

First Look at Madagascar

Karl Schleicher
April 21, 2017



BUREAU OF
ECONOMIC
GEOLOGY



WHAT STARTS HERE CHANGES THE WORLD
THE UNIVERSITY OF TEXAS AT AUSTIN



Texas Consortium for
Computational Seismology

JACKSON
SCHOOL OF GEOSCIENCES

First Look at Madagascar

- ◆ Presentation Outline
 - Assume you have installed Madagascar. Start very simple, quick tour some key features.
- ◆ Check your installation
- ◆ Some basic Madagascar programs
- ◆ Some basic scones
- ◆ Basic processing 2D marine
- ◆ Exercise

First Look at Madagascar

- ◆ Presentation Outline
 - Assume you have installed Madagascar. Start very simple, quick tour some key features.
- ◆ Check your installation
- ◆ Some basic Madagascar programs
- ◆ Some basic scones
- ◆ Basic processing 2D marine
- ◆ Exercise

Check your Installation

- ◆ Follow the online installation instructions
- ◆ Go to reproducibility.org -> installation -> Testing and quick start
- ◆ The section “check your installation” provides a first look at Madagascar.
- ◆ Review what you should have learned while you were focused on checking install.

Check your Installation

- ◆ Try some commands in your command window
sfm
sfattr
sfspike
sfbandpass
sfwiggle
- ◆ If you do not get selfdoc, you have an install problem.
- ◆ Madagascar programs start with sf

Check your Installation

NAME

sfbandpass

DESCRIPTION

Bandpass filtering.

SYNOPSIS

sfbandpass < in.rsfsf > out.rsfsf flo= fhi= phase=n verb=n nplo=6 nphi=6

COMMENTS

November 2012 program of the month: <http://ahay.org/.../program-of-the-month>

PARAMETERS

float **fhi=** High frequency in band, default is Nyquist

float **flo=** Low frequency in band, default is 0 ...

USED IN

[cwp/geo2006TimeShiftImagingCondition/zicig](#)

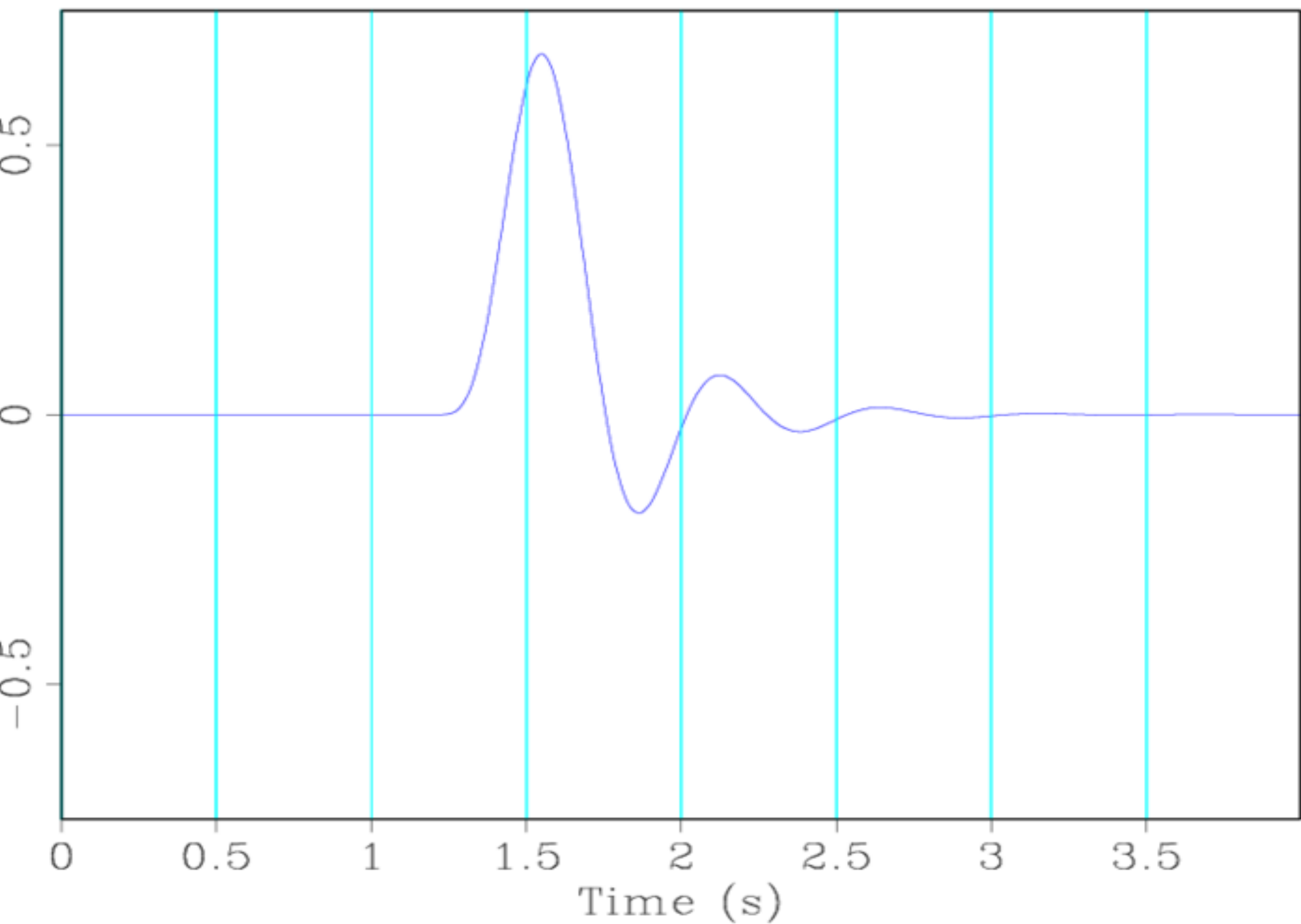
[cwp/geo2008IsotropicAngleDomainElasticRTM/marm2oneA...](#)

