

spcsac Manual

Last updated: May 20, 2023

1 Introduction

‘spcsac’ is a tool to transform frequency spectrum in an spc ascii format, computed by the DSM software (tish and tipsv), into time domain data in a SAC binary format. It can be downloaded from <https://github.com/UT-GlobalSeismology/DSMsynTI-mpi>. You must prepare spc files computed by the DSM software in order to use ‘spcsac.’ No filter or taper is applied. You should filter appropriately in the time domain.

2 Installation

After downloading, you should change the CC and CFLAGS in the makefile to fit your environment. Then, compile:

```
% setenv SACDIR where_you_installed_SAC (e.g. /usr/local/sac)
% cd spcsac
% make
```

You can install this anywhere; if you will be a frequent DSM user, you should set the spcsac directory in PATH.

3 Usage

3.1 LSMOOTH determination

In order to obtain seismograms whose sampling frequency is as you expect, you have to choose the parameter LSMOOTH. You can evaluate LSMOOTH as follows:

```
% spcsac -i
This is LSMOOTH finder.
Which spc file? YOUR_SPC_FILE
How much do you expect as the sampling frequency? (in Hz) 20
You should set lsmooth as 32
You can realize this by putting -l option
e.g. % spcsac -l 32
```

3.2 With no option

If you execute ‘spcsac’ in a certain directory that has “ABC.SH.spc” and “ABC.PSV.spc”, with no options, you will get “ABC.Rs”, “ABC.Ts”, and “ABC.Zs” with a parameter LSMOOTH=4. ‘spcsac’ will find pairs of SH and PSV spc files (named *.SH.spc and *.PSV.spc) and transform them into complete seismograms. You can change this behavior by adding options (see below).

3.3 Command line mode

‘spcsac’ has many options, so that various kinds of requests will be available. You can briefly check the meanings of each option by:

```
% spcsac -h
```

Details of some of the options are described below.

-v

Display the version of the software.

-h

Display the help message. You can briefly understand how the options work.

-e

If you hesitate to work in command line mode, spcsac provides you with prompt mode. See the next subsection.

-l LSMOOTH

The smoothness parameter LSMOOTH can be changed from the default value 4. In practice, you have to change it so that you obtain seismograms with the sampling frequency you expected. LSMOOTH can be calculated with spcsac. See the previous subsection.

-i

The smoothness parameter LSMOOTH can be evaluated if you put your spc file name and the sampling frequency you are expecting. You can do this in prompt mode. More details are available in the previous subsection.

-d DIRECTORY

All spcfiles in DIRECTORY will be transformed. Default value is “./” (current directory).

-f FILE

If you want to transform one specified spc file only, you can type “spcsac -f ABC.spc”. As a default setting, you will obtain “tmpsac.Rs”, “tmpsac.Ts”, and “tmpsac.Zs”. You can change the output sac files’ names with the “-r/-t/-z” option. You can change components of the output sac files with the “-c” option. For example, if you type “spcsac -f ABC.spc -c ZR -z ABC.SH.Z.sac -r ABC.SH.R.sac”, you will obtain two sac files “ABC.SH.Z.sac” and “ABC.SH.R.sac”.

-p/-s STRINGS

Sets the suffixes that the input SH and PSV spc files shall have. Default settings are “.SH.spc” and “.PSV.spc” for SH and PSV spc files, respectively. You can change them like “spcsac -p psv.spc”. This is not valid when used along with the “-f” option.

-c RTZ

You can choose which component is to be transformed. By default, `spcsac` will transform all components (R for radial, T for transverse, Z for vertical), but sac files occupy large amounts of bytes, so if you would like to look at some specific component of seismograms only, this option will be helpful. You can use this like “`spcsac -c TZ`” in order to obtain only the transverse and vertical components. The order of R, T, and Z is arbitrary.

-m MODE

Using this option, you can choose to use only one of either the SH or the PSV modes, as “`spcsac -m SH`” or “`spcsac -m PSV`”. This is not valid when used along with the “-f” option.

-r/-t/-z STRINGS

Sets the suffixes of the radial/transverse/vertical component output SAC files. By default, they are “.Rs”, “.Ts”, and “.Zs”. If you type “`spcsac -c R -r radial.sac`” for “ABC.SH.spc” and “ABC.PSV.spc”, you will obtain “ABCradiial.sac”. This is not valid when used along with the “-f” option.

3.4 User prompt mode

‘`spcsac`’ will help you out with prompt mode. You can just type

```
% spcsac -e
```

then you will be asked questions. You can do anything that can be done

with the command line mode. When there is a question that you do not care (when you do not have to consider it or if you agree with the default value), just press “\” (backslash) to skip the question.