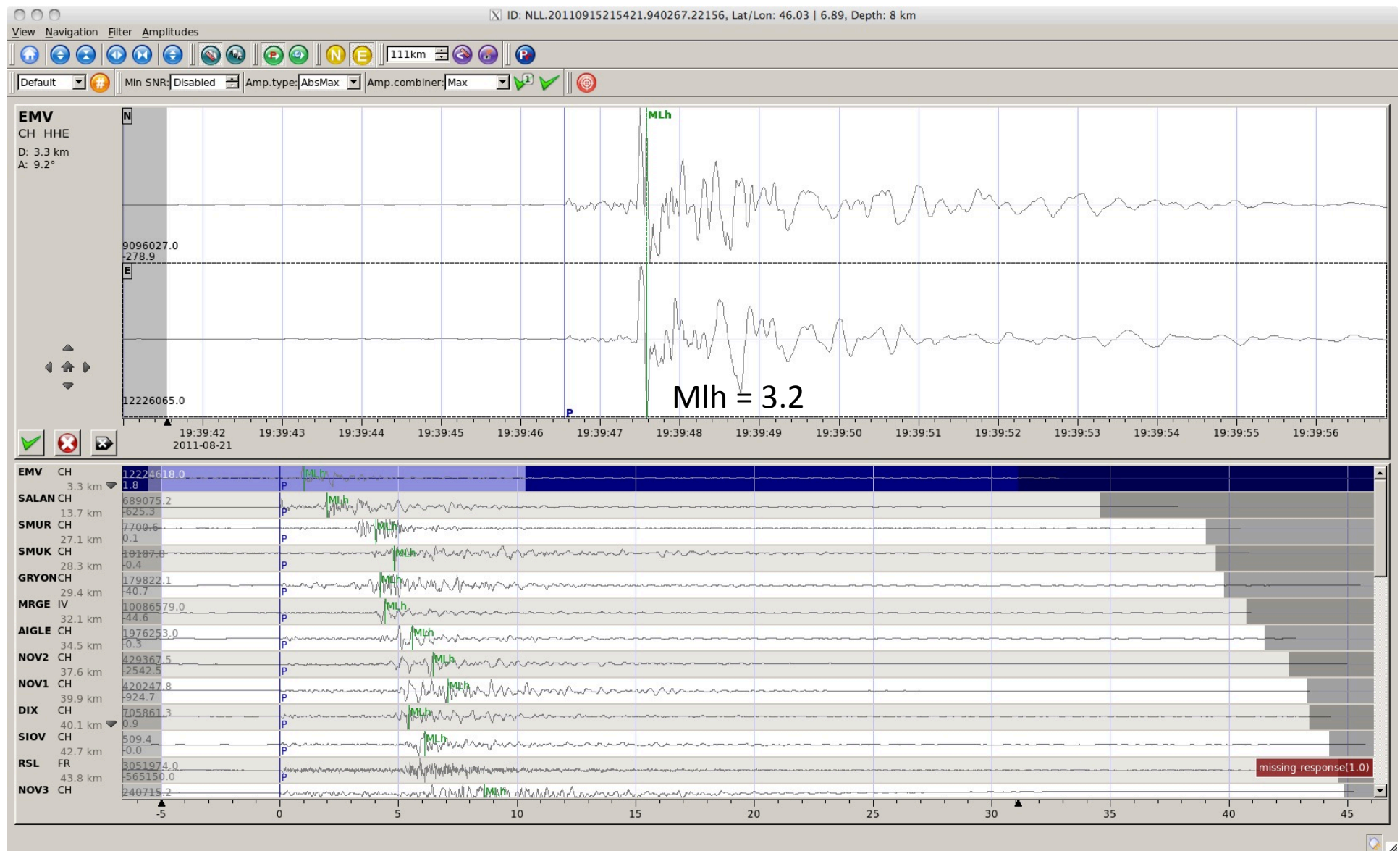
Event review with *scolv*



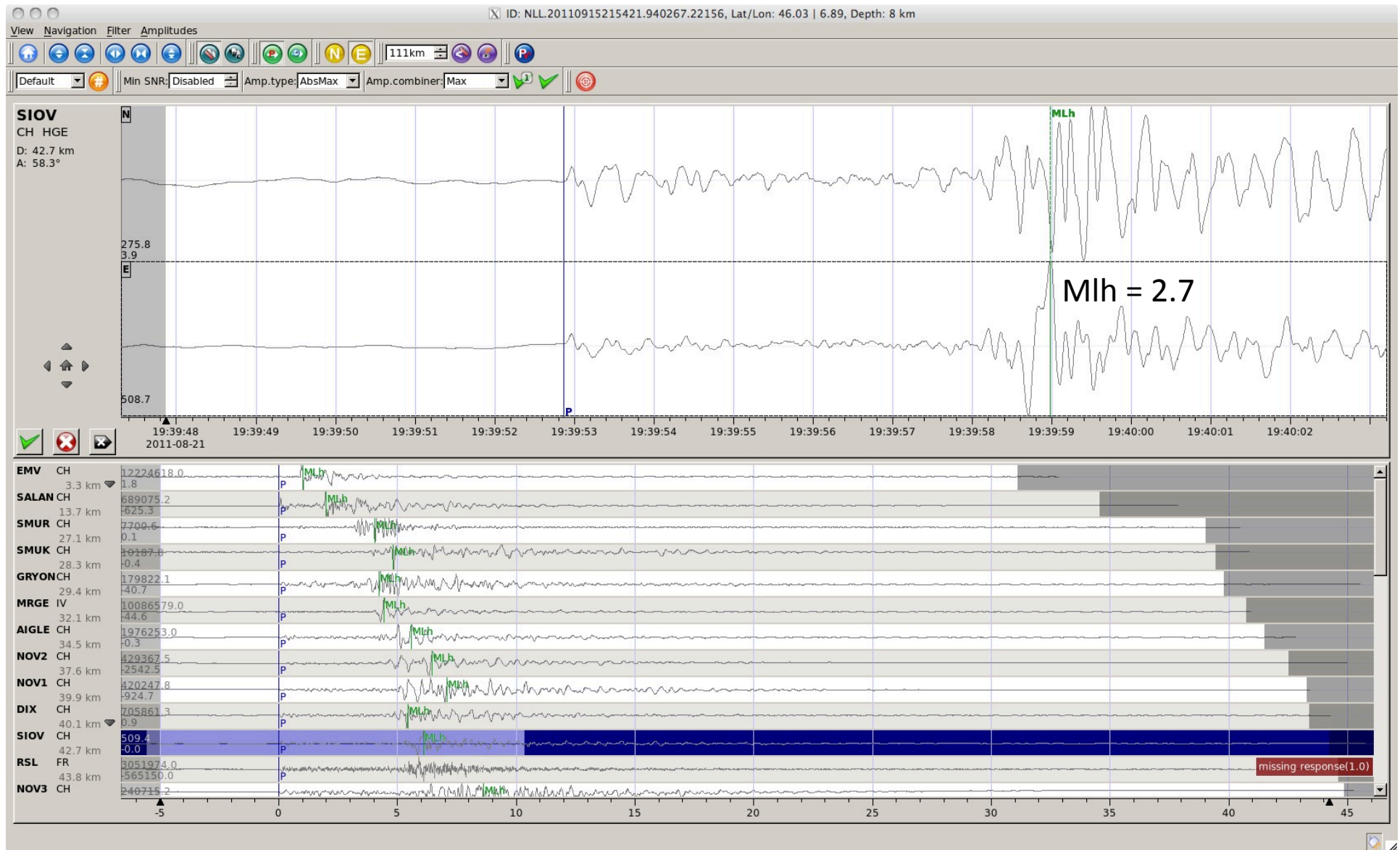
Event review with *scolv*

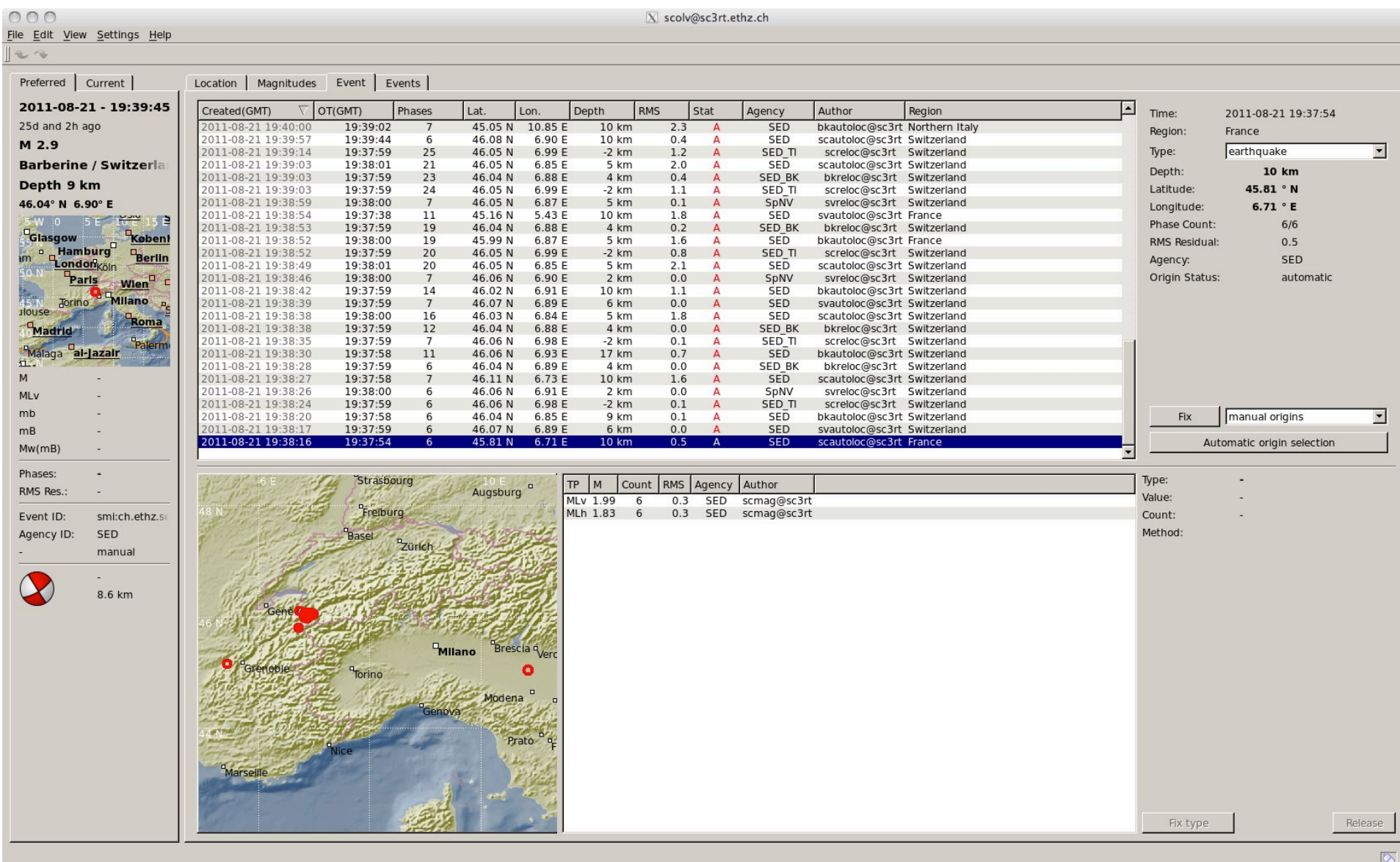


Event review with *scolv*



Event review with *scolv*





Event review with *scolv*

scolv@sc3rt.ethz.ch

File Edit View Settings Help

Preferred | Current | Location | Magnitudes | Event | Events

2011-08-21 - 19:39:45
25d and 2h ago
M 2.9
Barberine / Switzerland
Depth 9 km
46.04° N 6.90° E

Map showing the location of the event in the Alps region, near Geneva and Milan.