- ◆ Self doc provides description, parameters, and location of example scripts:

Check your Installation

- ◆ Make a simple spike file:
sfspike n1=1000 k1=300 > spike.rsf
sfin <spike.rsf
sfbandpass fhi=2 phase=y < spike.rsf > filter.rsf
sfwiggle clip=0.02 < filter.rsf > filter.vpl
sfpen < filter.vpl
- ◆ Data saved in .rsf files. (Regularly Sampled Format)
- ◆ Most programs use STDIN and STDOUT
Displays saved in .vpl files (vplot)
- ◆ sfpen sends vplot to screen. vpconvert converts to gif or pdf for papers and presentation.

Welcome to Madagascar



Check your Installation

- ◆ Create, filter, and display spike “all at once”:

```
sfspike n1=1000 k1=300 \  
| sfbandpass fhi=2 phase=y \  
| sfwiggle clip=0.02 \  
| sfpen
```

- ◆ No intermediate files
- ◆ If displays do not appear on screen you have an install problem. Probably:
`sudo apt-get install libx11-dev libxaw7-dev`

Check your Installation

- ◆ A file called SConstruct best for scripts:

```
from rsf.proj import *  
Flow('filter',None,'spike n1=1000 k1=300 | bandpass  
fhi=2 phase=y')  
Result('filter','wiggles clip=0.02 title="Welcome to  
Madagascar"')  
End()
```
- ◆ Running it in terminal in same directory:
scons view
- ◆ Just “scons” runs without sending to screen.
Good to get vpl files for presentation & papers.
- ◆ sf prefix optional on program names.

First Look at Madagascar

- ◆ Presentation Outline
 - Assume you have installed Madagascar. Start very simple, quick tour some key features.
- ◆ Check your installation
- ◆ Some basic Madagascar programs
- ◆ Some basic scons
- ◆ Basic processing 2D marine
- ◆ Exercise

Some Basic scon

- ◆ Online documentation:
Go to reproducibility.org
Enter scon in the search box in upper right, <enter>
Select “Reproducible computational experiments using Scons”
- ◆ Madagascar uses scon, an alternative to make
- ◆ Rules to create files are defined in SConstruct file.
- ◆ scon in terminal recreates any files if input data, programs, or program parameters change.
- ◆ It is best to know some python to read Madagascar SConstruct files.

