SeisComP plugin documentation

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Contents

1 Introduction **1**

1.1 Purpose of this document 2

2 Step-by-step instructions **2**

2.1 Starting Seismic Handler 2

2.2 Reading seismic data 4

2.3 Writing a manually analyzed event back to disk 11

1 Introduction

Seismic Handler [1] is a graphical tool for the processing and inspection of seismological data which could be in various formats like AH, Q or MiniSEED [2] for example. Unfortunately Seismic Handler is not capable to read the widely used MiniSEED data natively which is the primary data format at the GeoForschungsZentrum (GFZ) Potsdam [3] and most other seismic data centers world wide. In the consequence to load MiniSEED data the user has to manually select several options like networks, stations, component and time window for example. Clearly this is a time consuming process especially in respect to a manually verification and possible correction of a previously automatic processed seismic event from autoloc where a lot of seismic stations and networks are involved. Hence an automation of these step is desirable.

1.1 Purpose of this document

This document describes the usage of three plugins which automate the process of preparing and reading the data from the stations involved in an automatically detected and processed event from autoloc. Moreover this event can be written back to disc in case the seismic event has been relocated by a further autoloc processing step incorporating manually user modified pick times.
Note: To run the plugins you have to have the Python `Tkinter` module installed.

2 Step-by-step instructions

2.1 Starting Seismic Handler

To use Seismic Handler (SHM) and the SeisComP plugins provided by the GFZ you first have to start the application. To do so open a command prompt like xterm, go to the SeisComP [4] home directory (eg. `/home/user/seiscomp`) and start a C-shell. To do so type `tcsh` and press `Enter`:

```
user@machine: ~/seiscomp/> tcsh
```

The tilde `~` is short for the home directory of the user. In this example `/home/user`. After issuing the command the current commando interpreter (shell) will be replaced by `tcsh` and additionally all necessary environment variables for Seismic Handler will be set. Now Seismic Handler can be started with the command `SHM`.

```
user@machine: ~/seiscomp/> SHM
```

If everything is correct you should see the empty Seismic Handler panels with no data loaded (Figure 1). In case the environment variables are not set automatically you have to set them by hand. Type:

```
user@machine: ~/seiscomp/> source analysis/sh/setup/shsetup
```

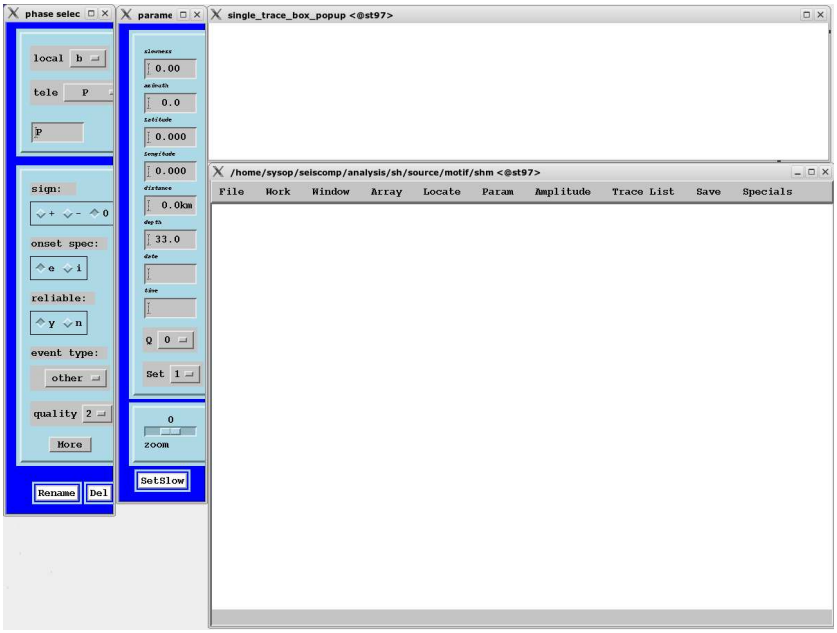

Figure 1: Layout of a newly started Seismic Handler

2.2 Reading seismic data

To manually inspect a seismic event which has been automatically processed by autoloc you have to choose from the menu the item `Specials->Plugins->Get Latest Event` (Figure 2). Optionally this menu item can be invoked via a shortcut `Strg + 3`. After you have invoked this