Created(GMT)	OT(GMT)	Phases	Lat.	Lon.	Depth	RMS	Stat	Agency	Author	Region
2011-08-21 21:19:03	19:39:45	-	46.04 N	6.90 E	9 km	-	M	SED		Switzerland
2011-08-21 21:11:38	19:37:59	-	46.04 N	6.89 E	4 km	-	M	SED		Switzerland
2011-08-21 20:47:37	19:39:45	-	46.04 N	6.90 E	9 km	-	M	SED		Switzerland
2011-08-21 20:09:40	19:39:44	49	46.03 N	6.89 E	9 km	0.4	M	SED	jclinton2	Switzerland
2011-08-21 19:48:21	19:37:58	-	46.03 N	6.92 E	8 km	-	M	ING		Switzerland
2011-08-21 19:47:29	19:39:44	49	46.04 N	6.87 E	9 km	0.3	A	SED_BK	bkreloc@sc3rt	Switzerland
2011-08-21 19:47:23	19:39:45	50	46.04 N	6.89 E	3 km	0.5	A	SED_TI	scireloc@sc3rt	Switzerland
2011-08-21 19:47:06	19:39:45	53	46.01 N	6.89 E	10 km	1.9	A	SED	bkauloc@sc3rt	Switzerland
2011-08-21 19:47:04	19:39:45	52	46.02 N	6.84 E	5 km	1.8	A	SED	scautoloc@sc3rt	Switzerland
2011-08-21 19:45:56	19:37:59	25	46.04 N	6.88 E	4 km	0.4	A	SED_BK	bkreloc@sc3rt	Switzerland
2011-08-21 19:45:54	19:37:59	26	46.04 N	6.83 E	2 km	1.3	A	SED_TI	scireloc@sc3rt	Switzerland
2011-08-21 19:45:47	19:38:00	20	45.99 N	6.86 E	5 km	1.6	A	SED	bkauloc@sc3rt	France
2011-08-21 19:45:45	19:38:01	22	46.03 N	6.82 E	5 km	2.1	A	SED	scautoloc@sc3rt	Switzerland
2011-08-21 19:42:49	19:39:45	48	46.04 N	6.88 E	9 km	0.3	A	SED_BK	bkreloc@sc3rt	Switzerland
2011-08-21 19:42:35	19:39:45	49	46.04 N	6.89 E	3 km	0.5	A	SED_TI	scireloc@sc3rt	Switzerland
2011-08-21 19:42:30	19:39:45	48	46.04 N	6.88 E	9 km	0.3	A	SED_BK	bkreloc@sc3rt	Switzerland
2011-08-21 19:42:21	19:39:47	50	46.08 N	6.89 E	0 km	1.5	A	SED_Tt	telerelec@sc3rt	Switzerland
2011-08-21 19:42:10	19:39:45	47	46.04 N	6.88 E	9 km	0.3	A	SED_BK	bkreloc@sc3rt	Switzerland
2011-08-21 19:42:09	19:39:45	49	46.04 N	6.89 E	3 km	0.5	A	SED_TI	scireloc@sc3rt	Switzerland
2011-08-21 19:42:00	19:39:47	50	46.08 N	6.89 E	0 km	1.5	A	SED_Tt	telerelec@sc3rt	Switzerland
2011-08-21 19:41:41	19:39:45	46	46.04 N	6.88 E	9 km	0.3	A	SED_BK	bkreloc@sc3rt	Switzerland
2011-08-21 19:41:40	19:39:45	47	46.04 N	6.89 E	3 km	0.5	A	SED_TI	scireloc@sc3rt	Switzerland
2011-08-21 19:41:25	19:39:48	58	46.08 N	6.85 E	5 km	2.2	A	SED_Tt	teleloc@sc3rt	Switzerland
2011-08-21 19:41:23	19:39:45	52	46.02 N	6.84 E	10 km	1.9	A	SED	bkauloc@sc3rt	Switzerland
2011-08-21 19:41:22	19:39:47	50	46.09 N	6.89 E	0 km	1.5	A	SED_Tt	telerelec@sc3rt	Switzerland
2011-08-21 19:41:14	19:39:45	41	46.04 N	6.89 E	3 km	0.4	A	SED_TI	scireloc@sc3rt	Switzerland
2011-08-21 19:41:13	19:39:46	51	46.03 N	6.85 E	5 km	1.8	A	SED	scautoloc@sc3rt	Switzerland

