

Data Analysis in Geophysics

ESCI 7205

Class 21

Bob Smalley

SAC and extras (IRIS DMC, FTP).

Use SAC macros to try to automate as much as possible.

- Saves time if have to do it over and over.

- Documents what you did – you can reproduce it exactly.

Notice importance of

- Organization/structure

- Naming conventions

Take advantage of them to automate processing.

SAC subprocesses

Spectral Estimation Package – **spe**

Signal Stacking Subprocess – **sss**

<http://www.iris.edu/software/sac/commands/spe.html>

SAC subprocesses

A subprocess is effectively a small program within the main SAC program. You start a subprocess by typing its name (SPE in this case.)

You can terminate it and return to the main program using the
QUITSUB or **QUIT**
commands.

SAC subprocesses

While within a subprocess, you can execute any command belonging to that subprocess plus a limited number of main SAC commands.

See the manual for the list of main SAC Commands executable from within either the SPE or SSS subprocess

Spectral Estimation Package – spe

SPE is a spectrum estimation package intended primarily for use with stationary random processes.

It contains three different spectral estimation techniques:

Power Density Spectra (PDS),
Maximum Likelihood Method (MLM), and
Maximum Entropy Method (MEM).

SPE Commands

- COR** : Computes the correlation function.
- MEM** : Calculates the spectral estimate using Maximum Entropy Method.
- MLM** : Calculates the spectral estimate using Maximum Likelihood Method.
- PDS** : Calculates the spectral estimate using Power Density Spectra Method.

SPE Commands

PLOTCOR : Plots the correlation function.

PLOTPE : Plots the RMS prediction error function.

PLOTSPE : Plots the spectral estimate.

SPE Commands

READ : within **SPE** works the same as in the main **SAC** program with two exceptions.

First, only **ONE** file may be read in while in **SPE**.

Second, executing this command deletes any correlation function or spectral estimate that may already have been computed.

SPE Commands

READ

Parameters within **SPE**, such as the number of prewhitening coefficients or the window type and length, are not changed when **read** is executed.

To reinitialize all **SPE** parameters, terminate the subprocess using the **QUITSUB** command and then start it over again.

SPE Commands

WRITECOR : Writes a SAC file containing the correlation function.

WRITESPE : Writes a SAC file containing the spectral estimate. Their abbreviated names are also allowed.

There are two primary differences between **SPE** and the main **SAC** program.

Only one data file can be processed by **SPE** at a time.

This is because **SPE** produces and stores a number of auxiliary functions (the correlation function, the prediction error function, and the spectral estimate itself) as it proceeds.

This restriction to a single data file may be removed in the future.

The second difference is that, unlike SAC itself, there is a specific order or progression in which the commands are generally executed.

Initialization (done with `spe` command), read, correlation, estimation, termination

Signal Stacking Subprocess – sss

primarily a package for doing signal stacking (i.e. summation or beamforming).

<http://www.iris.edu/software/sac/commands/sss.html>

SSS

Each signal (i.e. SAC file) has properties such as a static delay, epicentral distance, weighting factor, and polarity associated with it.

In addition, dynamic delays can be calculated using a normal moveout or refracted wave velocity model.

SSS

Certain delay properties can be automatically incremented between summations.

Files are easily added to or removed from the stack file list.

The time window for the stack is easily adjusted.

SSS

Files which do not contain data throughout the stack time window are filled with zeros.

The stack file list can be plotted with or without the summation.

Each summation can be saved on disk for later use.

SSS

A record section plot is also included in this subprocess.

<http://www.iris.edu/software/sac/commands/sss.html>

SSS Commands (in alphabetical order)

ADDSTACK : Add a new file to the stack file list.

CHANGESTACK : Change properties of files currently in the stack file list.

DELETESTACK : Deletes one or more files from the stack file list.

DELTACHECK : Change the sampling rate checking option.

SSS Commands

DISTANCEAXIS : Define the record section plot distance axis parameters.

DISTANCEWINDOW : Controls distance window properties on subsequent record section plots.

GLOBALSTACK : Sets global stack properties.

INCREMENTSTACK : Increments properties for files in the stack file list.

SSS Commands

LISTSTACK : Lists the properties of the files in the stack file list.

PLOTRECORDSECTION : Plots a record section of the files in the stack file list.

PLOTSTACK : Plots the files in the stack file list.

SSS Commands

QUITSUB or **QUIT** : Terminates the Signal Stacking Subprocess.

SUMSTACK : Sums the files in the stack file list.

TIMEAXIS : Controls the time axis properties on subsequent record section plots.

TIMEWINDOW : Sets the time window limits for subsequent stack summation.

SSS Commands

TRAVELTIME : Computes traveltime curves for pre-defined models or reads traveltime curves from ascii text files.

VELOCITYMODEL : Sets stack velocity model parameters for computing dynamic delays.

VELOCITYROSET : Controls placement of a velocity roset on subsequent record section plots.

SSS Commands

WRITESTACK : Writes a stack summation to disk.

ZEROSTACK : Zeros or reinitializes the signal stack.

Some seismic processing examples

Get seismic data from the Maule, Chile, earthquake in 2010 for a number of sites from the Earthscope transportable array and make a record section.

Principal open seismic database in the US is run by IRIS – the Incorporated Research Institutions for Seismology – a consortium of U.S. Universities with U.S. Government and Foreign associate members.

IRIS has a number of "facilities"

- Database Management Center (DMC) hosted by the University of Washington in Seattle.
- The PASSCAL (Program for Array Seismic Studies for the Continental Lithosphere)
- GDSN (Global Digital Seismic Network) together with Albuquerque Seismic Lab.
- Manages Earthscope Transportable and Flexible Arrays

- The PASSCAL (Program for Array Seismic Studies for the Continental Lithosphere)

Loans seismic equipment (sensors, recorders, telemetry) for both passive and active sources to principally NSF funded seismology projects.

- Database Management Center (DMC) hosted by the University of Washington in Seattle.

The part that is most important for this class – source of seismic data.

The IRIS DMC has hundreds of Terrabytes of data.

There is a very powerful (i.e. complicated) process for accessing this data.

There are some "easy" forms of access, these forms have some built in limits on time series lengths, file sizes, etc.

First go to the IRIS DMC.

Direct way

<http://www.iris.edu/dms/dmc/>

You can also Google on IRIS DMC or connect to the IRIS home page.

- Data
- Request Tools
- Services
- Software
- Staff
- News

DMC Quick Links

Earthquakes



View Seismic Monitor

Data Management Center

Home » DMS » DMC Home

Welcome to the IRIS DMC

The IRIS DMC archives and distributes data to support the seismological research community. Our state-of-the-art data center is located near the University of Washington in Seattle.

Below are the latest items of interest at the IRIS DMC. Click on the **News** tab at the left for more recent developments you may not be aware of. Please explore the **Data Access Navigator** below to find out more about what we have to offer. The **Quick Links** tool can also take you to our most popular informational pages.

Data Access Tools

IRIS has a variety of tools for requesting and viewing data, including DHI clients and mapping tools. An easy way to find these tools is shown on the Data Access Navigator.

[View »](#)

Public Access Researchers

General Public Basic User

Education Regular User

Data Providers Advanced User

Help Center

posted: September 19th, 2011

IRIS Metadata Workshop in Thailand, January 8-16, 2012

The IRIS Metadata Workshop will be held in Thailand and promises to bring lots of expertise and tools to the registered attendees (*registration is now closed*). IRIS DMC has a web page that describes this and the accompanying Advanced Studies Institute session that follows.

Please follow this link for more information:
[«http://www.iris.edu/workshops/2012/metadata/»](http://www.iris.edu/workshops/2012/metadata/)



posted: August 25th, 2011

DMS Newsletter - Summer 2011 Issue

This issue features the **IRIS Knowledge Base** - a central archive of information for seismologists.

Discover the IRIS Help Center and try the interactive IRIS Mousepad.

New software releases include rdseed v5.1 and VASE v2.9.


[Read more »](#)

From here you can go to various data portals (click in box)

(this stuff will probably be out of date by the time I present it - they are "improving" it all the time.)

That will bring you to this page

Enter the "Basic User" area.

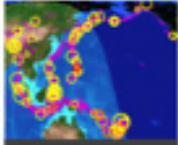
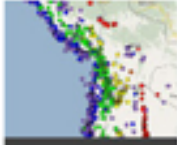

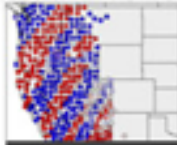
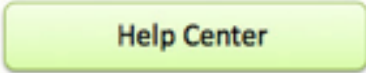

IRIS
Seismic Data Access

Public Access

General Public

Education

Data Providers


Seismic Monitor

Event Browser

Software

Products

Help Center

Researchers

Basic User

Regular User

Advanced User



[Data Mousepad](#)

This will bring us to Wilbur where we will have access to "prepared" earthquake data from the "FARM" and "SPYDER" data sets.



The map below displays events containing **FARM** and **SPYDER®** data for the last 90 days or the selected quarter. The data resides in IRIS DMC's **POND** archive.

Click on the map to display a listing of events within the selection radius OR [list all events](#).

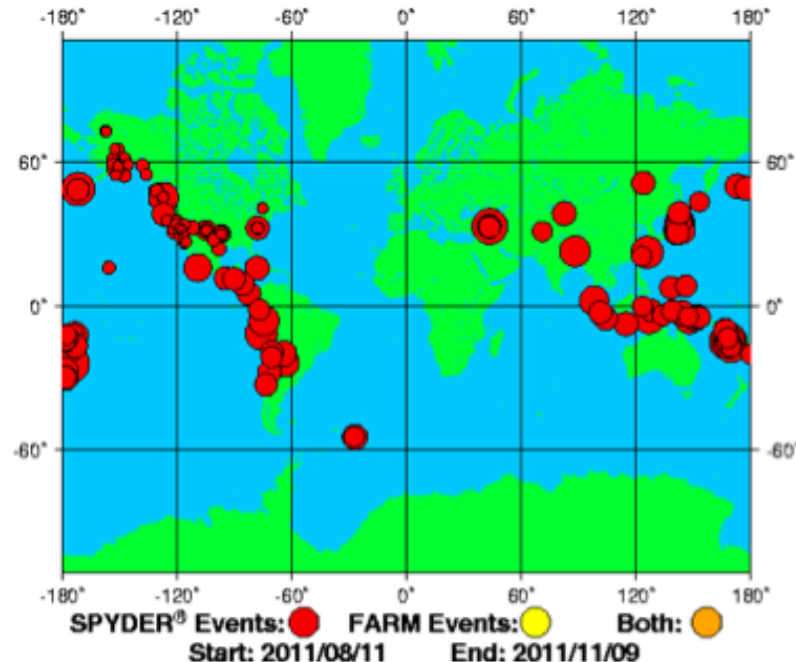
Last 90 days

Q3 2011
Q2 2011
Q1 2011
Q4 2010
Q3 2010
Q2 2010
Q1 2010
Q4 2009
Q3 2009

Select a Quarter to Display

5 (default)
10
15

Selection Radius (degrees)



Interested in Very-Long or Ultra-Long Period data? Check out our [UVFARM holdings](#).