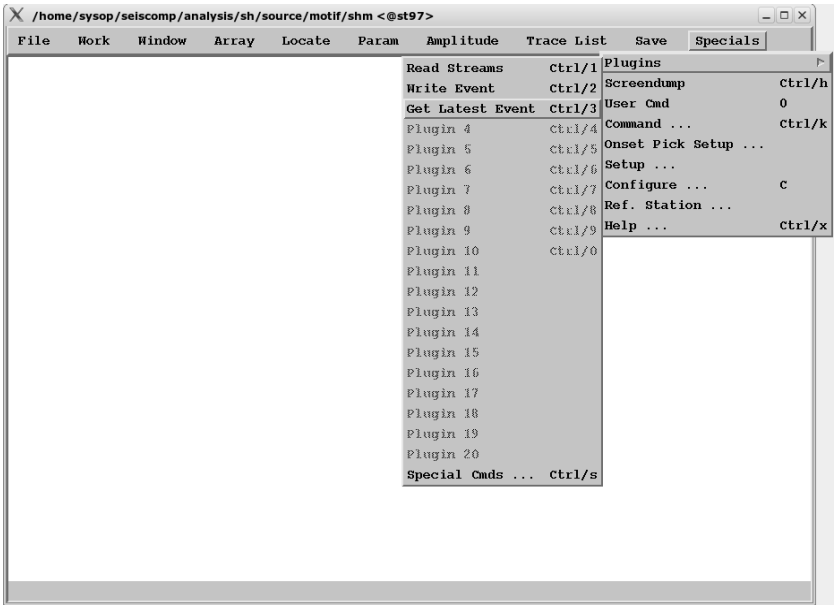

Figure 2: Selecting the plugin to load the data involved in an event.

menu item a window appears that contains the latest 30 events which have been automatically detected and processed by autoloc. Pressing immediately `Enter` the latest event will be chosen due to its default selection. Otherwise an other event can be selected from the list (Figure 3).

Choosing an event will start a Python script that converts the event parameters in a format that can be read by Seismic Handler. Normally this process had to be done by hand. The output of the script you could see on the command prompt from which you have started Seismic Handler.

To load the waveform data that have been prepared by the first plugin you have to start a second one. Like before go to the `Specials->Plugins` (Figure 4) and choose the item `Read Streams`.

The result will be something like shown in Figure 5. Now Seismic Handler shows all traces (seismic data) from the stations which detected the chosen event. Beyond the reading of the data all traces are automatically resampled to 20 Hz by the plugin.

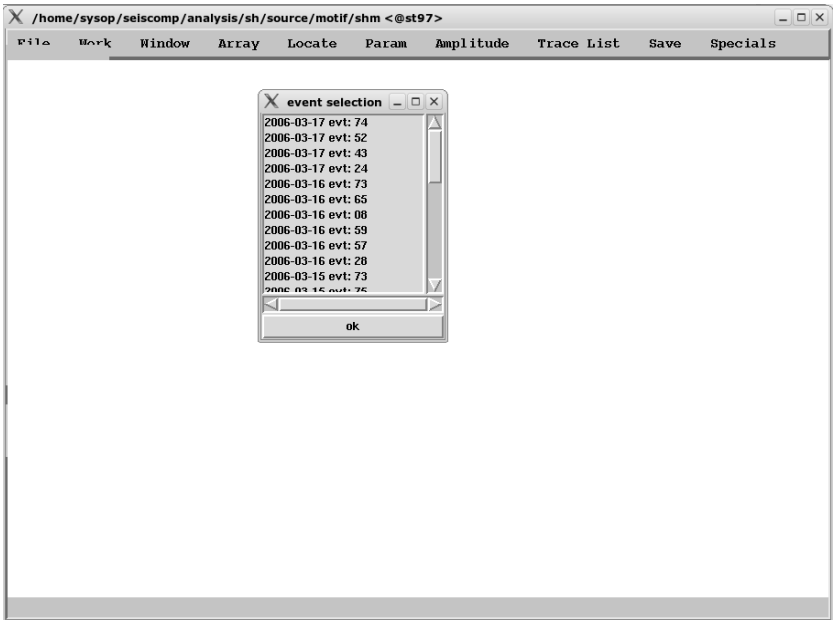

Figure 3: Example window with the latest 30 events.