Map showing the location of the event in the Alps region, near Geneva and Milan.

TP M Count RMS Agency Author
MLh 2.81 27 0.2 SED bkmag@sc3rt
MLv 2.96 27 0.2 SED bkmag@sc3rt

Time: 2011-08-21 19:39:45
Region: Switzerland
Type: earthquake
Depth: 9 km
Latitude: 46.04 ° N
Longitude: 6.88 ° E
Phase Count: 46/49
RMS Residual: 0.3
Agency: SED_BK
Origin Status: automatic

Fix | manual origins |

Value: |
Type: |
Method: |

Fix type | Release

> 40 origins for M=3.0 event. Which is used for alerting? Crucial to have location quality for *autoloc AND *reloc

Event review with *scolv*

File Edit View Settings Help

Commit location

☒ Update origin
☒ Fix this origin as preferred location.
Set event type to: **earthquake**
Set origin status to: **confirmed**

NOTE To fix the origin involves that successive origins are not considered as preferred origins by the event associator (scevent) until another origin is fixed again. Fixing an origin overrides the automatic rules of setting an origin as preferred

☒ Return to event list after commit

OK Cancel

Time: **2011-08-21 19:39:44**
Depth: **8.6 km +/- 0.5 km**
Lat: **46.034 ° N +/- 0.3 km**
Lon: **6.892 ° E +/- 0.5 km**
Phases: **49 / 50**
RMS Res.: **0.4 s**
Quality: **A**
Az. Gap: **111 °**
Min. Dist.: **3.4 km**

Distance Azimuth TravelTime MoveOut Polar FirstMotion
Filter is **not active**

EventID: smi:ch.ethz.sed/KP2011082
Agency: **SED**
Author: **jclinton2**
Evaluation: confirmed (M)
Method: NonLinLoc(L2)
Earth model: swiss 3D
Updated: 2011-08-21 20:09:40

Used	Status	Phase	Net	Sta	Loc/Cha	Res	Dis (km)	Az	Time	+/-
☒	M	Pg	CH	EMV	HHZ	-0.38	3.4	11	19:39:46.55	0.025s
☒	M	Sg	CH	EMV	HHN	-0.92	3.4	11	19:39:47.45	0.025s
☒	M	Pg	CH	SALAN	EHZ	-0.01	13.9	28	19:39:47.97	0.025s
☒	M	Sg	CH	SALAN	EHZ	-0.31	13.9	28	19:39:49.85	0.05s
☒	M	Sg	CH	SMUR	HGN	-0.16	27.2	6	19:39:53.05	0.05s
☒	M	Pg	CH	SMUR	HGZ	0.09	27.2	6	19:39:49.86	0.025s
☒	M	Pg	CH	SMUK	HGZ	0.27	28.4	9	19:39:50.29	0.05s
☒	M	Sg	CH	SMUK	HGZ	0.52	28.4	9	19:39:54.18	0.1s
☒	M	Pg	CH	GRYON	EHZ	0.18	29.7	35	19:39:50.49	0.025s
☒	M	Sg	IV	MRGE	HHN	0.15	31.8	157	19:39:55.05	0.05s
☒	M	Pg	IV	MRGE	HHZ	0.25	31.8	157	19:39:51.00	0.025s
☒	M	Pg	CH	AIGLE	HHZ	0.13	34.8	9	19:39:51.19	0.025s
☒	M	Sg	CH	AIGLE	HHN	-0.16	34.8	9	19:39:55.27	0.05s
☒	M	Sg	CH	NOV2	EHN	0.04	37.5	359	19:39:56.27	0.05s
☒	M	Pg	CH	NOV2	EHZ	0.01	37.5	359	19:39:51.54	0.025s
☒	M	Pg	CH	NOV1	EHZ	0.08	39.7	352	19:39:51.98	0.025s
☒	M	Sg	CH	DIX	HHE	-0.01	40.3	82	19:39:57.54	0.2s
☒	M	Pg	CH	DIX	HHZ	0.31	40.3	82	19:39:52.61	0.025s
☒	M	Pg	CH	SIOV	HGZ	0.26	43.1	58	19:39:52.87	0.025s
☒	M	Pg	FR	RSL	00.HHZ	-0.50	44.3	209	19:39:52.25	0.025s