Now you select a 3 month time period and radius of interest from the menu on the left.

It will update the map.



The map below displays events containing **FARM** and **SPYDER®** data for the last 90 days or the selected quarter. The data resides in IRIS DMC's **POND** archive.

Click on the map to display a listing of events within the selection radius OR [list all events](#).

Last 90 days

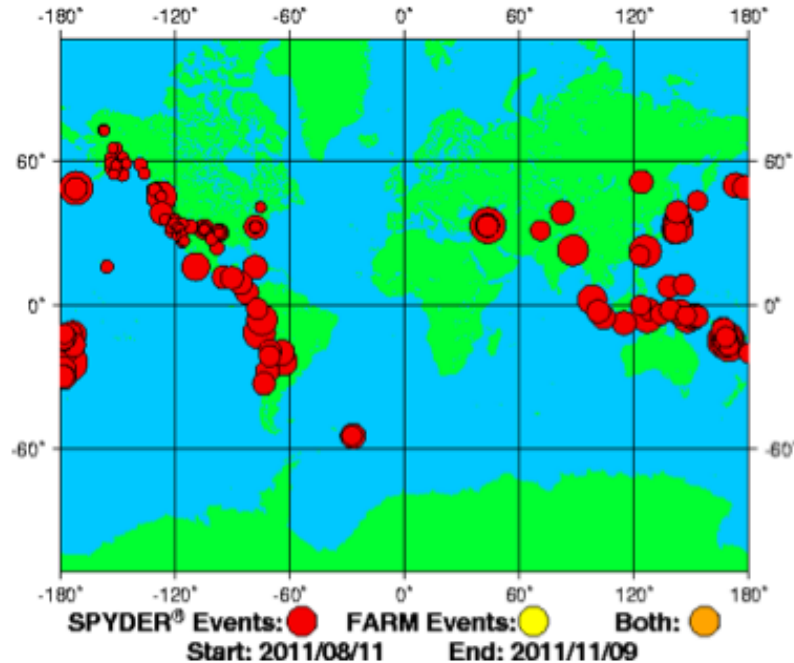
- Q3 2011
- Q2 2011
- Q1 2011
- Q4 2010
- Q3 2010
- Q2 2010
- Q1 2010
- Q4 2009
- Q3 2009

Select a Quarter to Display

5 (default)

- 10
- 15

Selection Radius (degrees)



Interested in Very-Long or Ultra-Long Period data? Check out our [UVFARM holdings](#).

Then use the mouse to click on the earthquake/
area of interest.
Click here.



The map below displays events containing **FARM** and **SPYDER®** data for the last 90 days or the selected quarter. The data resides in IRIS DMC's **POND** archive.

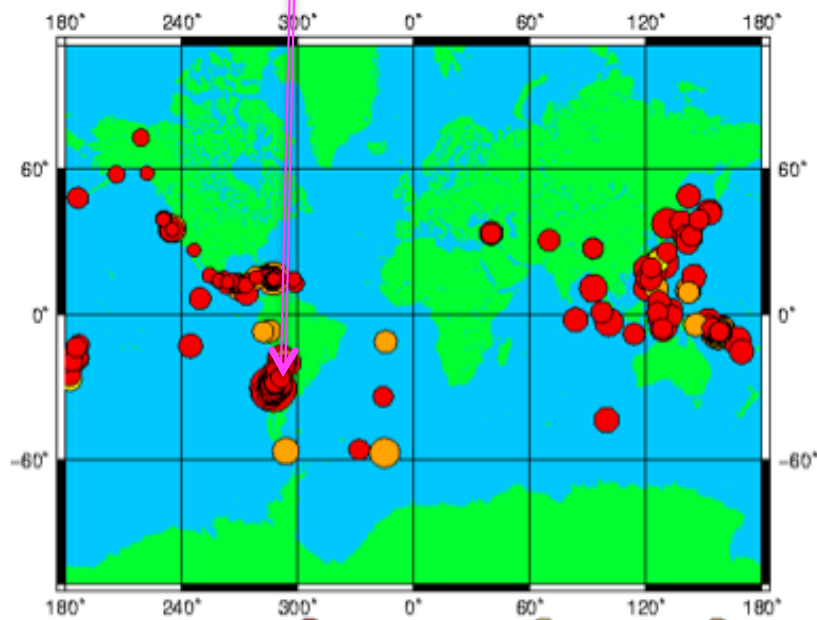
Click on the map to display a listing of events within the selection radius OR [list all events](#).

Q1 2010
Last 90 days
Q3 2011
Q2 2011
Q1 2011
Q4 2010
Q3 2010
Q2 2010
Q4 2009
Q3 2009

Select a Quarter to Display

5 (default)
10
15

Selection Radius (degrees)



SPYDER® Events: ● FARM Events: ● Both: ●
Start: 2010/01/01 End: 2010/03/31

Interested in Very-Long or Ultra-Long Period data? Check out our [UVFARM holdings](#).

And it will produce a list of earthquakes.

Click on the one you want.

[back to map](#)

Events within 5° distance of selected Lat: -33.62° Lon: 289.74° for Q1 2010

DATE	TIME	SOURCE	MAG	LAT	LOM	DEPTH	DESCRIPTION
2010/01/18	12:28:36.9	SPYDER*	5.5	-31.26	-68.57	107.60	SAN JUAN PROVINCE ARGENTINA
2010/02/12	12:03:38.8	FARM	5.8	-33.62	-68.79	148.40	MENDOZA PROVINCE ARGENTINA
2010/02/12	12:03:40.1	SPYDER*	5.8	-33.49	-68.56	144.70	MENDOZA PROVINCE ARGENTINA
2010/02/27	06:34:11.5	FARM	8.8	-36.12	-72.90	22.90	NEAR COAST OF CENTRAL CHILE
2010/02/27	06:34:17.2	SPYDER*	8.3	-35.83	-72.67	59.40	NEAR COAST OF CENTRAL CHILE
2010/02/27	06:52:35.0	SPYDER*	6.2	-34.74	-72.64	35.00	NEAR COAST OF CENTRAL CHILE
2010/02/27	07:12:28.9	SPYDER*	6.0	-33.81	-71.91	35.00	NEAR COAST OF CENTRAL CHILE
2010/02/27	07:37:18.1	SPYDER*	6.0	-36.84	-72.54	35.00	NEAR COAST OF CENTRAL CHILE
2010/02/27	08:13:16.2	SPYDER*	5.6	-33.06	-71.70	35.00	NEAR COAST OF CENTRAL CHILE
2010/02/27	08:19:23.7	SPYDER*	5.5	-33.48	-71.57	35.00	NEAR COAST OF CENTRAL CHILE
2010/02/27	08:25:29.6	SPYDER*	6.1	-34.75	-72.39	35.00	NEAR COAST OF CENTRAL CHILE
2010/02/27	08:31:04.7	SPYDER*	5.7	-34.82	-72.44	35.00	NEAR COAST OF CENTRAL CHILE
2010/02/27	09:00:17.5	SPYDER*	5.6	-33.43	-71.63	35.00	NEAR COAST OF CENTRAL CHILE
2010/02/27	10:10:15.3	SPYDER*	5.6	-33.70	-72.18	35.00	OFF COAST OF CENTRAL CHILE
2010/02/27	10:30:34.8	SPYDER*	5.9	-33.56	-72.64	35.00	OFF COAST OF CENTRAL CHILE
2010/02/27	12:03:27.9	SPYDER*	5.5	-34.40	-73.82	35.00	OFF COAST OF CENTRAL CHILE

Now it gives you a list of seismic networks (real and virtual).

Click the check box for the one you want, then scroll to bottom and click "proceed".

Be careful what you wish for here - you can easily get back several thousand stations with TBs of data.

[back to list](#)

Event: 2010/02/27 06:34:11.5
Catalog: WHDF Mag: 8.8 Type: MW Contributor: GCMT
Lat: -36.12 Lon: -72.90 Depth: 22.90
Description: NEAR COAST OF CENTRAL CHILE Source: FARM

Responding Networks

- SELECT ALL**
- AF** Africa Array
- AK** Alaska Regional Network
- AT** Alaska Tsunami Warning Seismic System
- AU** Geoscience Australia
- AV** Alaska Volcano Observatory (AVO)
- AZ** ANZA Regional Network
- BE** Belgian Seismic Network
- BI** University of Dhaka Seismographic Network-Bangladesh
- BK** Berkeley Digital Seismograph Network (BDSN)
- CB** China National Seismic Network
- CC** Cascade Chain Volcano Monitoring
- CH** Switzerland Seismological Network
- CI** Caltech Regional Seismic Network
- SV** Servicio Nacional de Estudios Territoriales (SINET), El Salvador
- TA** USArray Transportable Array (NSF EarthScope Project)
- TM** Thai Seismic Monitoring Network

The IRIS DMC bases servicing requests based on how much data you ask for.

The more you ask for, the lower your priority.

The priority setting is also dynamic, if a new request for a smaller amount of data comes in after your request, it goes ahead of you.

We're getting there!

Now we have a list of stations plus some metadata on the event, and several "filters" to select data. We can also sort the data by distance (default), azimuth, station name, and signal to noise ratio.

[back to networks](#)

WILBER II

Event: 2010/02/27 06:34:11.5 NEAR COAST OF CENTRAL CHILE
Mag: 8.8 Type: MW Lat: -36.12 Lon: -72.90 Depth: 22.90
Catalog: WHDF Contributor: GCMT Source: FARM

FILTER BY:

NETWORK

ALL
TA

CHANNEL

ALL
BHE
BHN
BHZ
LHE
LHN
LHZ
B??
L??