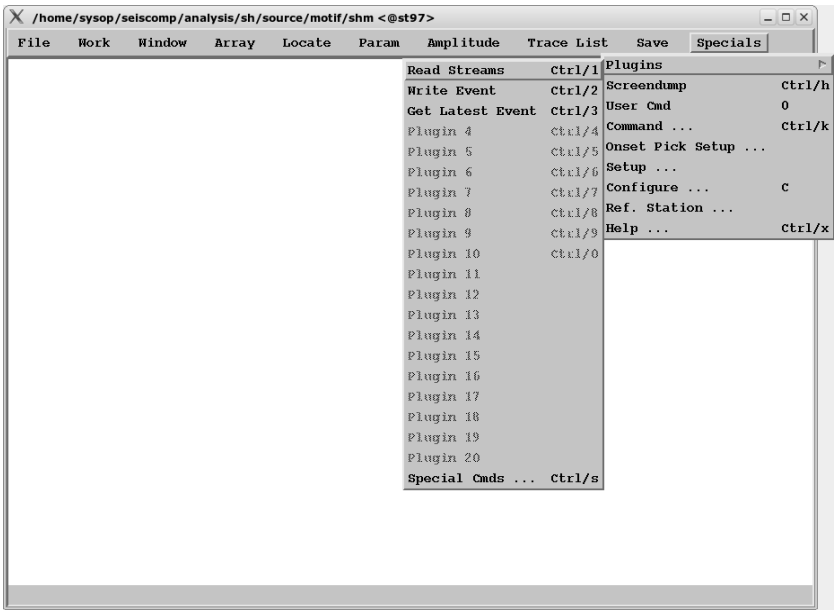

Figure 4: Menu item to read the data that has been prepared by the plugin: `Get Latest Event`.

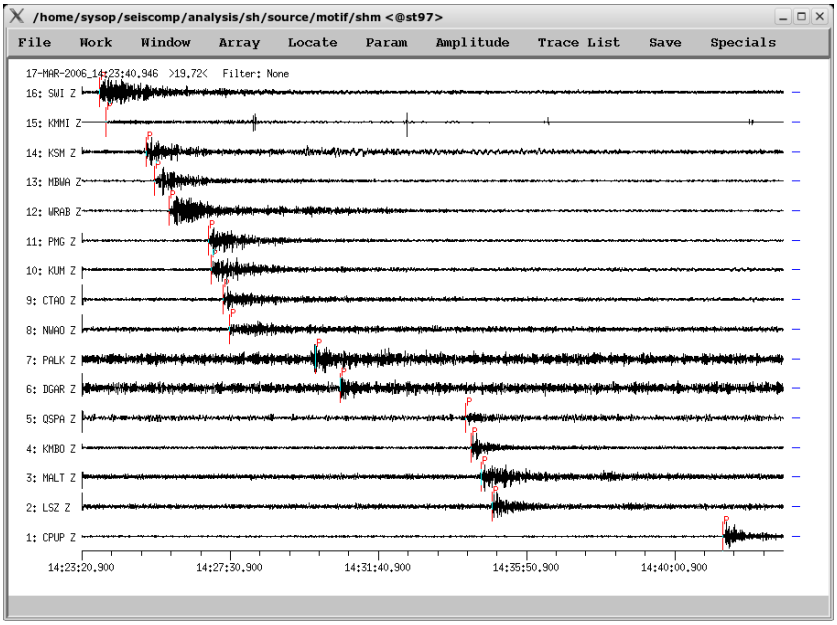

Figure 5: Seismic data from the chosen event.

At this level the user can inspect the automatically picked arrivals and if required correct them. The picks are shown as red vertical bars (Figure 6).

For a better readability the traces have to be filtered. This can be done from the menu `Work->Filter` where you should select the entry `WWSSN-SP` (Figure 7). It should be pointed out that every step you do in Seismic Handler can by undone be deactivating the last issued command. As an example you can undo the filtering by selecting in the filter menu the item `None`.