Basic Madagascar SConstruct Functions

- ◆ **Fetch(data_file,dir[,ftp_server_info])**
download data_file from directory dir on a server
- ◆ **Flow(target[s],source[s],command[,stdin][,stdout])**
generate target[s] from source[s] using command[s]
- ◆ **Result(plot[,source],plot_command)**
generate a final plot in the Fig directory of the working directory.
- ◆ **End()**
- ◆ Collect default targets.

Basic Madagascar SConstruct Functions

- ◆ Functions to make plots that contain subplots
- ◆ **Plot(intermediate_plot[,source],plot_command)** or **Plot(intermediate_plot,intermediate_plots,combined)**
generate intermediate_plot in the working directory.
- ◆ **Result(plot,intermediate_plots,combination)**
generate a final plot in the Fig directory of the working directory.

Simple Spike SConstruct

```
# import the Madagascar functions  
from rsf.proj import *
```

```
# create filter.rsf, no input file  
Flow('filter',None,'spike n1=1000 k1=300 |  
bandpass fhi=2 phase=y')
```

```
# create filter.vpl from filter.rsf in ./Fig directory  
Result('filter','wiggle clip=0.02 title="Welcome to  
Madagascar"')
```

```
# wrap up  
End()
```


Check your Installation Exercise

- ◆ The previous section reviewed what you should have learned from the “check your installation” section from the online installation?
- ◆ If you did not previously learn this, you can use some of the exercise time later.

First Look at Madagascar

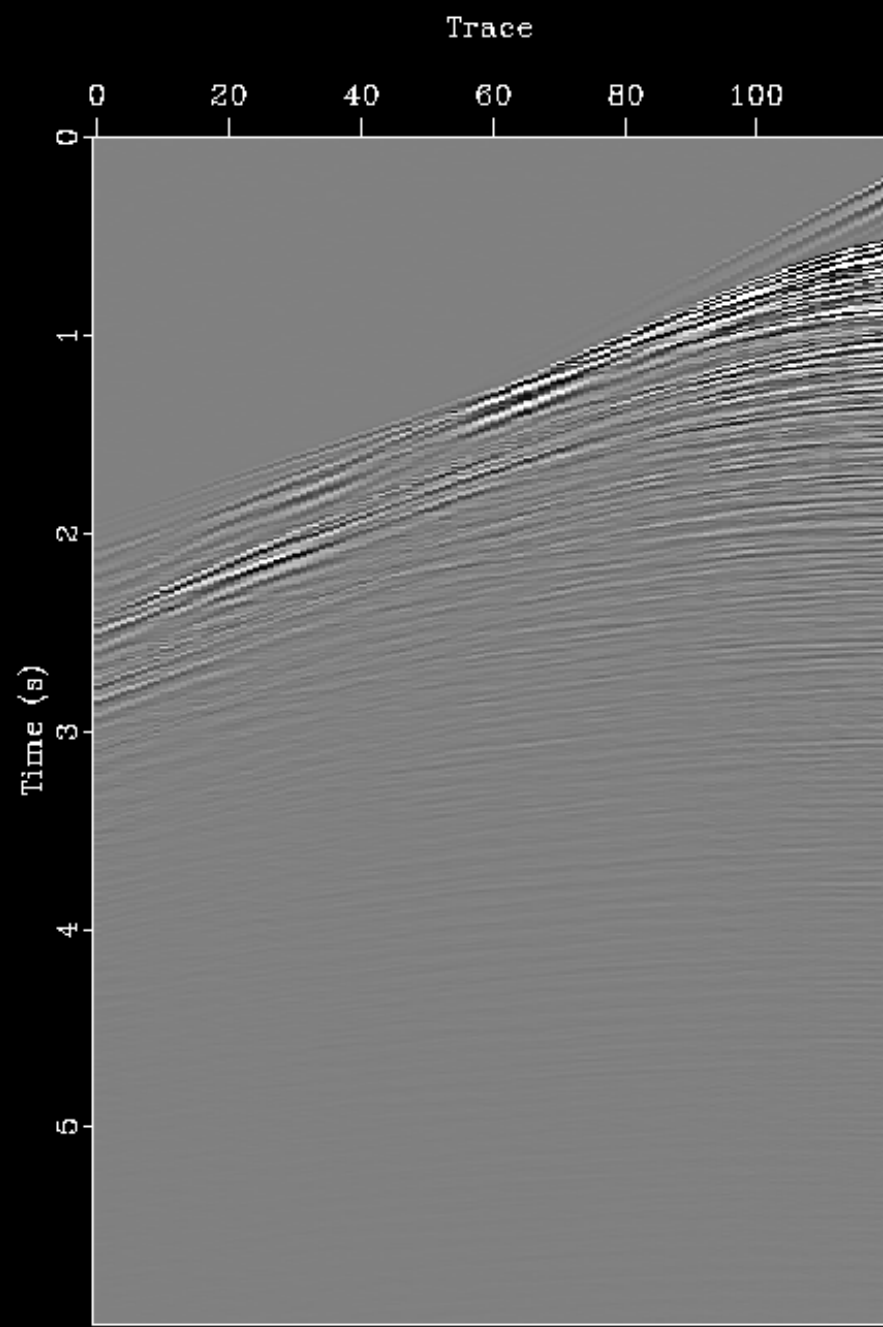
- ◆ Presentation Outline
 - Assume you have installed Madagascar. Start very simple, quick tour some key features.
- ◆ Check your installation
- ◆ Some basic Madagascar programs
- ◆ Some basic scon
- ◆ Basic processing 2D marine
- ◆ Exercise