DISTANCE

from 0

to 180 deg

AZIMUTH

from 0

to 360 deg

SNR

-1 = not avail any 0 = error >1.5=good

DISTRIBUTE

about every 2 deg

Apply Filter Reset

415 selected

415 Responding Stations

[name.net](#) (distance/azimuth/snr)

Clear All Check All

<input checked="" type="checkbox"/>	0352.TA	(66.62°/335°/1.37)
<input checked="" type="checkbox"/>	035A.TA	(67.07°/335°/1.08)
<input checked="" type="checkbox"/>	936A.TA	(67.26°/336°/1.39)
<input checked="" type="checkbox"/>	034A.TA	(67.39°/335°/.76)
<input checked="" type="checkbox"/>	934A.TA	(67.83°/335°/.71)
<input checked="" type="checkbox"/>	T1GA.TA	(67.95°/350°/3.13)
<input checked="" type="checkbox"/>	738A.TA	(68.07°/338°/1.81)
<input checked="" type="checkbox"/>	933A.TA	(68.09°/334°/4.99)
<input checked="" type="checkbox"/>	835A.TA	(68.23°/336°/1.74)
<input checked="" type="checkbox"/>	834A.TA	(68.32°/335°/1.96)
<input checked="" type="checkbox"/>	735A.TA	(68.75°/336°/.85)
<input checked="" type="checkbox"/>	833A.TA	(68.79°/335°/2.46)
<input checked="" type="checkbox"/>	832A.TA	(68.95°/334°/2.34)
<input checked="" type="checkbox"/>	734A.TA	(68.99°/335°/1.03)
<input checked="" type="checkbox"/>	636A.TA	(69.10°/337°/5.3)
<input checked="" type="checkbox"/>	733A.TA	(69.12°/335°/9.35)
<input checked="" type="checkbox"/>	635A.TA	(69.24°/336°/6.46)
<input checked="" type="checkbox"/>	538A.TA	(69.32°/339°/2.51)
<input checked="" type="checkbox"/>	732A.TA	(69.36°/334°/13.43)
<input checked="" type="checkbox"/>	634A.TA	(69.42°/336°/12.11)
<input checked="" type="checkbox"/>	537A.TA	(69.43°/338°/1.81)
<input checked="" type="checkbox"/>	536A.TA	(69.65°/337°/2.77)
<input checked="" type="checkbox"/>	633A.TA	(69.76°/335°/4.79)
<input checked="" type="checkbox"/>	535A.TA	(69.77°/337°/2.94)
<input checked="" type="checkbox"/>	438A.TA	(69.81°/339°/2.6)
<input checked="" type="checkbox"/>	340A.TA	(70.01°/340°/16.31)
<input checked="" type="checkbox"/>	632A.TA	(70.01°/335°/12.95)
<input checked="" type="checkbox"/>	534A.TA	(70.05°/336°/19.48)
<input checked="" type="checkbox"/>	437A.TA	(70.08°/338°/9.66)
<input checked="" type="checkbox"/>	339A.TA	(70.11°/340°/14.58)

TOOLS:

SORT BY

Distance

STATION MAP

Plot

RECORD SECTION

Plot

REQUEST DATA

[Below](#)

We can also make a map or draw a record section
(if you have all day – this is pretty slow)

There are 417 stations available (each with at least three components, maybe more).

[back to networks](#)

WILBER II

Event: 2010/02/27 06:34:11.5 NEAR COAST OF CENTRAL CHILE
Mag: 8.8 Type: MW Lat: -36.12 Lon: -72.90 Depth: 22.90
Catalog: WHDF Contributor: GCMT Source: FARM

FILTER BY:

NETWORK
ALL
TA

CHANNEL
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BHN
BHZ
LHE
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LHZ
B??
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DISTANCE
from 0
to 180 deg

AZIMUTH
from 0
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SNR
-1 = not avail any 0 = error >1.5=good

DISTRIBUTE
about every 2 deg

Apply Filter Reset

415 selected

415 Responding Stations
[name.net](#) (distance/azimuth/snr)

Clear All Check All

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<input checked="" type="checkbox"/>	437A.TA	(70.08°/338°/9.66)
<input checked="" type="checkbox"/>	339A.TA	(70.11°/340°/14.58)

TOOLS:

SORT BY

Distance

STATION MAP

Plot

RECORD SECTION

Plot

REQUEST DATA

[Below](#)

I selected only the broadband high gain (BHE, BHN and BHZ) distributed every 2 degrees and it gave me a selection of 15 (a bit more reasonable)

[back to networks](#)

Event: 2010/02/27 06:34:11.5 NEAR COAST OF CENTRAL CHILE
Mag: 8.8 Type: MW Lat: -36.12 Lon: -72.90 Depth: 22.90
Catalog: WHDF Contributor: GCMT Source: FARM

FILTER BY:

NETWORK

ALL
TA

CHANNEL

ALL
BHE
BHN
BHZ
LHE
LHN
LHZ
B??
L??

DISTANCE

from 0 to 180 deg

AZIMUTH

from 0 to 360 deg

SNR

-1 = not avail any >1.5=good 0 = error

DISTRIBUTE
about every 2 deg

Apply Filter Reset

15 selected

415 Responding Stations

[name.net](#) (distance/azimuth/snr)

Clear All Check All

<input checked="" type="checkbox"/>	035Z.TA	(66.62°/335°/1.37)
<input type="checkbox"/>	035A.TA	(67.07°/335°/1.08)
<input type="checkbox"/>	936A.TA	(67.26°/336°/1.39)
<input type="checkbox"/>	034A.TA	(67.39°/335°/.76)
<input type="checkbox"/>	934A.TA	(67.83°/335°/.71)
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<input type="checkbox"/>	538A.TA	(69.32°/339°/2.51)
<input type="checkbox"/>	732A.TA	(69.36°/334°/13.43)
<input type="checkbox"/>	634A.TA	(69.42°/336°/12.11)
<input type="checkbox"/>	537A.TA	(69.43°/338°/1.81)
<input type="checkbox"/>	536A.TA	(69.65°/337°/2.77)
<input type="checkbox"/>	633A.TA	(69.76°/335°/4.79)
<input type="checkbox"/>	535A.TA	(69.77°/337°/2.94)
<input type="checkbox"/>	438A.TA	(69.81°/339°/2.6)
<input type="checkbox"/>	340A.TA	(70.01°/340°/16.31)
<input type="checkbox"/>	632A.TA	(70.01°/335°/12.95)
<input type="checkbox"/>	534A.TA	(70.05°/336°/19.48)
<input type="checkbox"/>	437A.TA	(70.08°/338°/9.66)

TOOLS:

SORT BY

Distance

STATION MAP

Plot

RECORD SECTION

Plot

REQUEST DATA

[Below](#)

Finally scroll down to the bottom of the page where you have to select the data format, the time window and set up for retrieving the data.

When ready – click "Process Request"

1. Select NETWORK(s), CHANNEL(s) and station checkboxes to compose your data request.

Use [Apply Filter](#) button to verify data availability and to select by distance, azimuth, signal quality and interval ranges.
Click on the underlined station names to view sample seismograms and station detail.
Change the sorting order of the list using the SORT BY popup.
RESPONDING STATIONS map currently shows all stations.
RECORD SECTION plot operates on the currently selected stations and the selected channel.
Note that Javascript must be enabled for WILBER to work.

2. Select data format, time window and user identification here:

Available Data Formats

SEED (default)
miniSEED
SAC BINARY individual files
SAC BINARY tar file
SAC BINARY gzipped tar file
SAC BINARY compressed tar file
SAC ASCII individual files
SAC ASCII tar file
SAC ASCII gzipped tar file
SAC ASCII compressed tar file

Time Window Data

2 (default)
1
3

minutes before P
and

10 (default)
20
30

minutes after P

Personal Information

bob smalley	User Name*
maule	Request Label*
rsamiley@memphis.edu	Email Address
<input checked="" type="checkbox"/>	Notify me through email when complete

* = required fields

Process Request

3. Click button to process request.

Data formats [help](#)

- Please Wait -

Your request is being queued into WILBER processing

[\(next\)](#)

Click on "next" to see what I asked for.

Request Completed!

ID Number: 18185
User Name: bob_smalley
Request Label: maule
Data Format: SEED
File Size: 6164480 bytes

Take me to my [current FTP directory \(/pub/userdata/bob_smalley/maule\)](#) to download my data product.

And then the "current FTP directory".

This request was pretty small (only 6 MB) so it was ready almost immediately, long before the email notification. I also asked for the same thing yesterday but did not record it.)

Index of ftp://ftp.iris.washington.edu/pub/userdata/bob_smalley/maule/

 [Up to higher level directory](#)

Name	Size	Last Modified
 maule.seed	6020 KB	11/8/11 6:47:00 PM
 maule.seed_01	6020 KB	11/9/11 6:43:00 PM
 my_processing.log	1 KB	11/9/11 6:43:00 PM
 my_request	3 KB	11/9/11 6:42:00 PM

Double click on the file to download it.
Files are kept online for a few days.

This was the *easy way!*

You can only do this for prepared
"event" (earthquake) data.

If you want continuous data, PASSCAL data, etc.
you have to use other shovels in the toolshed.

This is a bit harder.

Data Access - Regular User



Data Requests

[BREQ_Fast](#)

[NetDC](#)

[SeismiQuery](#)

[WILBER](#)

General Interest

[Help Center](#)

[DMS Products](#)

[Seismic Monitor](#)

[Software](#)

Service Oriented

[Earthquake Browser](#)

[BUD](#)

[MDA](#)

[JWEED](#)

[Data Wizard](#)

[Tutorial](#)

[Tool Wizard](#)

Here's what we get as a regular user

Data Access - Advanced User



Real-Time Data

[BUD TOOLS](#)
[SeedLink](#)

Archived Data

[Assembled](#)
[BreqFast](#)
[NetDC](#)
[WILBER](#)
[Help Center](#)
[Software](#)

Metadata

[Dataless SEED](#)
[MDA](#)
[SeismiQuery](#)

Mapping

[Earthquake Browser](#)
[IRIS Mapping Tools](#)

Service Oriented

[DHI Clients](#)
[Web Services](#)

Products

[DMS Products](#)
[QUACK](#)
[SPUD](#)
[SeismoArchives](#)
[Data Wizard](#)
[Tool Wizard](#)

[Data Mousepad](#)

And as an
advanced
user



Assembled Data Request Form

(*required fields)

*** Name:**

Bob Smalley

*** Institution:**

CERI/UM

*** Mailing Address:**

3876 Central Ave
Memphis, TN 38152

*** Email:**

rsmalley@memphis.edu

Phone:

901-678-4929

FAX:

901-678-4734

*** Dataset Report Number:**

05-025

Enter only one Dataset Report Number. If you are unsure of the number, please view the [lists of data sets](#).

LABEL:

que_es

*** Media Type:**

FTP

(FTP, DDS2, DDS3, 8mm, Mammoth, DLT III, DLT IV)

Review Request

Reset

Fill out form



Assembled Data Request Form

Review Screen (Edit the text here, then submit the request)

```
.NAME Bob Smalley
.REPORT_No. 05-025
.LABEL que_es
.EMAIL rsamley@memphis.edu
.INST CERI/UM
.MAIL 3876 Central Ave
Memphis, TN 38138
.PHONE 901-678-4929
.FAX 901-678-4734
.MEDIA FTP
.END
```

Review and
submit

From:

Subject:

Check your ftp area at IRIS DMC

Index of ftp://ftp.iris.washington.edu/pub/userdata/Bob_Smalley/CHARME/

 [Up to higher level directory](#)

Name	Size	Last Modified
 file001.CHARME.E2002-310_sgy.tar	831 KB	11/9/11 7:42:00 PM
 file002.CHARME.E2002-311_sgy.tar	6244 KB	11/9/11 7:31:00 PM
 file003.CHARME.E2002-312_sgy.tar	16149 KB	11/9/11 7:34:00 PM
 file004.CHARME.E2002-313_sgy.tar	29204 KB	11/9/11 7:42:00 PM
 file005.CHARME.E2002-314_sgy.tar	57474 KB	11/9/11 7:40:00 PM
 file006.CHARME.E2002-315_sgy.tar	168189 KB	11/9/11 7:32:00 PM
 file007.CHARME.E2002-316_sgy.tar	169683 KB	11/9/11 7:41:00 PM
 file008.CHARME.E2002-317_sgy.tar	315429 KB	11/9/11 7:33:00 PM
 file009.CHARME.E2002-318_sgy.tar	160436 KB	11/9/11 7:41:00 PM
 file010.CHARME.E2002-319_sgy.tar	135268 KB	11/9/11 7:41:00 PM
 file011.CHARME.E2002-320_sgy.tar	174337 KB	11/9/11 7:41:00 PM

Most browsers do FTP – but you have to do each file individually to download them.