To adjust a pick move the cursor over the vertical bar press the left mouse button and move the mouse to the left or right. The vertical bar will follow immediately. The same process can be done on a magnified Trace (Data from one station). To magnify an excerpt or time window of a trace you have to click with the right mouse button on a trace and drag the mouse to the left or right. This will span a blue box (time window) which will be shown in a separate window (Figure 8). To change the time window click with the right mouse button into the box and drag the mouse. The time span of the window can be changed by clicking with the right mouse button on the right edge of the box and dragging the mouse to the left or right.

For a better visual presentation the picks can be horizontally aligned. Therefor select from the menu `Array` the item `Align` or type `Strg + i`. An example can be found in figure 9.

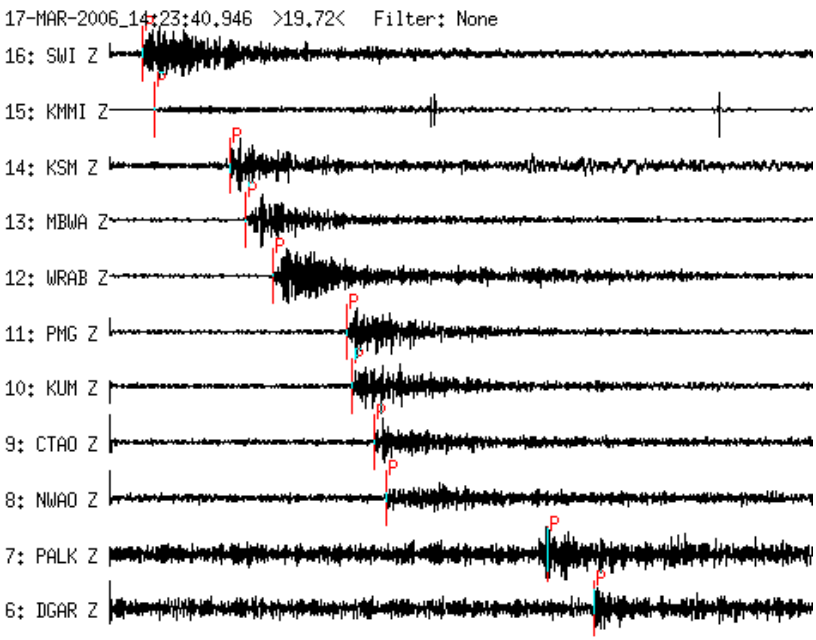

Figure 6: The red vertical bars mark the automatically calculated pick times.

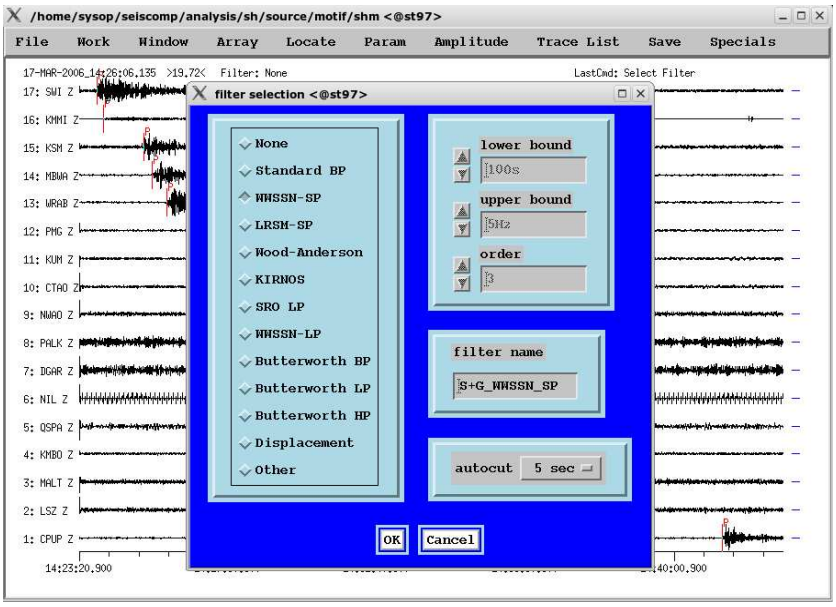

Figure 7: Depiction of the filter menu as presented by Seismic Handler.

