UNITED STATES DEPARTMENT OF THE INTERIOR

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User's Guide to SELECT, an Interactive VAX Computer Program for Building Subsets of Earthquake Summary Data

by
Fred W. Klein

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INTRODUCTION

One of the end products of seismic network data analysis is a summary computer file with one record per earthquake. This SELECT program reads these summary files and produces similar files for which events meet limiting criteria of location, depth, time, magnitude, etc. SELECT reads files sequentially, and thus must read every record to find the desired events. It is not a data base system optimized for fast retrieval, but makes no requirements of file structure or pre-indexed data.

SELECT features multiple input files (which are read sequentially) and multiple output files (which contain certain time periods in chronological order). Epicenter selection can be done by three methods: 1) by a latitude-longitude box, 2) by containment within a convex polygon whose verticies are specified, and 3) by one or more predefined regions or earthquake classes. Further selection can be by depth, time, amplitude and/or duration magnitude, location error, RMS travel time residual, and number of first motions. Selection or rejection can also be done on the presence of one or more 1-3 letter remarks at 1 or 2 preset places on the data records.

SELECT is command driven. Commands are 3-letters. If a command sets parameters or names, these may follow the command on the same line. If the parameters are not supplied, SELECT will prompt for them, allowing you to see and default to the current values. Default values are set for all parameters, and you need issue commands only for the parameters you want to change. Parameters supplied on a command line are in free-format: parameters are separated by spaces or commas, and names or character strings must be enclosed within apostrophes. For example, the input file is set by a command like FIL 'INFILE.SUM'. Complete rules for free-format input are given in appendix A.

All commands fall into three general types: 1) Most commands define parameters to be used for a subsequent selection; 2) The command "SEL" takes no arguments, and runs a selection on data using the parameters currently set; 3) A few commands invoke conveniences, like getting help with a list of command names, listing current file names and selection criteria, saving all parameters in a control file for future use, and issuing operating system (DCL) commands from within SELECT.

Commands may be executed either by typing them in (with or without supplying parameters on the command line), or by executing them from a disk file. The commands in a control file are executed as if they were typed. If they have parameters, the file executes by itself. If the commands in a command file do not have parameters, SELECT prompts and waits for you to input the parameters.

On the Menlo Park VAX, put this line in your LOGIN.COM file:

```
$ SELECT :== RUN WE:[KLEIN]SELECT.EXE
```

and run the program by typing SELECT.

SOME SIMPLE EXAMPLES

```
1) FIL 'INPUT.SUM'                  Set the input file name.
   OUT 'OUTPUT.SUM'                 Set the output file name.
   LAT 19 0  19 30                  Set min & max latitude.
   LON 154 50  155 20               Set min & max longitude.
   DEP 5  13                        Set depth range.
   SEL                              Select earthquakes.


2) FIL 'INPUT.SUM'                  Set input file.
   OUT 'OUTPUT.SUM'                 Set output file.
   REG 'B'  'VERTICIES.DAT'         Read the verticies of a convex
                                    polygon labelled "B" from the file
                                    VERTICIES.DAT.
   ERH 5                            Set max horizontal error to 5 km.
   SEL                              Select earthquakes.


3) FIL 'INPUT.SUM'                  Set input file.
   OUT 'MAG2.SUM'                   Set output file.
   MAG 2 9                          Set magnitude range.
   SEL                              Select earthquakes M>=2.0.
   OUT 'MAG3.SUM'                   Set new output file.
   MAG 3 9                          Set new magnitude range.
   SEL                              Select earthquakes M>=3.0.
```

(The second select was done on INPUT.SUM, but the program would have run a bit faster if we had defined MAG2.SUM as a new input file for the second select.)

```
4) FIL '1982.SUM'                   Set first input file.
   IFL 2 '1983.SUM'                 Set second input file.
   IFL 3 '1984.SUM'                 Set third input file.
   OUT 'PERIOD1.SUM'                Set first output file (no beg. date).
   OFL 'PERIOD2.SUM' 82 12 2 0 0    2nd output file & its beginning date.
   OFL 'PERIOD3.SUM' 83 5 6 12 0    3rd output file & its beginning date.
   SEL                              Read 3 files sequentially and split
                                    the data into 3 output files which
                                    begin at different times. A file ends
                                    where the next one begins.
```