Basic Processing 2D Marine

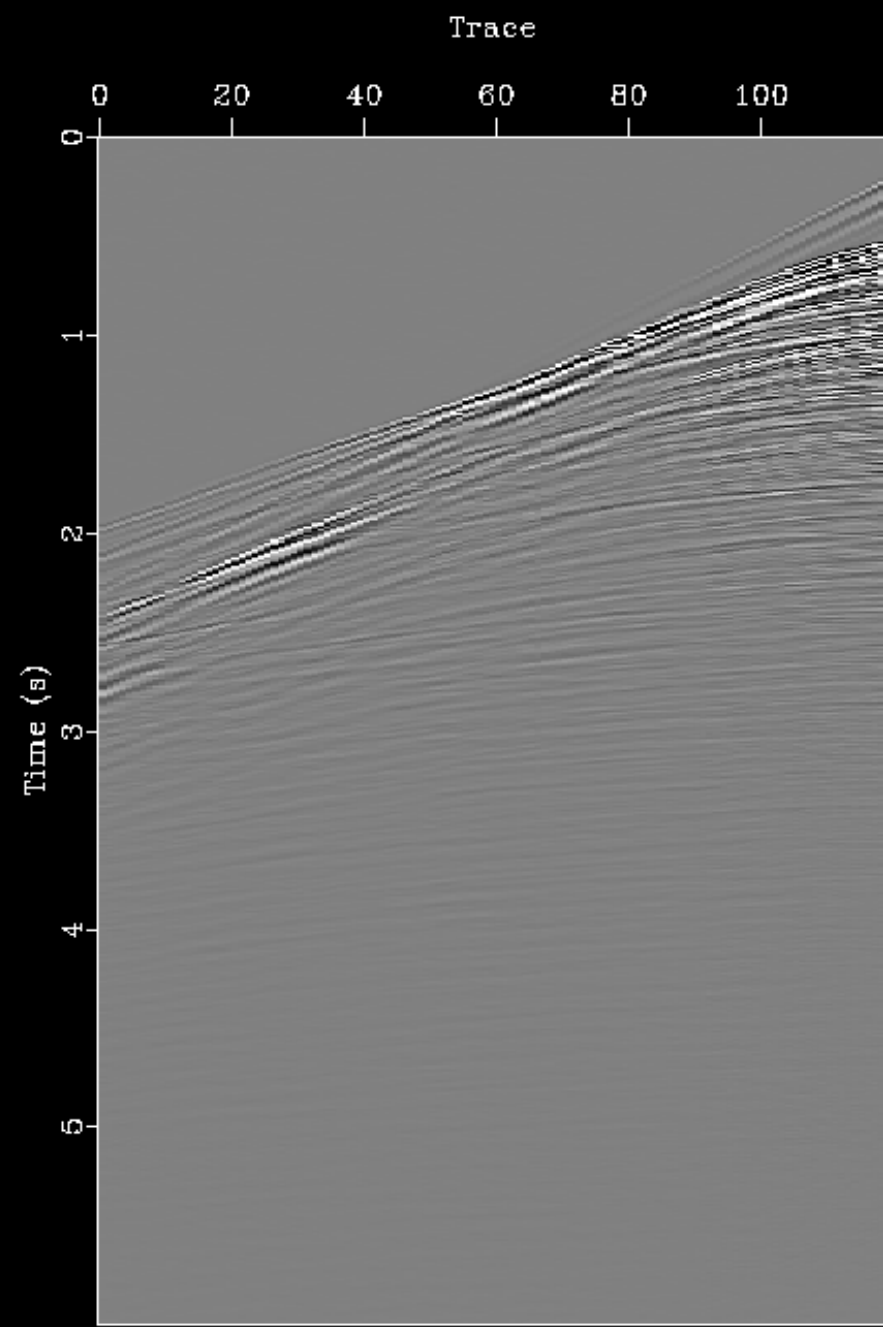
- ◆ I will step through instructions to show what to expect when you run basic processing Viking Graben 2D line.
- ◆ In a terminal window
`cd $RSFSRC/book/data/viking/fetch`
- ◆ Madagascar uses scons, an alternative to make, to create files based on rules.
- ◆ The rules are defined in the SConstruct file.
- ◆ To prevent fetching data from Internet and killing network, copy the files from viking/fetch on the thumb drive to this directory. This comments Fetch in SConstruct file and provides required files.