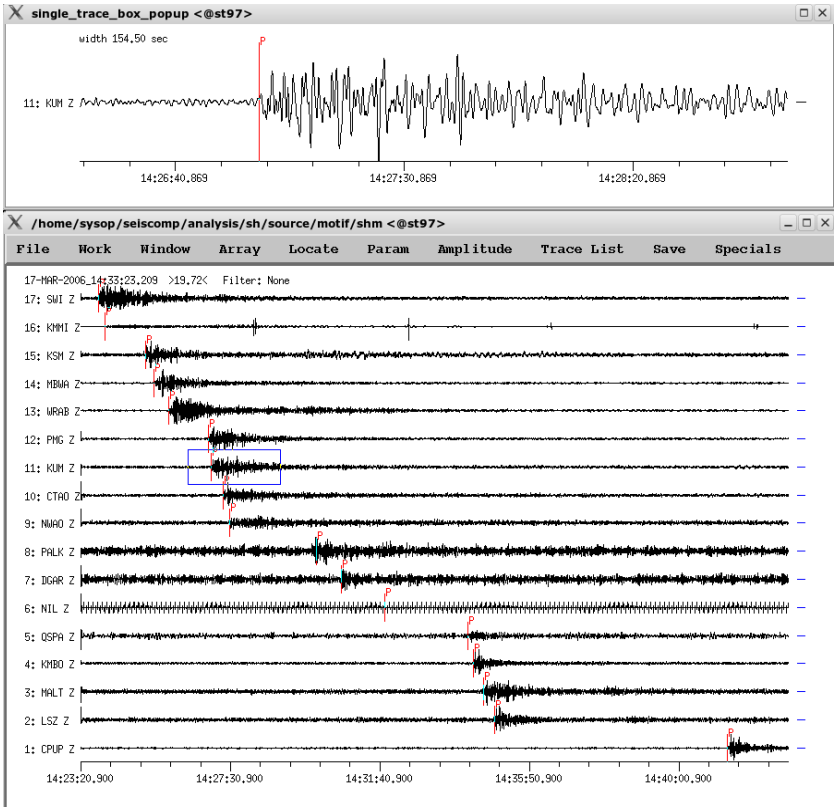

Figure 8: Example of a time window selection. The contents of the blue rectangle is magnified in the upper Seismic Handler window.

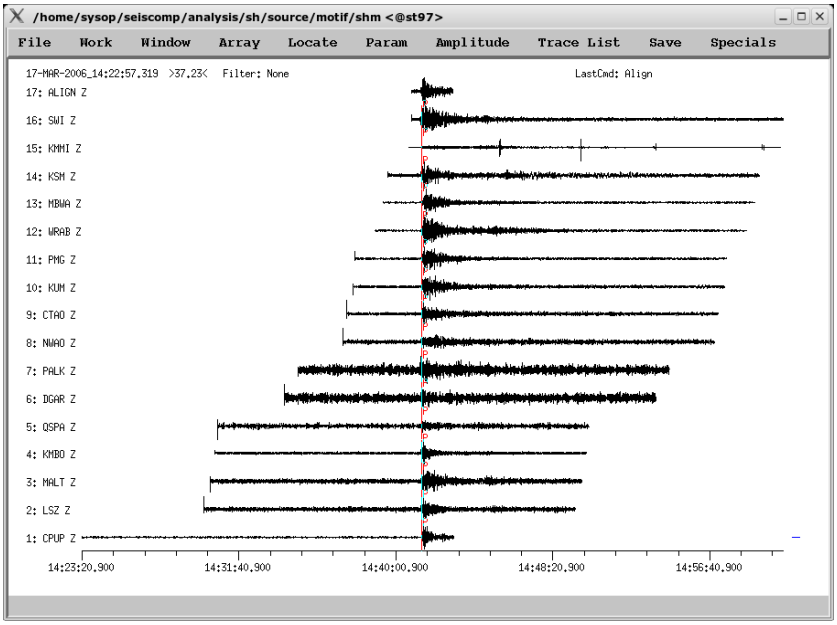

Figure 9: An example of aligned traces.