The screenshot shows a web browser window with the address bar containing the URL `ftp://ftp.iris.washington.edu/pub/userdata/Bob_Smalley/CHARME/`. The browser's address bar also shows the text "Index of ftp://ftp.iris.washingto...". The browser's toolbar includes navigation buttons (back, forward, home, stop), a search bar with the Google logo, and a bookmarks bar with items like "Most Visited", "Getting Started", "Latest Headlines", "Apple", "Yahoo!", "Google Maps", "YouTube", "Wikipedia", "News", and "Popular".

The main content area displays the following information:

Index of `ftp://ftp.iris.washington.edu/pub/userdata/Bob_Smalley/CHARME/`

[Up to higher level directory](#)

Name	Size	Last Modified
file001.CHARME.E2002-310_sgy.tar	831 KB	11/9/11 7:42:00 PM
file002.CHARME.E2002-311_sgy.tar	6244 KB	11/9/11 7:31:00 PM

Use FTP or other program (e.g. down them all plug in to Firefox that uses FTP internally) to download data.

114/128 - DownThemAll!

PayPal
DONATE HERE!

Download/Name	Progress	Perc...	Size	Est. time	Speed
file001.CHARME.E2002-310_sgy.tar	100%	831.0 KB	Complete		
file002.CHARME.E2002-311_sgy.tar	100%	6.10 MB	Complete		
file003.CHARME.E2002-312_sgy.tar	100%	15.77 MB	Complete		
file004.CHARME.E2002-313_sgy.tar	100%	28.52 MB	Complete		
file005.CHARME.E2002-314_sgy.tar	100%	56.13 MB	Complete		
file006.CHARME.E2002-315_sgy.tar	100%	164.25 MB	Complete		
file007.CHARME.E2002-316_sgy.tar	100%	165.71 MB	Complete		
file008.CHARME.E2002-317_sgy.tar	100%	308.04 MB	Complete		
file009.CHARME.E2002-318_sgy.tar	100%	156.68 MB	Complete		
file010.CHARME.E2002-319_sgy.tar	100%	132.10 MB	Complete		
file011.CHARME.E2002-320_sgy.tar	100%	170.25 MB	Complete		
file012.CHARME.E2002-321_sgy.tar	100%	179.21 MB	Complete		
file013.CHARME.E2002-322_sgy.tar	100%	153.49 MB	Complete		
file014.CHARME.E2002-323_sgy.tar	100%	179.79 MB	Complete		
file015.CHARME.E2002-324_sgy.tar	100%	227.81 MB	Complete		
file016.CHARME.E2002-325_sgy.tar	100%	168.88 MB	Complete		
file017.CHARME.E2002-326_sgy.tar	100%	158.84 MB	Complete		

Downloads: 114 of 128, 0 running 0 b/s Limit: Unlimited Preferences

Check what you got, you may have to fix a few by hand.

114/128 - DownThemAll!

PayPal
DONATE HERE!

Download/Name	Progress	Perc...	Size	Est. time	Speed
file061.CHARME.E2003-006_sgy.tar		100%	202.80 MB	Complete	
file062.CHARME.E2003-007_sgy.tar		100%	380.26 MB	Complete	
file063.CHARME.E2003-008_sgy.tar		100%	247.07 MB	Complete	
file064.CHARME.E2003-009_sgy.tar		100%	220.78 MB	Complete	
file065.CHARME.E2003-010_sgy.tar		100%	184.41 MB	Complete	
file066.CHARME.E2003-011_sgy.tar		0%	Unknown	Server error	
file067.CHARME.E2003-012_sgy.tar		0%	Unknown	Server error	
file068.CHARME.E2003-013_sgy.tar		0%	Unknown	Server error	
file069.CHARME.E2003-014_sgy.tar		0%	Unknown	Server error	
file070.CHARME.E2003-015_sgy.tar		100%	233.82 MB	Complete	
file071.CHARME.E2003-016_sgy.tar		100%	181.96 MB	Complete	
file072.CHARME.E2003-017_sgy.tar		100%	231.30 MB	Complete	
file073.CHARME.E2003-018_sgy.tar		100%	194.27 MB	Complete	
file074.CHARME.E2003-019_sgy.tar		100%	202.94 MB	Complete	
file075.CHARME.E2003-020_sgy.tar		100%	270.23 MB	Complete	
file076.CHARME.E2003-021_sgy.tar		100%	283.33 MB	Complete	
file077.CHARME.E2003-022_sgy.tar		100%	280.45 MB	Complete	

Downloads: 114 of 128, 0 running 0 b/s Limit: Unlimited Preferences

Make sure *you* have the space.

The CHARME dataset was ~25 GB.

File Transfer Protocol (FTP).

Program to move data between computers.

One of the original tools of the internet.

Computer with data has to be running an FTP server.

Computer requesting data has to be running an FTP client.

(both capabilities are build into UNIX, have to enable the server, but the client program is always available)

ftp is somewhat of a security hole since nothing is encrypted (usernames and passwords are sent as is, "in the clear") and the computer running the server can also accept data.

Replaced by secure FTP (sftp) which has encryption and other security measures.

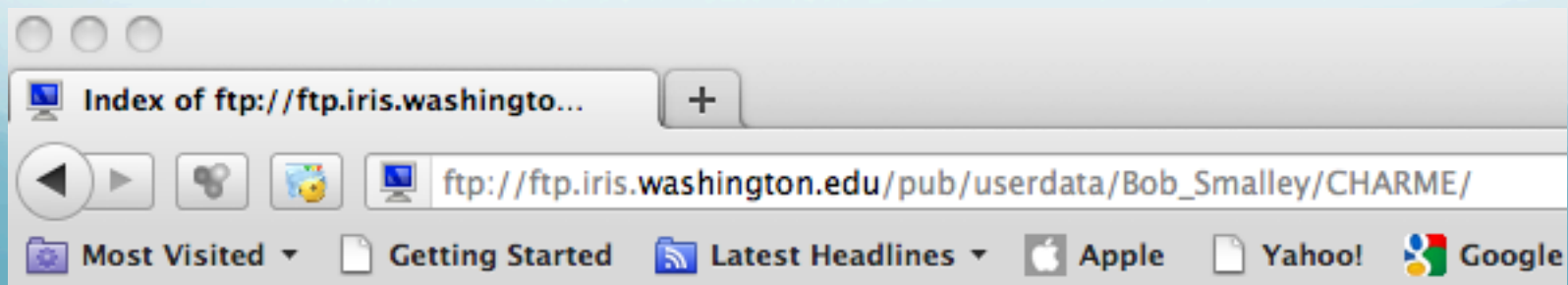
For account based FTP/SFTP entry (username and password controlled) you have the same access to disks as you do from terminal.

Since ftp comes from earliest days of the internet it has a command line interface.

You need to know the address of the machine with the FTP server.

In our example this information is the bold, underlined part of the url below (universal record locator, the thing in the address bar in your web browser)

`ftp://ftp.iris.washington.edu/pub/userdata/
Bob_Smalley/CHARME/`



```
alpaca.ceri.memphis.edu501:> ftp ftp.iris.washington.edu
Connected to dmc.iris.washington.edu.
220 dmc1 FTP server ready.
Name (ftp.iris.washington.edu:rsmalley): anonymous
331 Guest login ok, send your complete e-mail address as password.
Password:
230-
230-          *** Welcome to the IRIS-DMC FTP Server ***
230-
230- This server is sponsored and run by the IRIS Consortium. Information
230- about your login and any transfers you do are logged on this host. If
230- you don't approve of this, you may disconnect now and no logging will
230- occur.
230-
230- Please contact inge@iris.washington.edu with any technical problems
230- you may have accessing this archive.
230-
230- You are currently user 17 of a maximum of 50 users. The local time
230- in Seattle WA is Thu Nov 10 06:19:59 2011.
230-
230- *** Please type "passive" (linux) or "epsv" (mac) after you log in ***
230- *** if you are having problems with active mode ftp ***
230-
230-
230 Guest login ok, access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> cd pub/userdata
250 CWD command successful.
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
-A0JorgeRoman
111
444
527365240
ANH
Aamer
Ahmet_Okeler
Alastair_Sloan
Alex_Copley
...
Blaine_Bockholt
Blessing
Blessing_Shumba
Bob_Smalley
Brandon_Schmandt
Brock_Alldredge
Burguis
CHA_SAI
```

Notice kinship to UNIX

Have to log in (username and password – will see special account anonymous later) so need an account on the machine with the ftp server.

cd – you can go anywhere you can go from terminal (except anonymous – more later).

ls

uses UNIX wildcards

Other FTP commands

`bin` – sets transfer
mode to binary

`ascii` – sets
transfer mode to ASCII

`get` – gets single file

```
ftp> cd Bob_Smalley
250 CWD command successful.
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
CHARME
226 Transfer complete.
8 bytes received in 0.0014 seconds (5.50 Kbytes/s)
ftp> cd CHARME
250 CWD command successful.
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
file001.CHARME.E2002-310_sgy.tar
file002.CHARME.E2002-311_sgy.tar
file003.CHARME.E2002-312_sgy.tar
file004.CHARME.E2002-313_sgy.tar
...
ftp> bin
200 Type set to I.
ftp> prompt
Interactive mode off.
ftp> mget file*
200 PORT command successful.
150 Opening BINARY mode data connection for file001.CHARME.E2002-310_sgy.tar (850944 bytes).
226 Transfer complete.
local: file001.CHARME.E2002-310_sgy.tar remote: file001.CHARME.E2002-310_sgy.tar
850944 bytes received in 2.3 seconds (367.16 Kbytes/s)
200 PORT command successful.
150 Opening BINARY mode data connection for file002.CHARME.E2002-311_sgy.tar (6393856 bytes).
```

...

Other FTP commands

`mget` – gets multiple files, uses wildcards

`prompt` – switches prompting off/on from `mget`. Have to do before `mget`.

```
ftp> cd Bob_Smalley
250 CWD command successful.
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
CHARME
226 Transfer complete.
8 bytes received in 0.0014 seconds (5.50 Kbytes/s)
ftp> cd CHARME
250 CWD command successful.
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
file001.CHARME.E2002-310_sgy.tar
file002.CHARME.E2002-311_sgy.tar
file003.CHARME.E2002-312_sgy.tar
file004.CHARME.E2002-313_sgy.tar
...
ftp> bin
200 Type set to I.
ftp> prompt
Interactive mode off.
ftp> mget file*
200 PORT command successful.
150 Opening BINARY mode data connection for file001.CHARME.E2002-310_sgy.tar (850944 bytes).
226 Transfer complete.
local: file001.CHARME.E2002-310_sgy.tar remote: file001.CHARME.E2002-310_sgy.tar
850944 bytes received in 2.3 seconds (367.16 Kbytes/s)
200 PORT command successful.
150 Opening BINARY mode data connection for file002.CHARME.E2002-311_sgy.tar (6393856 bytes).
```

...

Other FTP commands

`put / mput` ~ to upload data (you need write privileges).