Basic Processing 2D Marine

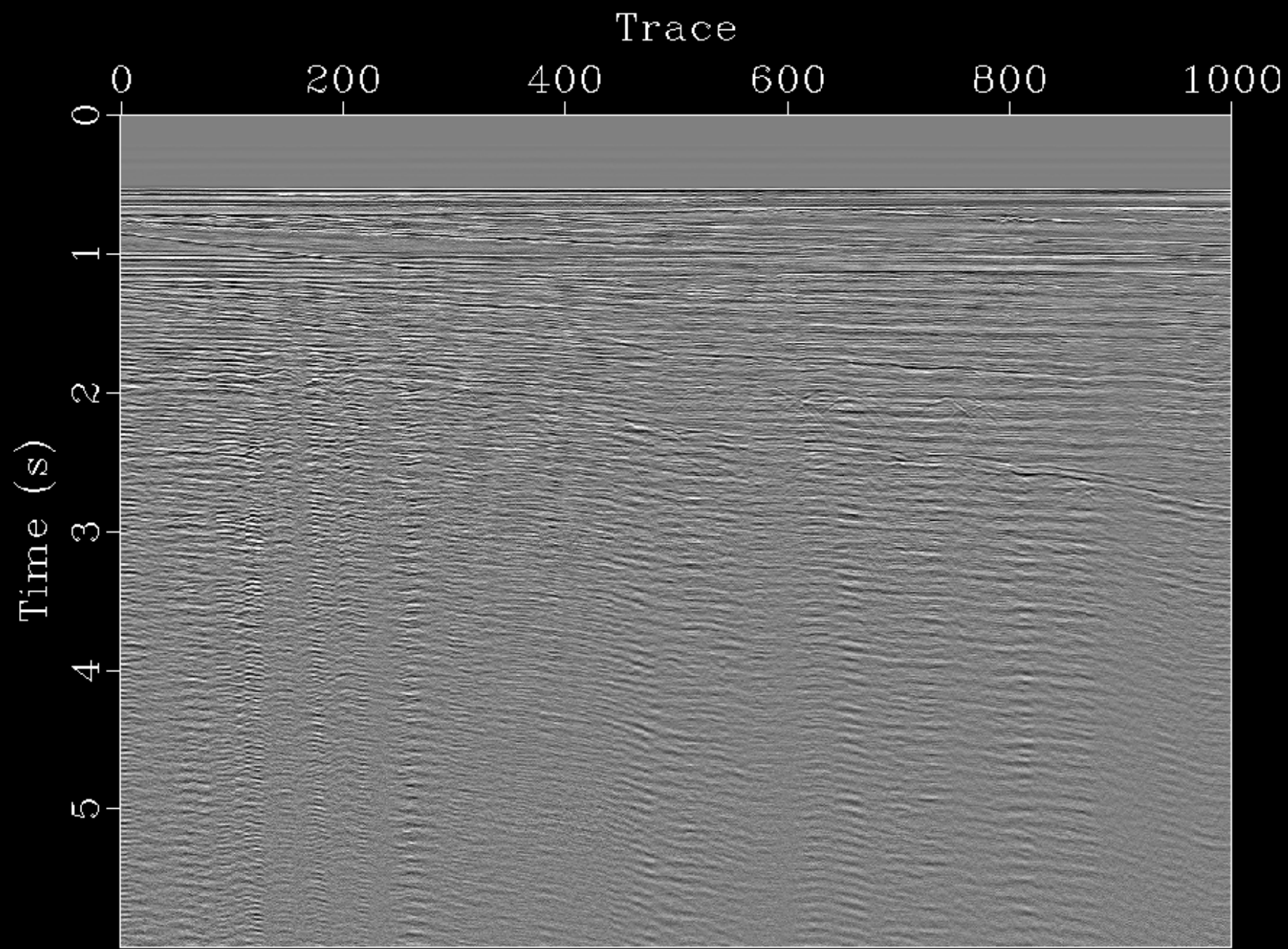
- ◆ In the terminal type:
scons view
- ◆ This will create and display results saved in the Figs directory. These results include two shots and a near trace gather.
- ◆ In the terminal type:
scons
- ◆ This will plot pdf jpg's and a movie of selected shots



