Focal Mechanisms – how to generate them at AEIC

Lets say that in the past day or two, there was an interest sequence of earthquakes in some region of Alaska, and you've been asked to generate some focal mechanisms for them. Lets assume they show up in duty_dbevents, which means there are present in the database /Seis/databases/duty/aeic_quakes (otherwise you'll just have to select the relevant database below). The following is a procedure for generating focal mechanisms:

Part one: subsetting the events of interest to a local database

1. Make a working directory and change to it, e.g.:
   ```
   cd /home/glenn
   mkdir focal
   cd focal
   ```

2. Run dbe on /Seis/databases/duty/aeic_quakes and view the origin table.

3. Subset your events of interest by typing an expression such as:
   ```
   lat > 68 && lat < 71 && lon > -146 && lon < -144
   ```
   inot the expression window, and then hitting View | Subset.

4. Now join the origin table to the assoc table, then the arrival table, and finally the wfdisc table.

5. Save (File | Save) this as a new database under your working directory, e.g. /home/glenn/focal/events.

6. Close dbe.

7. Now you need only work from your working directory.

8. Finally, create a symbolic link (in your working directory) to the waveform data, e.g.:
   ```
   ln -s /iwrun/op/archive_wf/2007 2007
   ```

Part two: processing each event and generating a focal mechanism

1. Run dbe on your local database:
   ```
   dbe events
   ```

2. Note the first event id (evid). Type this evid into the expression window, and then hit View | Subset.

3. Join the resulting view to the assoc, arrival and wfdisc tables.

4. Save this view to a new database with a name like dbYYYYMMDDhhmm, e.g. db200704090929.

5. Close dbe.

6. Now edit the database descriptor file (db200704090929 in this case), so it reads:
```
schema css3.0
/Seis/databases/stations/{master_stations}:
/iwrun/op/db/archive/{archive_2007_04_09}
```

7. Now run the program aeic_dbaddema toadd emergence angles to the database:
```
/home/natasha/AEIC/dbaddema/aeic_dbaddema db200704090929
```

8. Start smartpick:
```
smartpick db200704090929
```

9. Bring up waveforms by clicking “Start dbpick” and “next event” buttons.

10. Run dbe in edit mode:
```
dbe -e db200704100929 &
```

11. Open origin table and join to assoc and arrival

12. View | Arrange

13. Push “none” to deselect all then choose: sta delta iphase fm

14. Set value of fm to null – so you can choose your own picks.

15. Click on a P arrival and then push “iphase” and then “subset”. This makes a subset of P, not S, arrivals.

16. Sort delta: Click on the delta column button and then “sort”. This sorts the stations so that they appear in the same order as in the dbpick screen.

17. To pick first motions on each trace , hold down shift, and click on each P phase flag with the middle mouse button, then choose fm+ or fm- as appropriate. Note there are some stations with reversed polarity (ask Rowdy): on these choose opposite polarity.

18. If there is a large azimuthal gap, check for stations in a particular area by choosing “esaz” under View | Arrange.

19. Close dbe (edits will be saved).

20. Now run the inversion program dbfpfit, with an output file matching the pattern

evYYYYMMDDhhmm:

```
/home/natasha/programs/fpfit/dpfpfit/dbfpfit db200704090929
ev200704090929
```

21. Now plot the results using fpplot:

```
fpplot
input ray: ev200704090929
```

22. To look at the beach ball:

```
gs fppage.ps
```

23. To print:

```
lp fppage.ps
```

Repeat this for all events.

Glenn Thompson, 2007-04-10