`quit` ~ to quit

`^C` ~ stops action, still connected in FTP.

```
ftp> cd Bob_Smalley
250 CWD command successful.
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
CHARME
226 Transfer complete.
8 bytes received in 0.0014 seconds (5.50 Kbytes/s)
ftp> cd CHARME
250 CWD command successful.
ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
file001.CHARME.E2002-310_sgy.tar
file002.CHARME.E2002-311_sgy.tar
file003.CHARME.E2002-312_sgy.tar
file004.CHARME.E2002-313_sgy.tar
...
ftp> bin
200 Type set to I.
ftp> prompt
Interactive mode off.
ftp> mget file*
200 PORT command successful.
150 Opening BINARY mode data connection for file001.CHARME.E2002-310_sgy.tar (850944 bytes).
226 Transfer complete.
local: file001.CHARME.E2002-310_sgy.tar remote: file001.CHARME.E2002-310_sgy.tar
850944 bytes received in 2.3 seconds (367.16 Kbytes/s)
200 PORT command successful.
150 Opening BINARY mode data connection for file002.CHARME.E2002-311_sgy.tar (6393856 bytes).
```

...

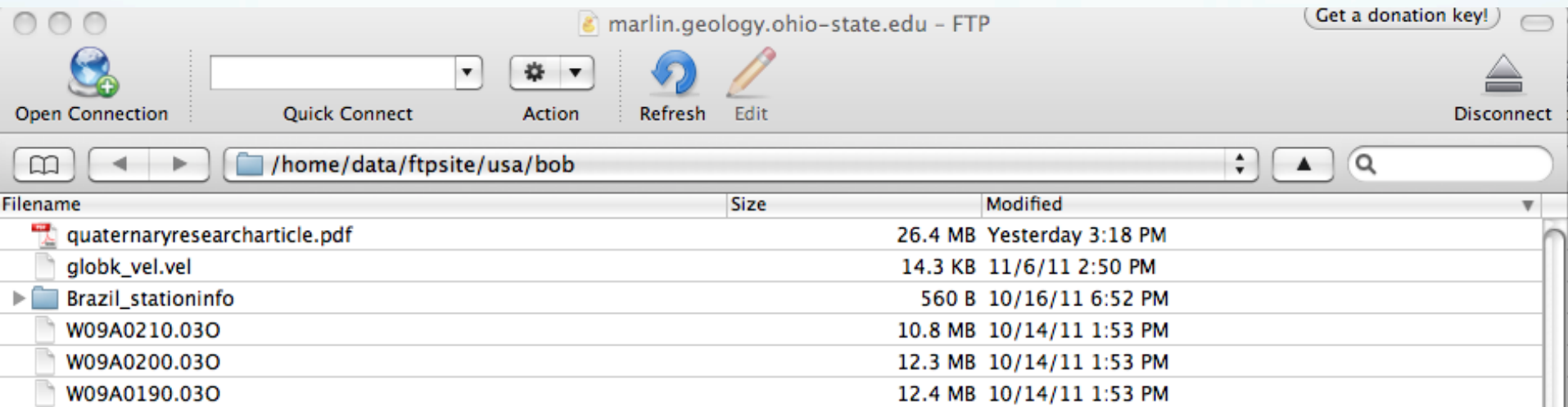
Unfortunately command line FTP will not navigate through subdirectories, it only works with regular files.

UNIX solution is to tar up the directory structure you want to FTP.

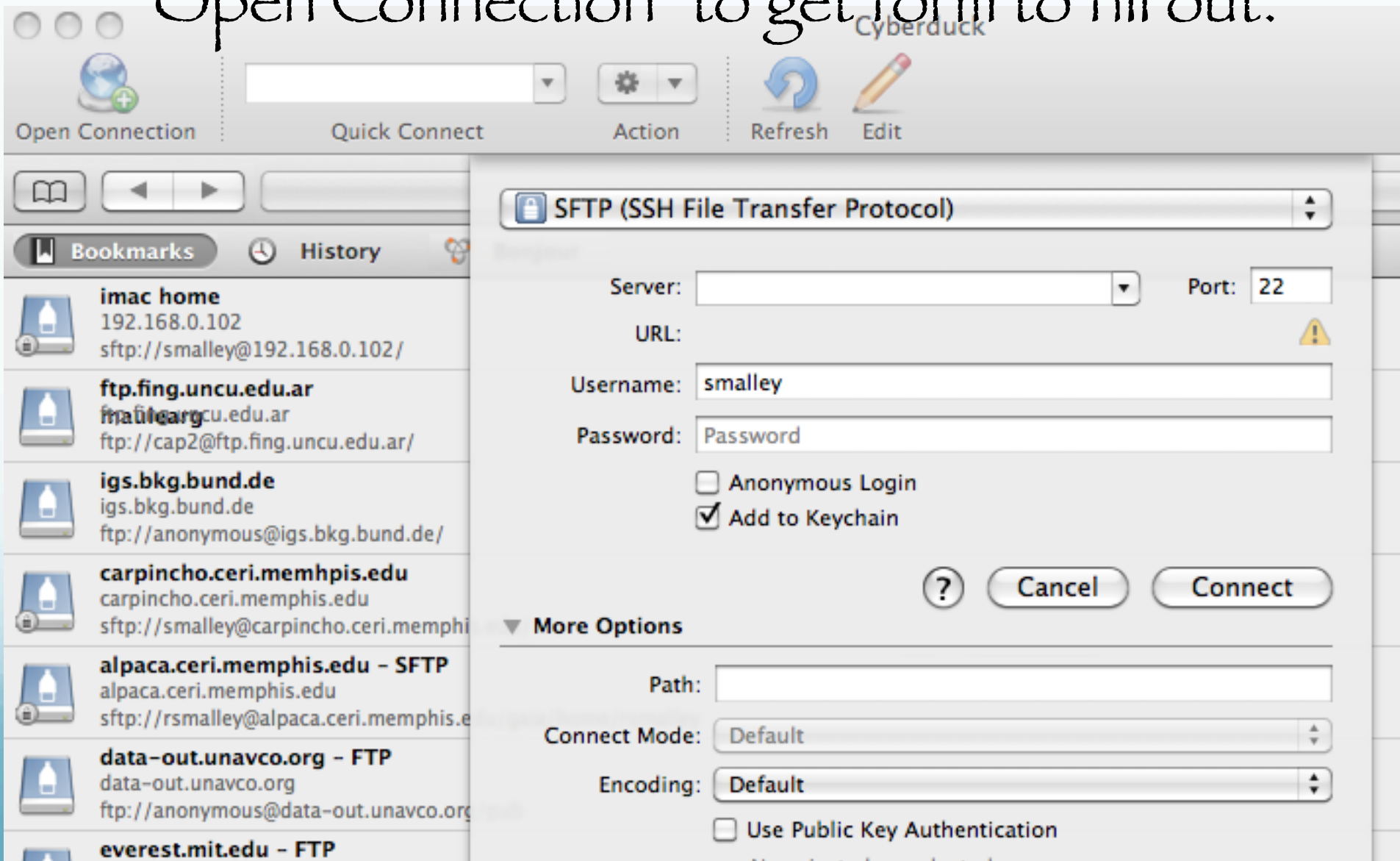
(assumes you have full user account/access to both machines).

On Mac and PC there are many FTP clients with GUI's with "drag and drop" capability and they navigate subdirectories.

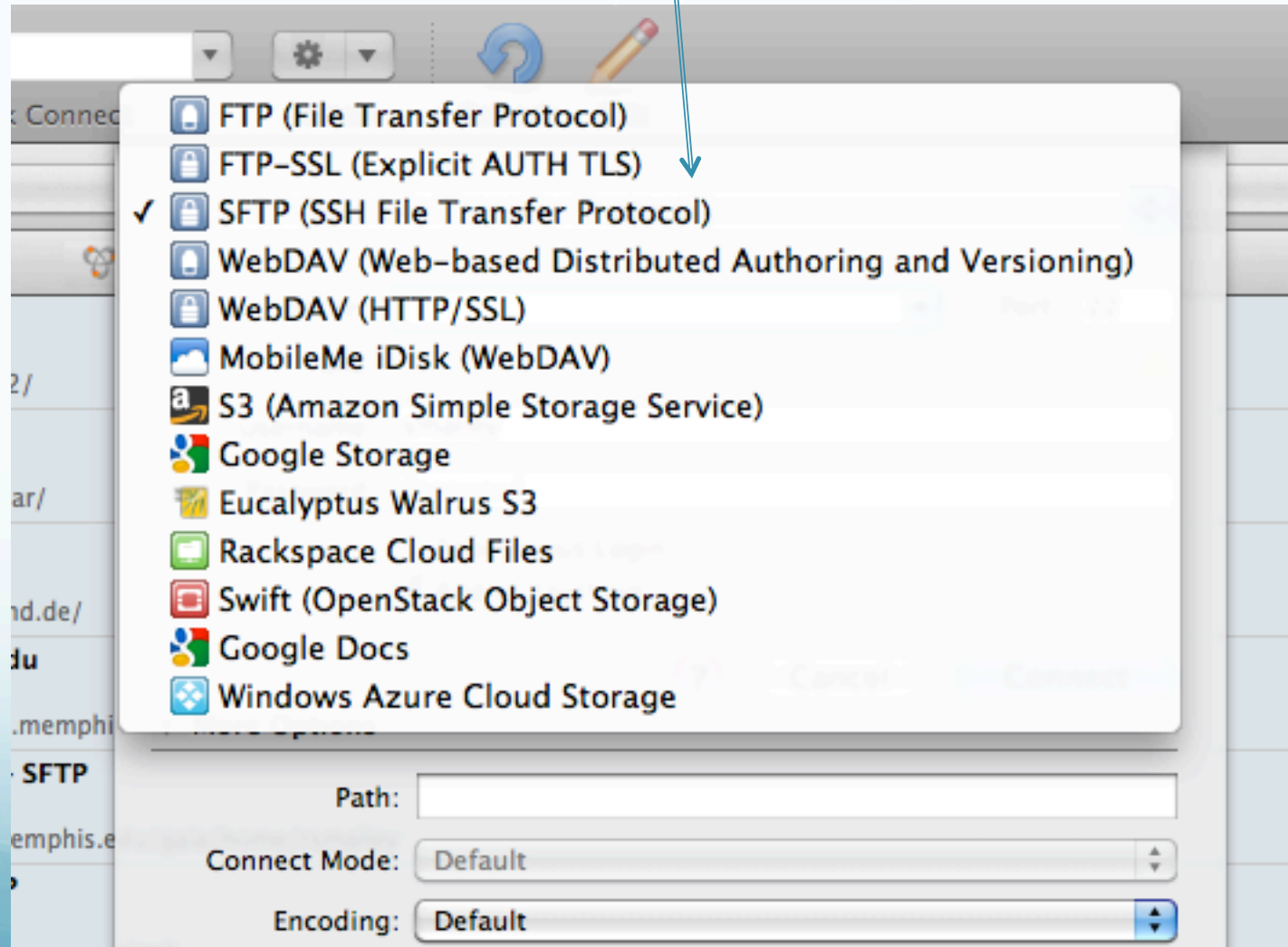
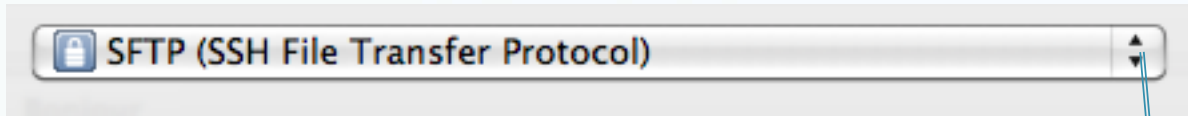
Here's an example from the Mac (Cyberduck) where the FTP program's window acts like a folder display - just drag stuff into/out of/around in it.