shot 300



shot 600



near trace gather

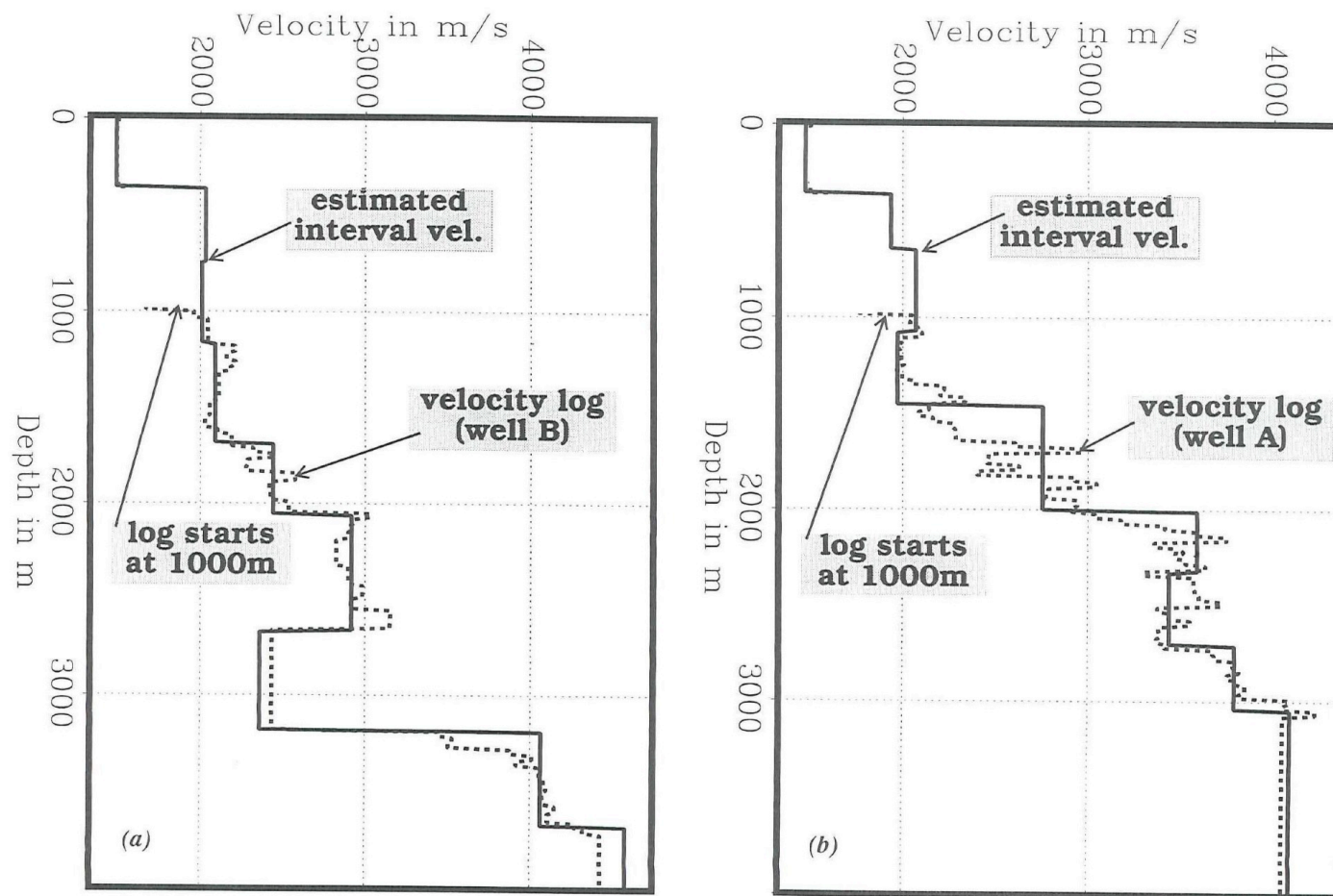