EXPLANATION OF COMMANDS
(The examples show the default values)

INPUT FILES AND DATA FORMAT ----------

FIL Set the input file name. This will be the only input file, or the first of a sequence if others are set with the IFL command.
Example: FIL 'IN.SUM'

IFL Set the number and name of the second or later input file. The number must be in the range 2-30.
Example: IFL 2 'FILE2.' (But the default is for only one input file)

SEQ Set a whole sequence of input files to be of the form n.SUM where n is an integer. A maximum of 30 files can be set at once.
Example: SEQ 1980 1982 sets 3 input files to 1980.SUM, 1981.SUM, and 1982.SUM.

FOR Set the summary format type. Use 1 for HYPOINVERSE, 2 for HYPO71.
Example: FOR 1

LIS List the current input files at your terminal.

OUTPUT FILES ----------

OUT Set the output file name. This will be the only output file, or the first of a sequence if others are set with the OFL command.
Example: OUT 'OUT.SUM'

OFL Set second or later output file, and the date on which output to it will begin. The OFL commands can be given in any order, and are automatically arranged chronologically by the dates given. The first output file must be set with the OUT command, and receives any data before the beginning date of the second output file. All input data must be in chronological order. Dates are of the form year, month, day, hour & minute. There is a maximum of 30 output files.
Example: OFL 'OUT2.SUM' 82 6 1 12 30 (But the default is only one output file).

CUT Remove an output file from the list by giving its name.
Example: CUT 'OUT2.SUM'

KIL Cancel entire list of output files except the first.

SEE Display the output files and their beginning dates on your terminal.

GEOGRAPHIC SELECTION CRITERIA ----------

Geographic boundaries may be set in either of two ways. Simple latitude and longitude limits may be set with the LAT and LON commands, or the verticies of a convex polygon set with the REG command. Only one of these two methods can be used at any one time, which is determined by which type of command was given most recently. The startup default is for no geographic selection.

Separately from and in addition to the two possibilities above is geographic selection by earthquake class number. This requires that a set of geographic classes for a particular network be preprogrammed into SELECT. Class and LAT-LON/polygon selection operate independently: an event is selected if it is both in a requested class and within the specified box or polygon.

LAT Set minimum and maximum latitude, each in degrees and minutes.
Example: LAT -90 0 90 0

LON Set minimum and maximum longitude, each in degrees and minutes.
Example: LON -180 0 180 0

REG Set the 1-letter label and filename in which to read the verticies of a convex polygon. An earthquake will be selected if it is within the polygon. Vertex files can be easily digitized by the QPLOT program using its CURS command. Several rules must be followed by the vertex file:

1) Several polygons may be in each file, but each polygon must have a unique 1-letter label. Each vertex must be labelled.
2) The format of the file is one vertex per line, with 1-letter polygon label, lat (deg & min) and lon (deg & min) in (A1, 4X, I2, 1X, F5.2, 1X, I3, 1X, F5.2) format.
3) The polygon must be convex (interior angles less than 180°).
4) The verticies must be specified in counter-clockwise order, so that the interior is to the left as one traces along the perimeter.
5) The last vertex specified is assumed identical to the first, thus N+1 points specify an N sided polygon. The last point is redundant, but must be present.
6) The polygon can have no more than 14 verticies.

NET Network number for determining earthquake classes (see below). The net number is not used unless classes are being selected. The nets with defined classes at present are 1=Hawaii, 2=Long Valley.
Example: NET 1

CLS Number of earthquake classes to select, and list of class numbers. The classes must be predefined by program statements within SELECT, (see the NET command) and are determined by latitude, longitude and depth. If several classes are listed, an event is selected if it is in any one of the classes. Specifying 0 for number of classes selects all events.
Example: CLS 0 (the default), or CLS 3 1 2 3