To connect – select "New Browser" under FILE menu and select saved server from list or click on "Open Connection" to get form to fill out.



Cyberduck supports multiple FTP protocols



Regular FTP, but not SFTP, has a feature called "anonymous FTP".

This lets the whole world have access to the data offered by the FTP server.

Username – anonymous

Password – your email (actually anything that "looks" like an email – has an @, etc., anonymous FTP does not check that it is a valid email).

anonymous account/access has to be set up by sysadmin.

Disk access by anonymous FTP is restricted

```
alpaca.ceri.memphis.edu505:> ftp ftp.ceri.memphis.edu
Connected to ftp.ceri.memphis.edu.
220 ProFTPD 1.2.10 Server (ftp.ceri.memphis.edu) [141.225.157.26]
Name (ftp.ceri.memphis.edu:rsmalley): anonymous
331 Anonymous login ok, send your complete email address as your password.
Password:
230-
```

```
#####
# # # # #
# # # # #
# #####
# # # # #
# # # # #
#####
```

Welcome to CERI's anonymous ftp server. If you've come here looking for files, try the download directory.

If you've come here to deposit files, try the upload directory.

```
230 Anonymous access granted, restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> ls
200 PORT command successful
150 Opening ASCII mode data connection for file list
download
upload
226 Transfer complete.
18 bytes received in 0.0021 seconds (8.46 Kbytes/s)
```

Some instructions
on how to use it.

ls works here

Can't see what is in upload directory (this is where anonymous users put files for someone on the host machine to pick up)

```
ftp> cd upload
250-
```

```
#####
# # # # #
# # # # #
# #####
# # # # #
# # # # #
#####
```

This is the anonymous ftp upload directory. You can leave files here for us to view. Please be advised that the files in the upload directory are not viewable to the general public.

more instructions.

If you would like to view the files in this directory, please look into enrolling in our graduate degree program at <http://www.ceri.memphis.edu/graduate>. ;-)

```
250 CWD command successful
ftp> ls
200 PORT command successful
450 No files found
ftp>
```

ls does not work here.
You can put stuff here.

You can see into the download directory - so you can find and download files.

```
ftp> cd ../download
250-
```

```
#####
# # # # #
# # # # #
# #####
# # # # #
# # # # #
#####
```

more instructions.

This is the anonymous ftp download directory. You can obtain files left here for you by us. The contents of this directory will change on a weekly basis so, if you see a file that you want, best to download it rather than wait. The file you desire might not be here on your next visit. Please be advised that the general public cannot deposit files in this directory.

If you would like to deposit files in this directory, please look into enrolling in our graduate degree program at <http://www.ceri.memphis.edu/graduate>. ;-)

```
250 CWD command successful
ftp> ls
200 PORT command successful
150 Opening ASCII mode data connection for file list
blytheville_nonlinear_exp
Stamps
car1630.10o
mwithers
```

Is works here.
You can get stuff
from here.

ls works here.
You can get stuff from here.

```
ftp> cd smalley
250 CWD command successful
ftp> ls
200 PORT command successful
150 Opening ASCII mode data connection for file list
arg_road.dat.Z
README
...
ftp>
```

Done with FTP/SFTP



SeismiQuery is a set of pre-formatted database queries that allow users to access data and information stored in the DMC Oracle database. The tools that make up SeismiQuery are categorized below:

Information queries	data holdings	request tools	help pages
Queries target the metadata tables.	Queries target the actual data holdings.	Links to request tools.	How to use SeismiQuery.

Below is the **hint bar** - roll over each tab to see a visual cue of each option. These hints are only available on this page - the bar acts as a normal navigation tool on all other pages.

	summaries	by station	by network	by timeseries	virtual nets	breq_fast		help
	channels	stations	responses	temp networks	assembled	events	comments	

↑ roll over each tab to see information about that query ↑
 click on the tab to go to that query page



Incorporated Research Institutions for Seismology

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Data Management Center

[Home](#)

[About IRIS](#)

[Data](#)

[Software](#)

[Instrumentation](#)

[Publications](#)

[DMC](#)

[Services](#)



Buffer of Uniform Data

[Home](#) » [Data](#) » [Request Methods](#)

BUD is the IRIS DMC's acronym for the online data cache from which we distribute our near-real time miniSEED data holdings prior to formal archiving.

- [BUD Web Interface](#)
- [Receiving BUD real time data](#)
- [BUD-data Mailing List](#)
- [Using BUD miniSEED data](#)
- [Getting a Dataless SEED File](#)
- [Data Available from BUD](#)
- [More about BUD Stat](#)

Thank you!

The Assembled Data Request has been sent.

[IRIS](#)

Not sure how long this will take or how big the data set is.

Breq_Fast requests

http://www.iris.edu/manuals/breq_fast.htm

Full interface to get anything in the IRIS DMC database.

Is an email based data request system.

Batch access to the IRIS DMC archive can be obtained by electronically mailing a specially formatted file to the IRIS DMC in Seattle.

These are BREQ_FAST files and provide a base level access to the DMC needed by any user.

These requests are not interactive in that you simply send the `breq_fast` file to the DMC and the DMC will return either full SEED data file or a dataless SEED file matching the request depending on where the e-mail was sent.

For users that do not have access to electronic mail facilities, the IRIS DMC will process tapes containing images of `BREQ_FAST` files in simple ASCII format.

FILE FORMAT

The format of the file is as follows:

```
.NAME
.INST
.MAIL
.EMAIL
.PHONE
.FAX
.MEDIA:
.ALTERNATE MEDIA:
.ALTERNATE MEDIA:
.LABEL
.SOURCE      ---
.HYPO        | optional
.MAGNITUDE   ---
.QUALITY
.END
request line-1
request line-2
.
.
.
request line-n
```

!!!BE SURE TO LEFT JUSTIFY EACH TOKEN LINE OR YOUR REQUEST COULD BE REJECTED.!!!

The format of each line is as follows:

```
                STARTING TIME                ENDING TIME
STA NN YYYY MM DD HH MM SS.TTTT  YYYY MM DD HH MM SS.TTTT
#_CH CH1 CH2 CHn LI
```

where:

STA is the station

NN is the network code or "virtual network"

YYYY is the year - 2 digit entries will be rejected!

MM is the month

DD is the day

HH is the hour

MM is the minute

SS.TTTT is the second and ten-thousandths of seconds

#_CH is the number of channel designators in the immediately following list

CHn is a channel designator that can contain wildcards

LI is location identifier (optional)

(See the DMS Electronic Newsletter article "Location Identifiers"

for more information about how these identifiers are used.)

EXAMPLE

An example of a valid short BREQ_FAST file:

```
.NAME Joe Seismologist
.INST Podunk University
.MAIL 101 Fast Lane, Middletown, KS 89432
.EMAIL joe@podunk.edu
.PHONE 555 555-1212
.FAX 555 555-1213
.MEDIA DVD
.ALTERNATE MEDIA 1/2" tape - 6250
.ALTERNATE MEDIA EXABYTE
.LABEL Joe's FIRST Request
.SOURCE ~NEIC PDE~Jan 1990 PDE~National Earthquake Information Center - USGS
```

DOI~

```
.HYPO ~1999 01 02 20 21 32.62~ 13.408~ 144.439~135.0~18~216~Mariana Islands~
.MAGNITUDE ~5.7~mb~
.QUALITY B
.END
```

```
GRFO IU 1999 01 02 00 18 10.4 1999 01 02 00 20 10.4 1 SHZ
ANTO IU 1999 01 02 02 10 36.6 1999 01 02 02 12 36.6 1 SH?
AFI IU 1999 01 02 02 10 37.1 1999 01 02 02 12 37.1 1 BH? 00
SEE CD 1999 01 02 14 45 08.9 1999 01 02 14 47 08.9 1 SHZ
CASY IU 1999 01 04 02 42 13.4 1999 01 04 02 44 13.4 1 BHZ 10
NNA II 1999 01 04 02 41 57.5 1999 01 04 02 43 57.5 1 BHZ
PFO TS 1999 01 04 02 41 57.5 1999 01 04 02 43 57.5 1 BHZ
PFO II 1999 01 04 02 41 57.5 1999 01 04 02 43 57.5 1 BHZ
KMI CD 1999 01 04 02 41 57.5 1999 01 04 02 43 57.5 1 BHZ
SSE CD 1999 01 04 02 18 25.4 1999 01 04 02 20 25.4 2 B?? SHZ
PAS TS 1999 1 4 2 10 49 1999 1 4 2 12 49 3 BH? SHZ L??
```

SUBMITTING YOUR REQUESTS

Once you have generated your BREQ_FAST file you can simply send it via email to either:

breq - for full SEED

or

dataless - for dataless SEED*

or

breq - for miniSEED

or

breq - for sync file

If you need lots of data you have to spam IRIS. Shell script to generate Breq_Fast files.

```
#!/bin/sh
#run "mk_breq_fast.sh ROOT YEAR STARTDOY ENDDOY", then after dmc makes files use
#"dmc_ftp.sh ROOT YEAR" to get files

#make breakfast files and submit to dmc
ENDDOY=$4
STARTDOY=`expr $3 - 1`
DOY=$STARTDOY
YEAR=$2
ROOT=$1

stnlst='AMER AREN BARD CONS ELBO FCH HEDI HUER HURT JUAN LENA LITI LLAN MAUL NEGR NIEB PACH PENA PICH RAFA RINC SJAV USPA'
while [ $DOY -lt $ENDDOY ]
do
  DOY=`expr $DOY + 1`
  OUTPUT=${ROOT}-${YEAR}-${DOY}
  ymd=`ymd2ydoy $YEAR $DOY`
  echo $YEAR, DOY $DOY, $mdy, $OUTPUT
  echo .NAME Bob Smalley > $OUTPUT
  echo .INST CERI/UofMemphis >> $OUTPUT
  echo .MAIL 3876 Central Ave, Ste. 1, Memphis, TN >> $OUTPUT
  echo .EMAIL rsmalley@memphis.edu >> $OUTPUT
  echo .PHONE 901-678-4929 >> $OUTPUT
  echo .FAX 901-678-4734 >> $OUTPUT
  echo .MEDIA: ftp >> $OUTPUT
  echo .LABEL $OUTPUT >> $OUTPUT
  echo .END >> $OUTPUT
  for stn in $stnlst
  do
    echo $stn YC $ymd 00 00 00.0 $ymd 23 59 59.0 1 BHN 01 >> $OUTPUT
    echo $stn YC $ymd 00 00 00.0 $ymd 23 59 59.0 1 BHE 01 >> $OUTPUT
    echo $stn YC $ymd 00 00 00.0 $ymd 23 59 59.0 1 BH2 01 >> $OUTPUT
    echo $stn YC $ymd 00 00 00.0 $ymd 23 59 59.0 1 BH3 01 >> $OUTPUT
  #use wildcard to take care of BH2 and BH3 in place of BHN and BH3
  # echo $stn YC $ymd 00 00 00.0 $ymd 23 59 59.0 1 BH? >> $OUTPUT
  done
  cat $OUTPUT | mailx -v -s "BREAK_FAST" breq\_fast@iris.washington.edu
# cat $OUTPUT | mailx -v -s "BREAK_FAST" bob@smalleys.org
done
```

Done with IRIS DMC

Returning to example using data from the Maule
earthquake.