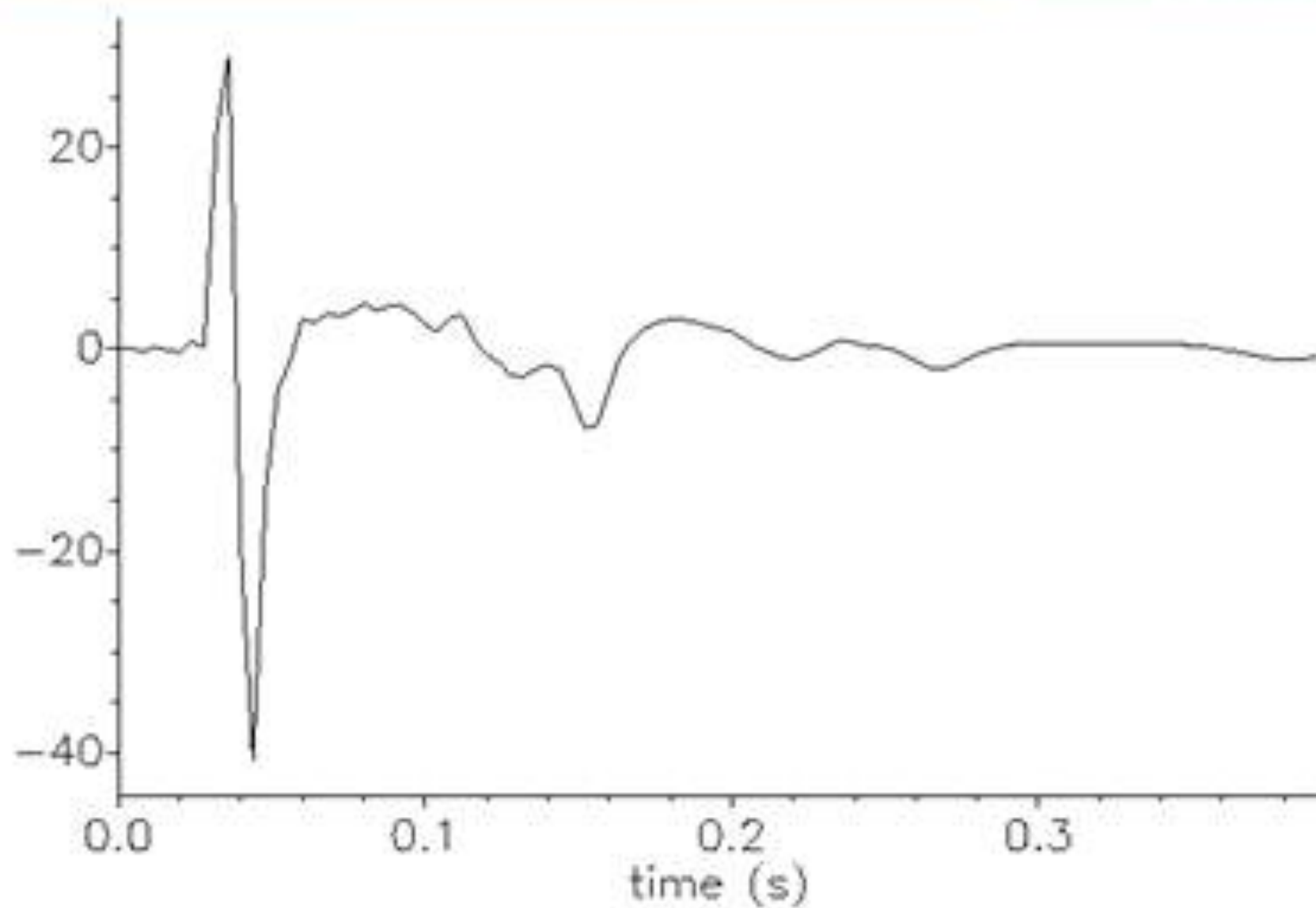