In case you have made any corrections to the pick times a relocation of the event is required. To start the location manually select from the menu `Locate` the item `LocSAT` or simply type `Strg + a` (Figure 10). After that adjust the parameter of the LocSAT menu to your needs and press the button `LocSAT`.

After reprocessing the event the result will be shown in an separate text editor window (Figure 11). Its contents can be saved or just ignored by closing the window.

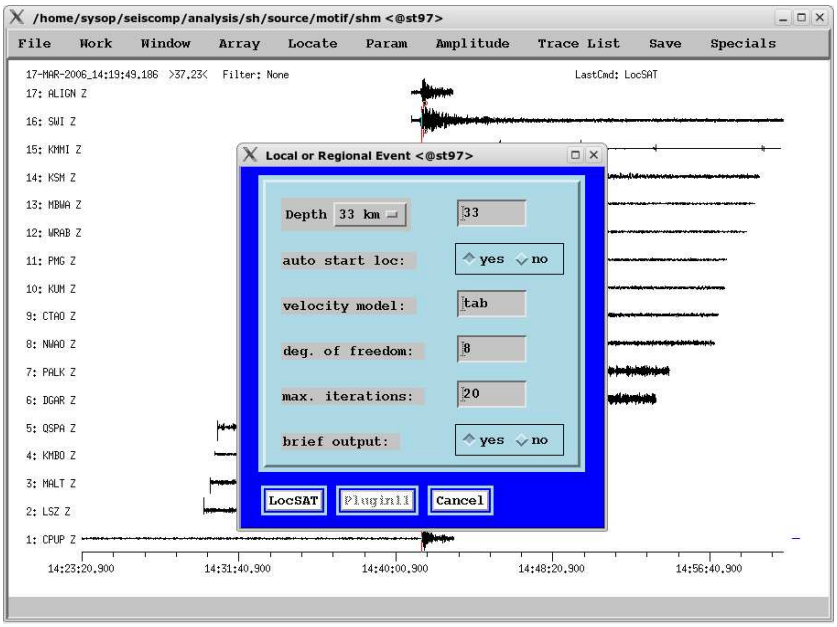

Figure 10: LocSAT menu as presented by Seismic Handler.

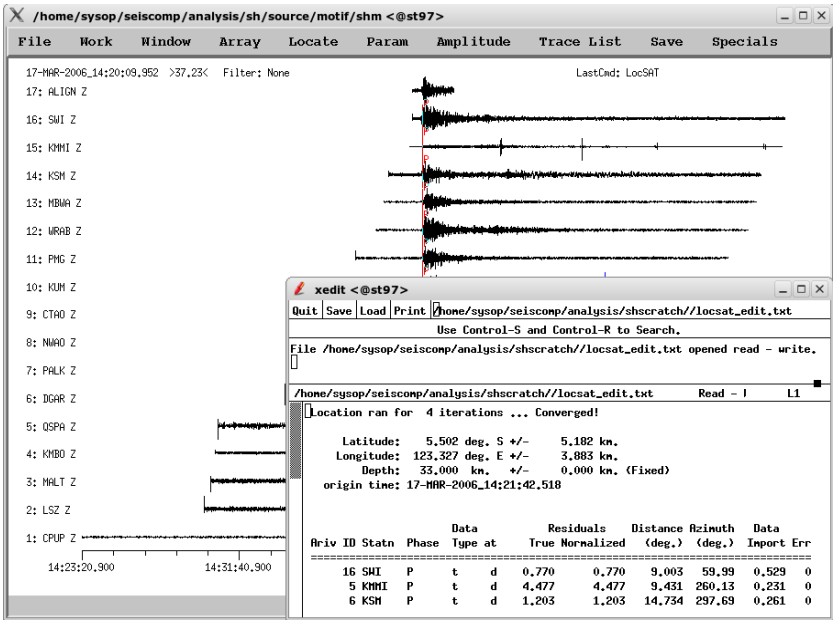

Figure 11: Result of the relocated event shown in a text editor window.