Convert SEED file obtained from IRIS DMC to a SAC file using rdseed.

```
Robert-Smalley-MacBook-Pro:~$ cd /Users/robert-smalley/sac_sample_data/520 $ rdseed
<< IRIS SEED Reader, Release 4.7.5 >>
Input File (/dev/nrst0) or 'Quit' to Exit: maule.seed
Output File (stdout)      :
Volume # [(1)-N]        :
Options [acCsSpRtde]    : d
Summary file (None)     :
Station List (ALL)      :
Channel List (ALL)      :
Network List (ALL)      :
Loc Ids (ALL ["--" for spaces]) :
Output Format [(1=SAC), 2=AH, 3=CSS, 4=mini seed, 5=seed, 6=sac ascii, 7=SEGY] : 1
Output file names include endtime? [Y/(N)]
Output poles & zeroes ? [Y/(N)]y
Check Reversal [(0=No), 1=Dip.Azimuth, 2=Gain, 3=Both]:
Select Data Type [(E=Everything), D=Data of Undetermined State, R=Raw waveform Data, Q=QC'd data] :
Start Time(s) YYYY,DDD,HH:MM:SS.FFFF :
End Time(s)   YYYY,DDD,HH:MM:SS.FFFF :
Sample Buffer Length [2000000]:
Extract Responses [Y/(N)]      : y
Writing TA.035Z..BHE, 79494 samples (binary), starting 2010,058 06:41:50.2750 UT
Writing TA.035Z..BHN, 79511 samples (binary), starting 2010,058 06:41:50.1500 UT
...
Input File (/dev/nrst0) or 'Quit' to Exit: Quit
Robert-Smalley-MacBook-Pro:~$ cd /Users/robert-smalley/sac_sample_data/521 $ ls
```



```
Robert-Smalley-MacBook-Pro:~$ cd /Users/robertsmalley/Projects/sac_sample_data; ls
```

```
2010.058.06.41.47.2750.TA.035Z..BHZ.R.SAC
2010.058.06.41.50.1500.TA.035Z..BHN.R.SAC
2010.058.06.41.50.2750.TA.035Z..BHE.R.SAC
2010.058.06.41.58.6750.TA.735A..BHN.R.SAC
2010.058.06.42.00.2000.TA.735A..BHE.R.SAC
2010.058.06.42.04.9000.TA.735A..BHZ.R.SAC
2010.058.06.42.09.8250.TA.239A..BHZ.R.SAC
2010.058.06.42.16.1750.TA.239A..BHN.R.SAC
2010.058.06.42.16.3500.TA.239A..BHE.R.SAC
2010.058.06.42.20.1250.TA.Z35A..BHN.R.SAC
2010.058.06.42.20.9750.TA.Z35A..BHE.R.SAC
2010.058.06.42.23.5000.TA.Z35A..BHZ.R.SAC
2010.058.06.42.30.9750.TA.TUL1..BHN.R.SAC
2010.058.06.42.36.6000.TA.TUL1..BHE.R.SAC
2010.058.06.42.38.9500.TA.TUL1..BHZ.R.SAC
2010.058.06.42.39.8000.TA.V27A..BHE.R.SAC
2010.058.06.42.47.9500.TA.V27A..BHZ.R.SAC
2010.058.06.42.50.0250.TA.V27A..BHN.R.SAC
2010.058.06.42.54.5250.TA.W18A..BHN.R.SAC
2010.058.06.42.55.9000.TA.W18A..BHZ.R.SAC
2010.058.06.43.01.0250.TA.W18A..BHE.R.SAC
2010.058.06.43.06.4750.TA.M31A..BHZ.R.SAC
2010.058.06.43.07.0000.TA.M31A..BHN.R.SAC
```

```
RESP.TA.J30A..BHE
RESP.TA.J30A..BHN
RESP.TA.J30A..BHZ
RESP.TA.L02D..BHE
RESP.TA.L02D..BHN
RESP.TA.L02D..BHZ
RESP.TA.M31A..BHE
RESP.TA.M31A..BHN
RESP.TA.M31A..BHZ
RESP.TA.TUL1..BHE
RESP.TA.TUL1..BHN
RESP.TA.TUL1..BHZ
RESP.TA.V27A..BHE
RESP.TA.V27A..BHN
RESP.TA.V27A..BHZ
RESP.TA.W18A..BHE
RESP.TA.W18A..BHN
RESP.TA.W18A..BHZ
RESP.TA.Z35A..BHE
RESP.TA.Z35A..BHN
RESP.TA.Z35A..BHZ
SAC_PZs_TA_035Z_BHE__2010.009.00.00.00.0000_99999.9999.24.60.60.99999
SAC_PZs_TA_035Z_BHN__2010.009.00.00.00.0000_99999.9999.24.60.60.99999
```

The names are a bit unwieldy (but leave for now)

Robert-Smalley-MacBook-Pro:-bash:sac_sample_data:522 \$ sac

SEISMIC ANALYSIS CODE [07/29/2009 (Version 101.3)]

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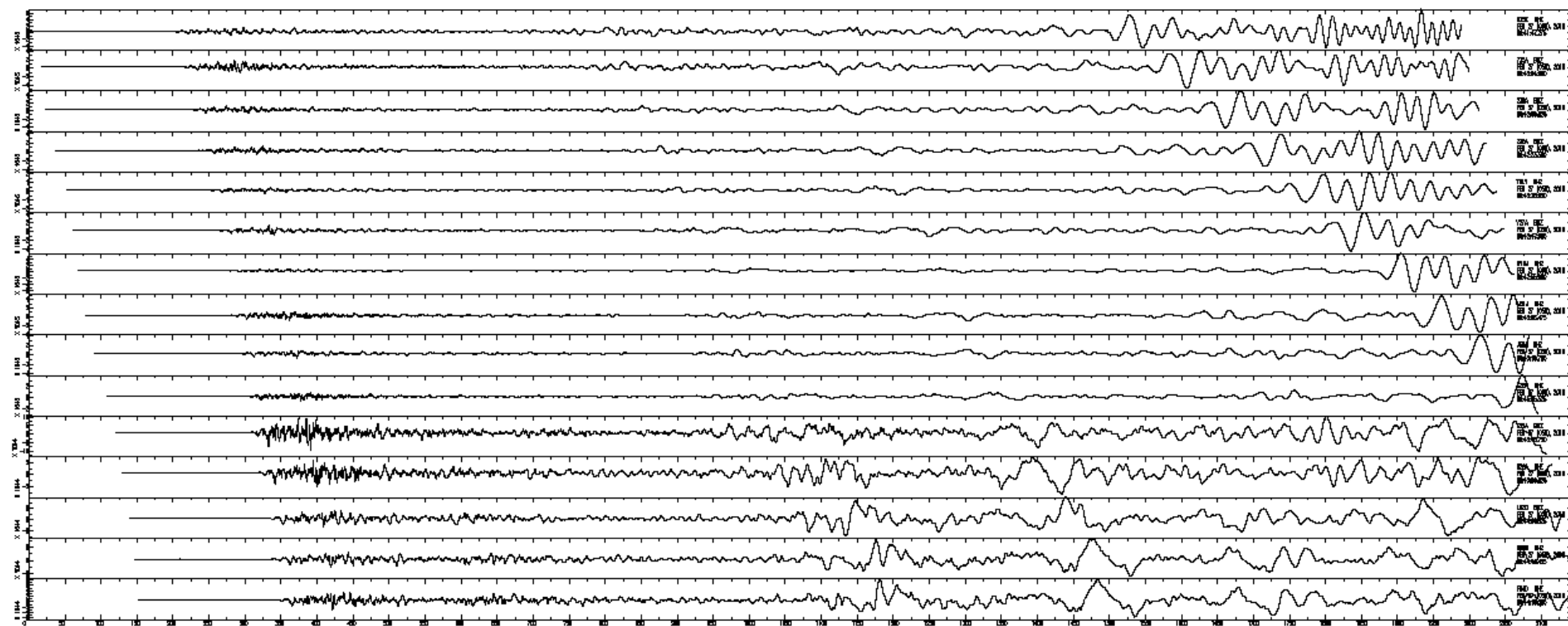
SAC> read *BHZ*SAC

SAC> read *BHZ*SAC

2010.058.06.41.47.2750.TA.035Z..BHZ.R.SAC 2010.058.06.42.04.9000.TA.735A..BHZ.R.SAC
2010.058.06.42.09.8250.TA.239A..BHZ.R.SAC 2010.058.06.42.23.5000.TA.Z35A..BHZ.R.SAC
2010.058.06.42.38.9500.TA.TUL1..BHZ.R.SAC 2010.058.06.42.47.9500.TA.V27A..BHZ.R.SAC
2010.058.06.42.55.9000.TA.W18A..BHZ.R.SAC 2010.058.06.43.06.4750.TA.M31A..BHZ.R.SAC
2010.058.06.43.18.7500.TA.J30A..BHZ.R.SAC 2010.058.06.43.35.5250.TA.G28A..BHZ.R.SAC
2010.058.06.43.48.7500.TA.E25A..BHZ.R.SAC 2010.058.06.43.56.8250.TA.D20A..BHZ.R.SAC
2010.058.06.44.06.8250.TA.L02D..BHZ.R.SAC 2010.058.06.44.14.4250.TA.G03D..BHZ.R.SAC
2010.058.06.44.19.3000.TA.F04D..BHZ.R.SAC