Figure 4.19 Velocity model estimation using curvature parameters and comparison with the well logs. a) Well B located around CMP 1572. b) Well A located around CMP 808



Basic Processing 2D Marine

- ◆ Experiment with scon
 - ◆ scon shot.view will show the two shot
 - ◆ It will skip some processes because it “knows” a rerun will create same results (eg sfseggyread is skipped)
 - ◆ scon -n (no execute) prints commands to be executed.
 - ◆ scon -c (clean) removes all the target files)

Basic Processing 2D Marine

- ◆ Read the SConstruct file.
- ◆ Key programs are:
 - ◆ sfsegypread – convert segy format data to rsf format
 - ◆ sfput reorganizes the 2D file (time,trace) into 3D (time, offset, shot)
 - ◆ sfwindow selects a subset of the traces
 - ◆ sfheaderattr prints summary of trace header values

Basic Processing 2D Marine

- ◆ Continue to process the data:

```
cd ../firstlook
```

```
scons view
```

- ◆ This will display variety of fold plots, cdp gathers, cdp gathers with nmo, near trace gathers, velocity analysis, and a stack section.
- ◆ The plots suggest deconvolution and multiple attenuation should be applied.

Basic Processing 2D Marine

- ◆ Processing in the firstlook directory use “**trace and header**” (tah) programs. They start with sftah and are similar to Seismic Unix.
- ◆ Data is read with sftahread or sftahsort, passed through pipes for processing with sftah programs and piped to sftahwrite to be saved
- ◆ A typical sequence is:
 sftahsort sort="cdp:200,200,1 -offset"\
 input=../fetch/seismic.rsfs \
| sftahwindow tmax=3.0 \
| sftahwrite verbose=1 output=cdp200.rsfs \
 mode=seq >/dev/null

Basic Processing 2D Marine

- ◆ A basic description of additional scripts can be read with:
`../readme.txt`

Basic Processing Exercises

Your Turn!

- ◆ Run “check your installation”.
- ◆ Run the book/data/viking/fetch, and firstlook directories.
- ◆ cd to the decon directory and run. What differences do you observe?
- ◆ Copy the decon directory to gapdecon. Change decon operator to be 32 ms gapped.
 - ◆ Eliminate all processing except that required for gapped decon stack.
 - ◆ Plot SideBySideAniso the rawstack, deconstack, and gappeddeconstack.
- ◆ Apply deterministic decon using sftahfilter.