NonLinLoc Profile: swiss_3d_L2 ☐ Fix depth 8.6 km ☐ Distance cutoff 1000 km

Relocate Seismicity Viewer

Picker Import picks Compute magnitudes Confirm

Direct SED Developments & Contributions to SC3 (FINISHED):

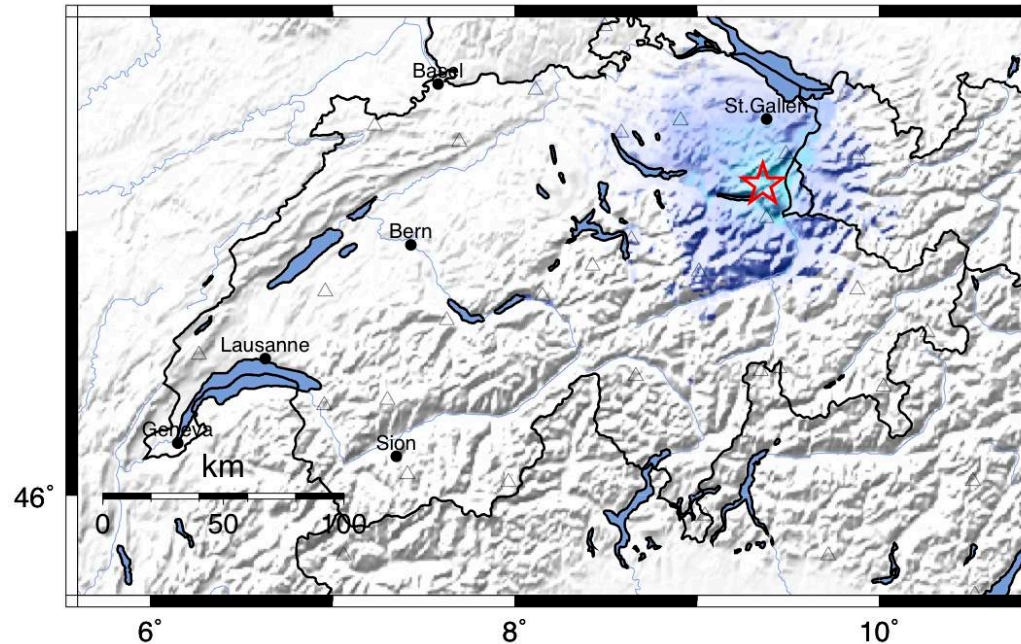
- Baer-Kradolfer Picker plugin
- Mlh plugin (MI from horizontal components)

Ongoing testing: Data Mining of the existing databases (approx. 1 year of data) instead of single play-backs.

- Benchmark test for different pipelines (latency, precision, etc.)
- Assess strategies for automatic location quality (crucial for automatic alerting) for *autoloc* as well as *reloc* modules. Adopt strategy from old system (quality defined by station residuals).