SAC> qdp off

SAC> p1



In SAC

read

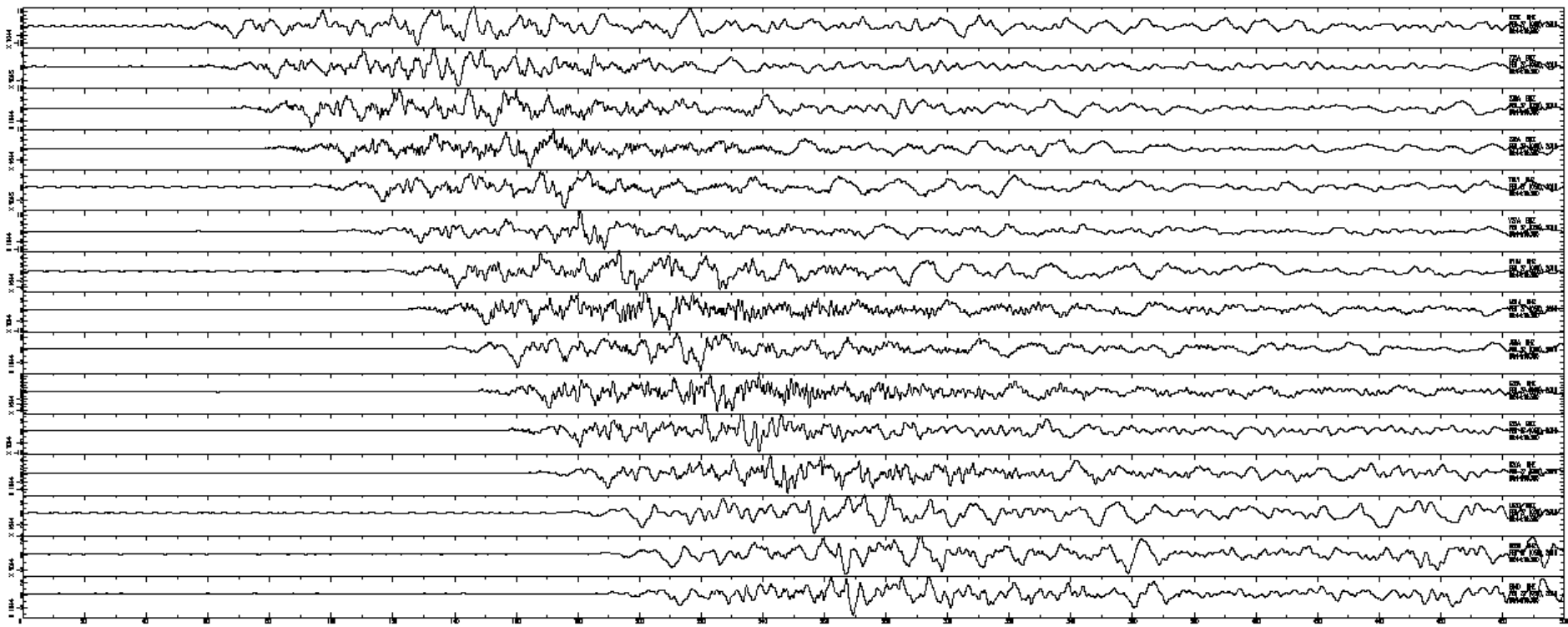
synch

write headers (now the headers in the disk files are compatible)

cut (is with respect to time zero after the synch)

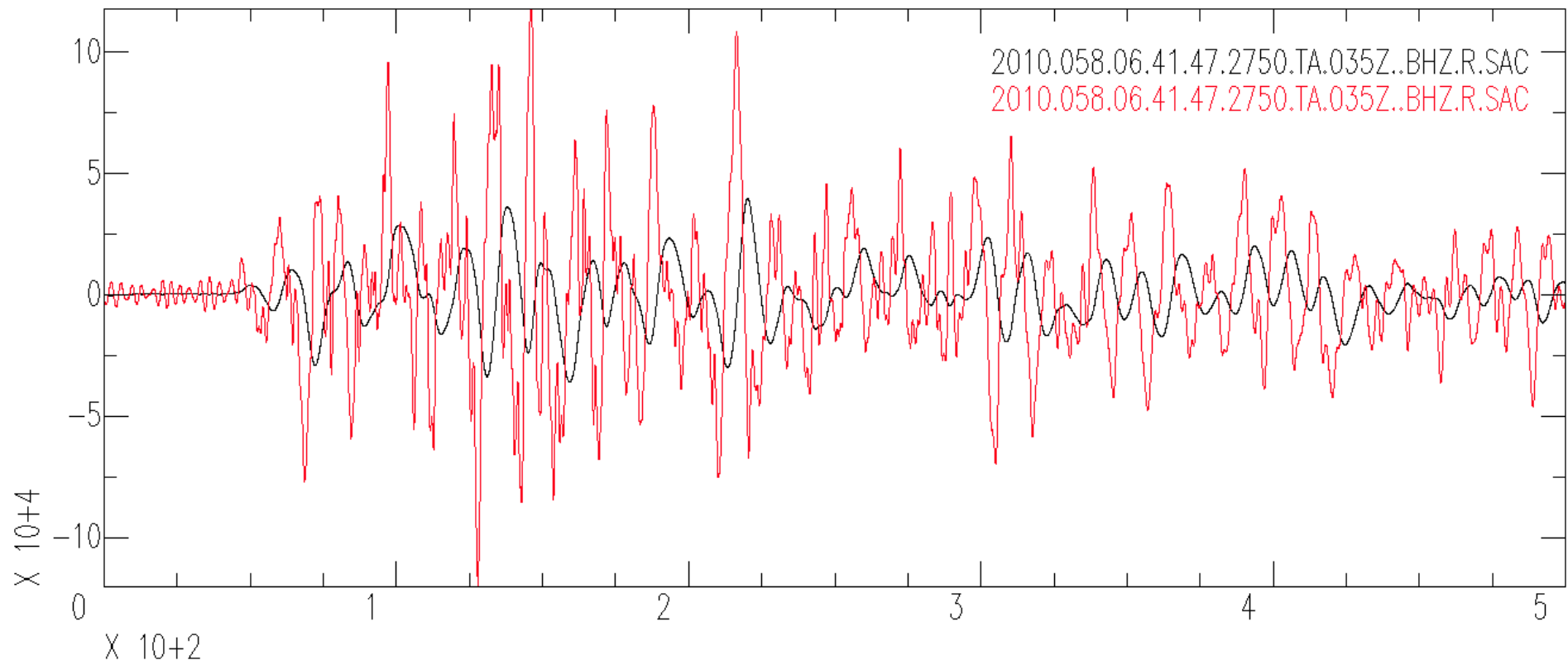
read again

xlim (to zoom in on beginning)



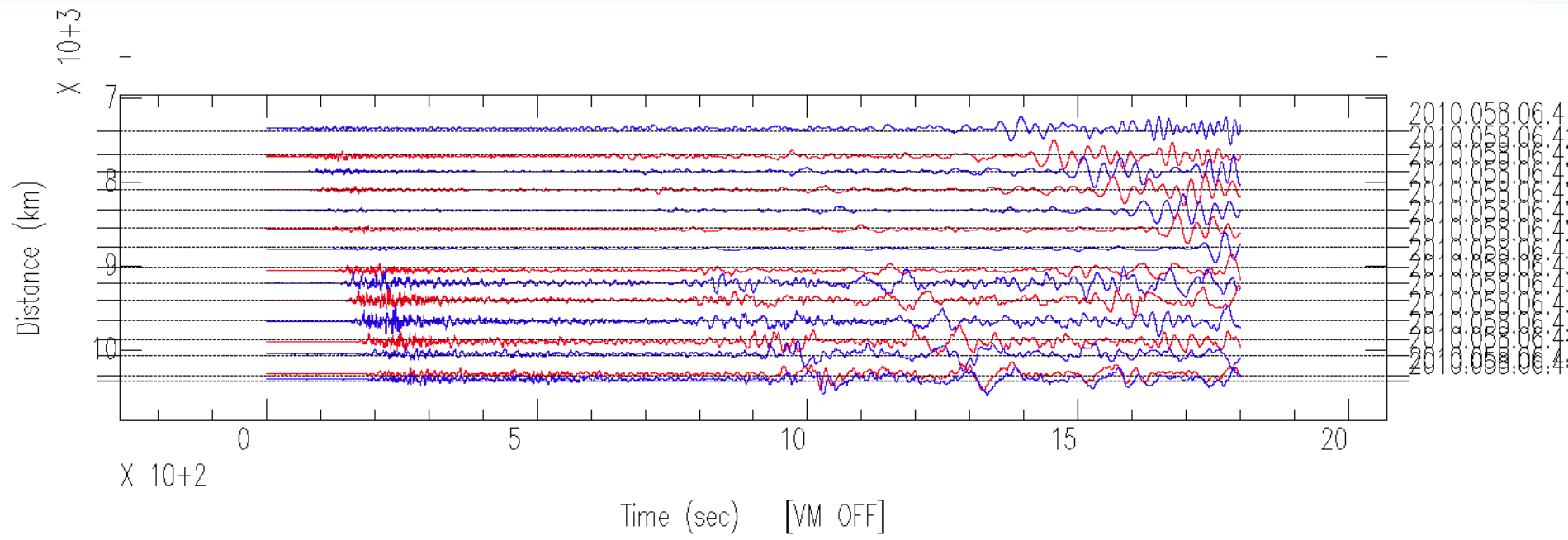
In SAC

low pass filter
reread
color on increment on
plot2



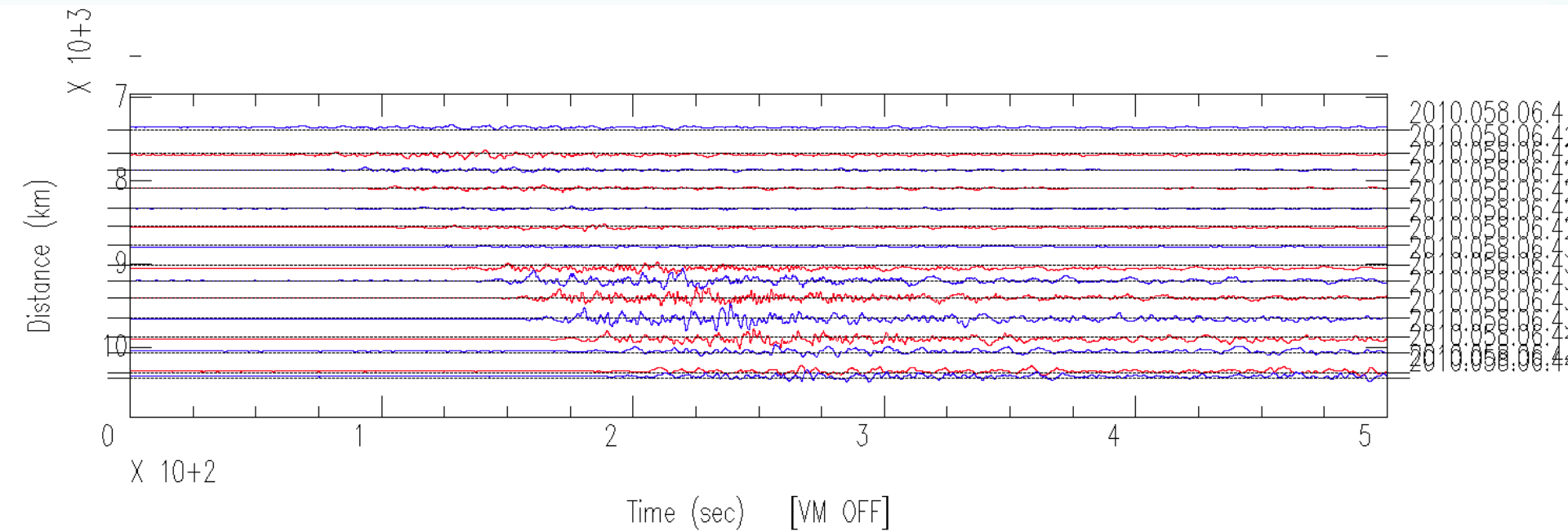
Signal Stacking Subprocess

plotrecordsection



Signal Stacking Subprocess

timewindow (not xlim)



Signal Stacking Subprocess

Record section with reduction velocity