2.3 Writing a manually analyzed event back to disk

Now you can save the newly located event back to disk. The event file will contain the same data you have seen in the text editor window but in a Seismic Handler specific format. Go to the menu `Specials` and select in the submenu `Plugins` the item `Write Event` (Figure 12). You can also type

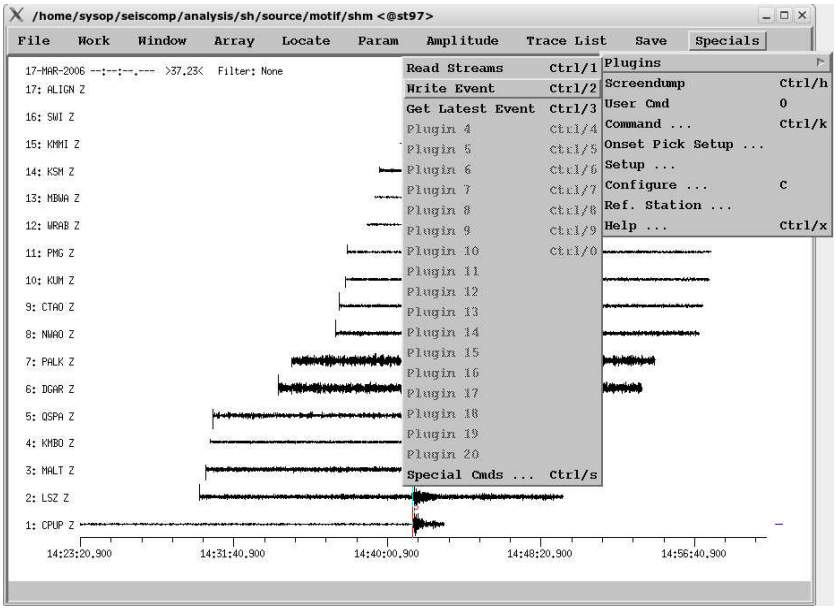

Figure 12: Menu entry for writing an newly calculated event location back to disk.

`Strg + 2`. After the event has been written a confirmation dialog appears containing the name and location of the event file (Figure 13). Generally most of the Seismic Handler saved files go to `~/seiscomp/analysis/shscratch`

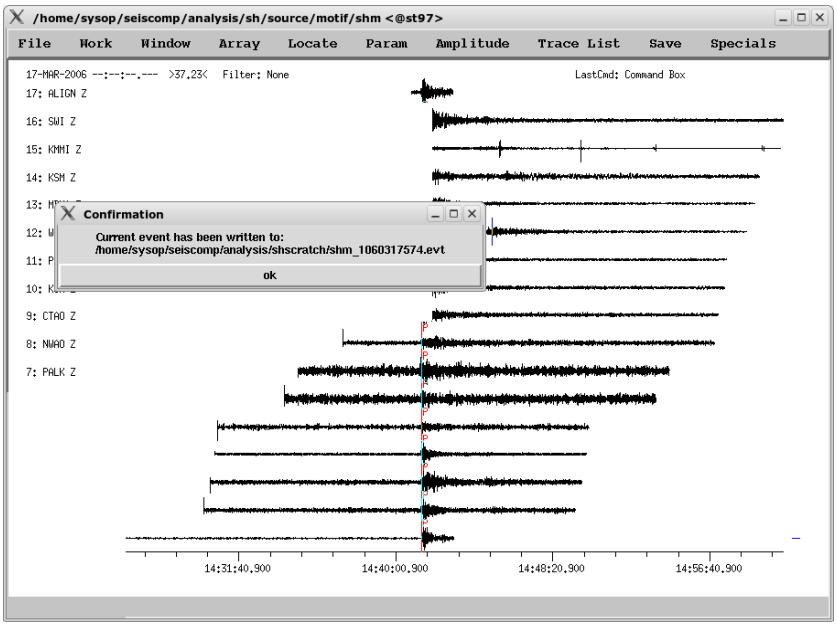

Figure 13: Confirmation dialog that appears after the newly located event has been written.

References

[1] Seismic Handler : www.franken-online.de/seismosite/

[2] Seed Reference: www.iris.edu/manuals/SEEDManual_V2.4.pdf

[3] GeoForschungsZentrum Potsdam (GFZ): www.gfz-potsdam.de

[4] SeisComP : www.gfz-potsdam.de/geofon/new/scp.html