MISCELLANEOUS SELECTION CRITERIA ----------

ERH Set maximum horizontal error.
Example: ERH 100

ERZ Set maximum vertical error.
Example: ERZ 100

MAG Set minimum and maximum magnitude.
Example: MAG 0 9

TYP Set type of magnitude to select on (HYPOINVERSE only). The codes are:
1=average of amplitude & duration mags; 2=duration mag;
3=amplitude mag; 4=greater of amplitude or duration mag.
Magnitudes of 0 are treated as missing mags and are not averaged.
Example: TYP 1

DAT Set beginning date and ending date, both in (Y, M, D, H, MIN).
Either or both years can be set to 0 not to use a date cutoff.
Example: DAT 0 0 0 0 0 0 0 0 0 0 0 (the default), or
DAT 82 1 1 0 0 83 2 6 14 55

DEP Set minimum and maximum depth.
Example: DEP 0 999

RMS Set maximum RMS travel time residual.
Example: RMS 100

NFM Set minimum number of first motions reported (HYPOINVERSE only).
Example: NFM 0

RAN Set flag to select on a user-defined real-number field (T or F).
Also give format for reading, and the min & max values.
Example: RAN F (the default) or RAN T '(T81,F4.2)' 0 5

COMMANDS TO SELECT OR REJECT 1-3 LETTER REMARKS ----------

COL Set the number of 1-3 letter remarks to read from the data and the format string for reading the remark(s).
The format should take forms such as (Tn,A1) where n is the first column of the string to be treated as a remark.
Example: COL 2 '(T77,2A1)'

RMK Set the number of 1-3 letter remarks to select on, and set the list of remarks. An event will be selected if it contains any one of the remarks you define with this command. If the number of remarks is 0, no remark selection takes place. Maximum of 10 remarks.
Example: RMK 0 (the default), or RMK 2 'A' 'B'

NOR Set the number of 1-3 letter remarks to reject, and set the list of remarks. An event will be rejected if it contains any one of the remarks you define with this command. If the number of remarks is 0, no remark rejection takes place. Maximum of 10 remarks.
Example: NOR 0 (the default), or NOR 2 'C' 'D'

COMMANDS WHICH TAKE ACTION ----------

SEL Select earthquakes using the current files and parameters. Several selects can be run in each session. If the same output filename is used twice, a new version is created without destroying the old.

STO Stops the program.

CONVENIENCE AND CONTROL COMMANDS ----------

HEL Gets very brief help by listing the basic commands.

MOR Gets a little more brief help by listing the more advanced commands.

LIS Lists the current input files on the terminal.

SEE Displays the current output files & beginning dates on the terminal.

SHO Displays some of the basic selection parameters on the terminal. All parameters can be examined without making changes by typing the command and defaulting to the present values.

SAV Give the file onto which commands specifying all current parameters are to be saved. This preserves the current state of the program, and can be loaded back with the HOP command. The default is the last file saved or HOPped to.
Example: SAV 'SET1.' , SAV 'SNAPSHOT.' , etc.

HOP Hop to or transfer control to a command file whose name you give. The file can be built with the editor or previously SAVed. If a command file called "SELINST." is present in your directory, it is executed when SELECT starts if you wish to set your own defaults.
Example: HOP 'SET1.' , HOP 'SNAPSHOT.' , etc.

Note: @filename is equivalent to HOP 'filename'

SPA Spawn an operating system command by giving it as a string. When the system command finishes, control returns to SELECT where you left off.
Example: SPA 'EDT SELINST.' , SPA 'DIR *.SUM' , etc.

Note: #command is equivalent to SPA 'command'

* Any command which begins with * or which is all blank is treated as a comment and is ignored.

APPENDIX - RULES FOR FREE-FORMAT INPUT OF PARAMETERS

-Supply the parameters in free-format following the command.

-The type and order of parameters is the same as in the command documentation.

-Free-format values may be separated by either spaces or commas.

-Character strings (for filenames, labels etc.) are delimited by apostrophes like 'MYFILE.DAT' .

-The form n*A stands for n occurrences of the value A.

-A null field will leave the existing value unchanged. A null field is specified by two consecutive commas, by one leading comma or by two trailing commas. Thus , 2 ,, 'MYFILE.' ,, changes only the 2nd and 4th of 5 values.

-A slash (/) at the end of a line means all later fields are null.

-The form n* stands for n occurrences of a null field.