SED Developments & Contributions: SC3 Waveform Parameterization Module

SED ShakeMap : KP200901041530 / 47.176 / 9.359
Sun Jan 4, 2009 03:30:30 PM GST M 4.1 N47.18 E9.36 Depth: 4.0km ID:KP200901041530



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Automatic Generation of ShakeMaps

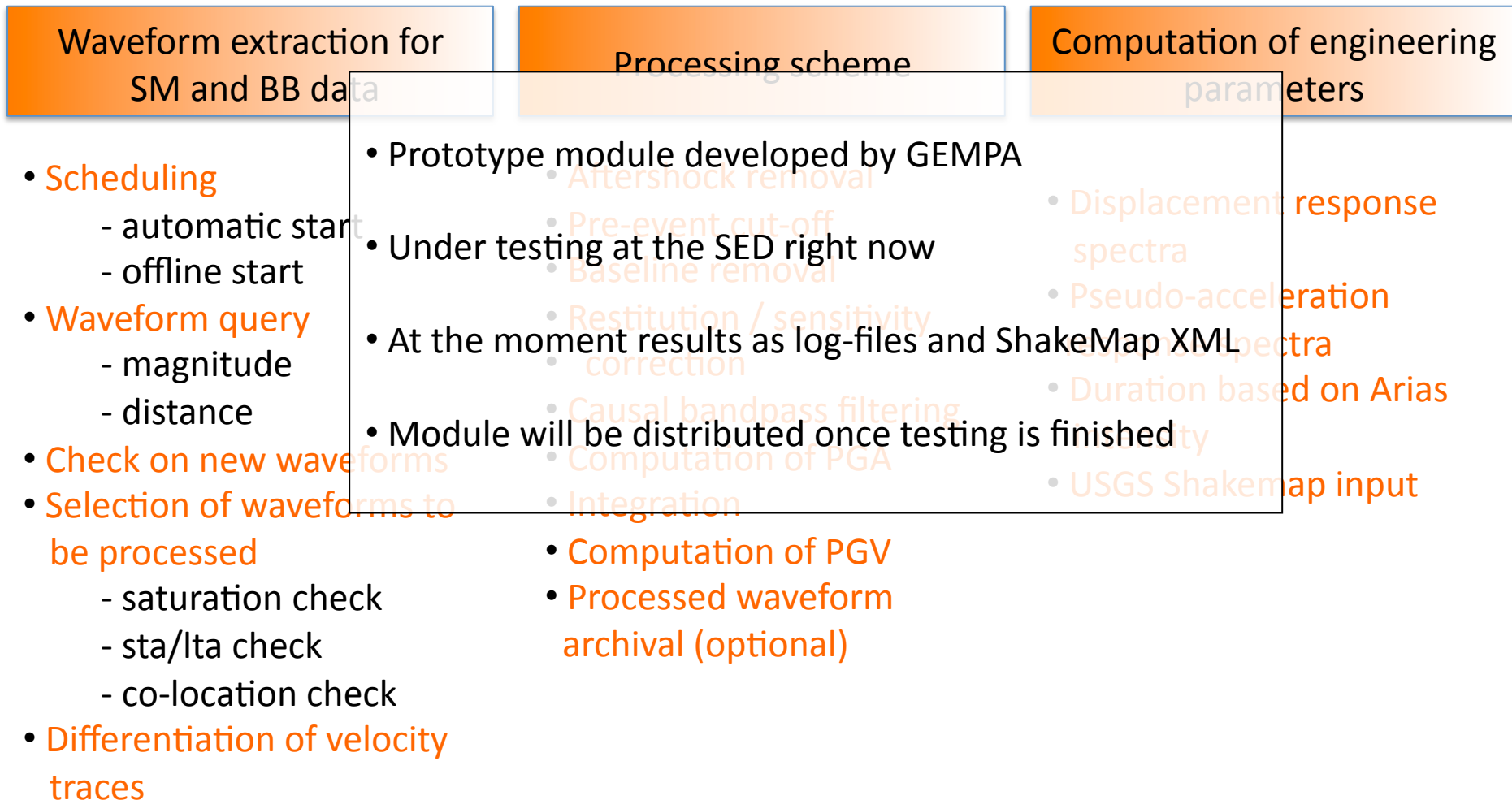
SC3 waveform parameterization module in the framework of the NA3 NERA Project:

- Populate SM database with relevant ground motion parameters (PGV, PGA, response spectra, etc.) in near real-time for e.g. engineering purposes.
- Input for USGS style ShakeMap

SED Developments & Contributions: SC3 Waveform Parameterization Module

SC3 waveform parameterisation module. Developed by SED+GNS+GA & GEMPA

Presently under testing at SED.



