

# Table of Contents

|                                      |          |
|--------------------------------------|----------|
| <b>Hypoinverse.....</b>              | <b>1</b> |
| Hypoinverse from a command line..... | 1        |
| Editing the crustal model.....       | 1        |

# Hypoinverse

Hypoinverse is the location software used in Atlas and CoreEarthworm.

## Hypoinverse from a command line.

These instructions assume you have Atlas installed in the standard location on the C drive of a Windows PC. If not, edit the paths accordingly.

If trying to run from the Atlas area, here are the steps:

1. Open Atlas, and locate some earthquake with the stations you are interested in. This will set up the station files as well as an initial input file for Hypoinverse.
2. In your command prompt, cd to C:\nmx\atlas\user.
3. run the command: C:\nmx\atlas\bin\hyp2000.

You should get some output like:

```
C:\nmx\atlas\user>C:\nmx\atlas\bin\hyp2000
HYPOINVERSE 2000 STARTING
  10 STATIONS READ IN.
    0 STATION DELAYS SET FOR MODEL  1
    0 STATION DELAYS SET FOR MODEL  2
```

The results of this run will be in the file HypoAtlasOut in C:\nmx\atlas\user. The format of the output file is described in the Hypoinverse manual on p. 93–95.

The file HypoAtlasIn will describe the picks and initial conditions. The format is the same as for the output file.

## Editing the crustal model

To edit your crustal model, first review the pages 9–12 in the Hypoinverse manual. If your model is not a simple layercake model everywhere, I recommend that you make a drawing similar to Figure 1 in the manual. Determine how many models you need including a default model. Then, I would recommend changing the crustal model a little at a time, run Hypoinverse to check that it still works and proceed.

There are two types of crustal model files. The CRH file is a simple layer cake p wave velocity model. It cannot have any low velocity zones. This means that velocity must always increase with depth.

The CRT file is a travel time table. It may be created with the fortran program TTGEN. I tried to find it on the internet and was unable to. If you can do ray paths, you could construct a travel time table yourself using instructions in the manual.

If you want a velocity model that varies horizontally, you must have more than one model. Atlas was shipped with an Hypoinverse command file: C:\nmx\atlas\user\hypoinverse\AtlasCrustalModel.hyp.

The formats for both types of crustal models as well as delay files are in the manual.

The first line of crustal model command file is:

**CRT 1 'hypoinverse/models/mcg.crt'**

## Hypoinverse

This says that model number 1 is in the directory hypoinverse/models and is called ncg.crt. The CRT command indicates that it is a travel time table. It could be replaced with a CRH file by using the line:

```
CRH 1 'hypoinverse/models/yourNewModel.crh'
```

The second line is:

```
DEL 1 'hypoinverse/models/ncg2.del'
```

This says that delays are applied to times in model number 1 that are described in the file:

```
hypoinverse/models/ncg2.del
```

There is no need to have this line at all if there are no delays to apply. These delays will not be applied to any other model.

The third line is:

```
MUL T 1
```

This line specifies that model number 1 (ncg.crt) is the default model in areas not defined with the NOD command. It is a very important command and may not be deleted.

The above lines described model number 1 and specified the default model. I recommend replacing this one first with your default model, then run Hypoinverse to make sure it works.

The next lines are:

```
CRT 2 'hypoinverse/models/lew.crt'
```

```
DEL 2 'hypoinverse/models/lew2.del'
```

```
NOD 37 29.0 121 41.7 10 5 2
```

```
NOD 37 26.1 121 49.6 7 5 2
```

```
NOD 37 29.3 121 51.5 6 5 2
```

These lines define model number 2 as a CRT file at hypoinverse/models/lew.crt. The delays to be applied for this model are in hypoinverse/models/lew2.del. This model will be applied at three places as defined by the NOD commands. Each area defined are two concentric circles centered at the latitude and longitude. See the NOD command defined on page 69 of the Hypoinverse documentation.

The last two lines of the crustal model file are:

```
CRH 3 'hypoinverse/models/CrustalModel.crh'
```

```
NOD 36 29.0 122 41.7 20 10 3
```

This defines model number 3. The model is in the file hypoinverse/models/CrustalModel.crh. There are no delays specified and there is only 1 circle where this model dominates.

— KristinaMagwood – 01 Dec 2005