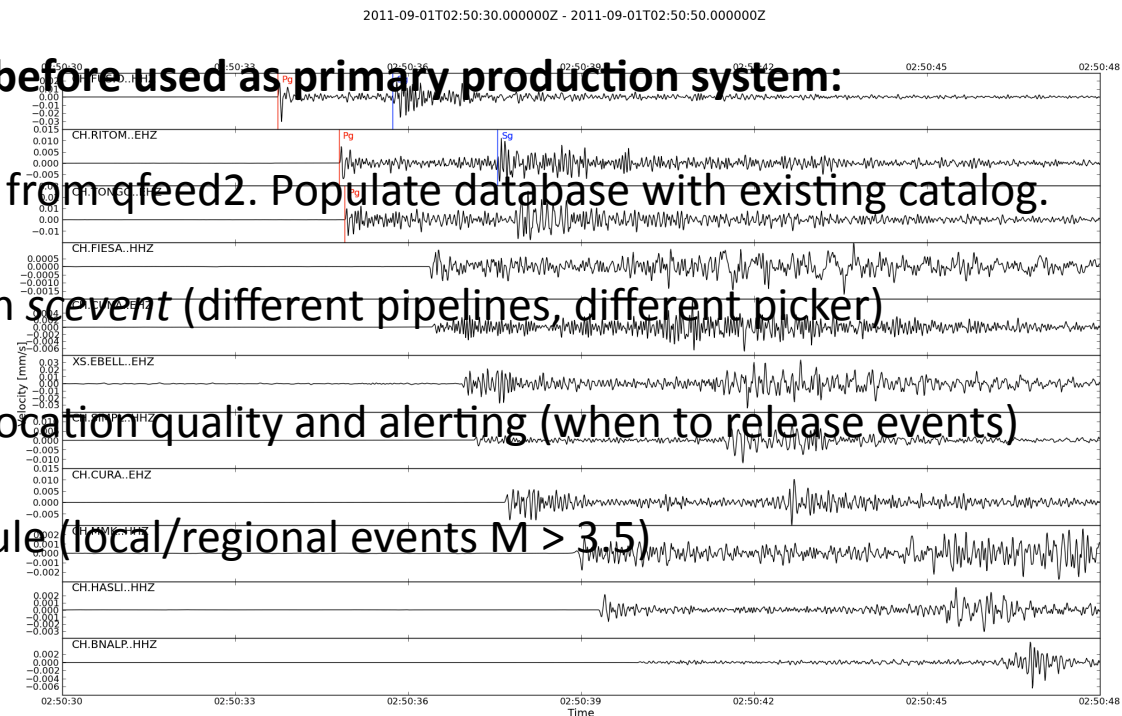
Outlook & Outstanding Problems

SED developments & contributions to SC3 under development:

- Rapid early warning module using the Virtual Seismologist (VS) algorithm
- Downstream visualization software for quick event review, quality control, etc. (python + obspy, matplotlib).
- Planed: Extend post-pickers (automatic pick quality, S-picker, etc.)

Outstanding problems to be solved before used as primary production system:

- Database issues and event merging from qfeed2. Populate database with existing catalog.
- Improvement of event merging with *scevent* (different pipelines, different picker)
- Improved strategies for automatic location quality and alerting (when to release events)
- Test of automatic/manual MT module (local/regional events $M > 3.5$)
- Migrate towards final IT setup



Outlook & Outstanding Problems

Seiscomp3 System Setup - Production - as planned September 2011

TD September 12, 2011

