GSRNOR

Program to convert data from Geophysical Survey of Russian Academy of Science

to SEISAN Nordic format.

The program uses 2-3 input files:

1

Output from hypo71 program (Russian version): Arrival times with weights, location, Russian magnitude based on P-waves, crustal model number used, polarity, gap, error, rms.

2

Arr file: this file has amplitudes of P, S and for Ml in units of um\*100, Ml for each station (used to calculate average Ml) and component codes. The P amplitudes are labeled AMP-P, S amplitudes AMP-S and amplitudes for Ml is labeled the standard IAML. All are converted to nm. The magnitudes from P amplitude are not given a type since not recognized by SEISAN. The time for the P and S amplitudes are given as the corresponding P and S-times plus 2 sec so as not to be plotted on top of P or S. In any case, the picking time for the amplitudes is not known.

3

A file filenr.lis with a list of corresponding waveform files. The file must have SEISAN style names which are used to get the file start time for comparison with the event origin time. It must also have the correct component codes. This can be done with program WAVFIX. This file is optional but needed if waveform file names should be integrated in the S-file.

The two first input files must be in chronological order and contain the same events, else the program stops. This is checked by comparing the P-times in the two files and if not within 1 s for corresponding stations, the program stops with an error message.

The program first reads the hypo file, then the arr-file and combines the two. Finally the waveform files names are put in. The names are put in if the waveform file name start time is within xx seconds of the origin time. The default is 600 s, but any value can be chosen by the user. If too larger, the waveform file might be put into more than one S-file and if too small there might not be correspondence.

If an event has depth zero, it is assumed to be an explosion and marked with an E in column 23 on the header line. The model number, if available in hypo file, is given in column 21 on the header line.

Energy class is given in a comment line.

S-files which are not assigned a waveform file name are listed at the end. Likewise for waveform files that are not put into S-files. So it can be checked if there is a correspondence between events and waveform files and if waveform files are missing

The agency is assumed to be GS and the operator is asked for. In the output file, the Ml magnitude is duplicated in the 3. position on the header line so it will remain at the next update. The header line is also duplicated using agency ORG so the original location can be compared to a future calculated location on the header line. An example of the output is seen below:

2020 9 1 1738 58.26L 44.010 39.302 10.5 GS 4 .33 2.1LGS 2.1 GS 2.1LGS 1

GAP=237 2.6 2.6 1.1 E

2020 9 1 1738 58.2 L 44.010 39.302 10.5 ORG 4 .33 2.1LORG 2.1 ORG 1

2020-09-01-1736-59M.TEST\_\_012 6

Magnitude Mp: 2.1 3

Energy class: 5.3 3

ACTION:H71 20-11-09 18:57 OP:jh STATUS: ID:20200901173858 I

STAT SP IPHASW D HRMM SECON CODA AMPLIT PERI AZIMU VELO AIN AR TRES W DIS CAZ7

GOYR EZ EP 3 1739 4.38 0.830 26.9 13

GOYR EN IS 1 1739 7.22 -.220 26.9 13

GUZR SZ IP 0 1739 10.43 0.250 65.6 91

GUZR SN IS 1 1739 18.83 -.080 65.6 91

VSLR EZ IP 1 1739 13.12 -.420 84.9 136

VSLR EN ES 2 1739 24.98 0.250 84.9 136

GRYR EZ IP 1 1739 22.90 -.020 144 85

GRYR EN IS 1 1739 40.52 -.430 144 85

GOYR EZ AMP-P 1739 6.38 40.0 0.72 26.9 13

GOYR EN IAML 1739 6.57 150.0 0.92 26.9 13

GOYR EE AMP-S 1739 9.22 160.0 0.62 26.9 13

GUZR SZ AMP-P 1739 12.44 10.0 0.20 65.6 91

VSLR EZ AMP-P 1739 15.13 30.0 0.78 84.9 136

GUZR SN IAML 1739 18.19 50.0 0.32 65.6 91

GUZR SN AMP-S 1739 20.83 50.0 0.48 65.6 91

GRYR EZ AMP-P 1739 24.91 10.0 0.30 144 85

VSLR EE AMP-S 1739 26.98 80.0 0.44 84.9 136

VSLR EE IAML 1739 26.20 90.0 0.36 84.9 136

GRYR EE IAML 1739 39.66 40.0 0.28 144 85

GRYR EE AMP-S 1739 42.53 40.0 0.30 144 85

2020 9 2 12 2 7.76LE 44.225 40.278 0.00 GS 6 .39 2.3LGS 2.8 GS 2.3LGS 1

GAP=189 1.3 1.30.340 E

2020 9 2 12 2 7.7 LE 44.225 40.278 0.00 ORG 6 .39 2.3LORG 2.8 ORG 1

2020-09-02-1159-59M.TEST\_\_018 6

Magnitude Mp: 2.8 3

Energy class: 7.2 3

ACTION:H71 20-11-09 18:57 OP:jh STATUS: ID:20200902120207 I

STAT SP IPHASW D HRMM SECON CODA AMPLIT PERI AZIMU VELO AIN AR TRES W DIS CAZ7

GUZR SZ IP 0 12 2 13.49 0.060 28.5 207

GUZR SN IS 1 12 2 18.02 0.430 28.5 207

RPOR EZ IP 0 12 2 18.96 0.280 58.4 181

RPOR EN IS 1 12 2 26.25 -.440 58.4 181

GRYR EZ IP 0 12 2 20.27 0.210 66.3 101

GRYR EN ES 2 12 2 29.14 0.060 66.3 101

GOYR EZ IP 1 12 2 21.16 0.080 72.1 272

GOYR EN ES 2 12 2 30.53 -.310 72.1 272

SHA1 EZ EP 2 12 2 40.12 -1.39 198 106

SHA1 EN ES 2 12 3 5.13 -1.05 198 106

KBZ BZ EP 3 12 2 43.80 -.100 217 105

KBZ BN ES 3 12 3 9.42 -.890 217 105

GUZR SZ AMP-P 12 2 15.49 140.0 0.60 28.5 207

GUZR SE AMP-S 12 2 20.02 640.0 0.48 28.5 207

RPOR EZ AMP-P 12 2 20.96 60.0 0.54 58.4 181

GUZR SE IAML 12 2 19.42 1350.0 0.92 28.5 207

GRYR EZ AMP-P 12 2 22.28 40.0 0.60 66.3 101

GOYR EZ AMP-P 12 2 23.17 80.0 0.56 72.1 272

RPOR EE IAML 12 2 25.41 280.0 0.38 58.4 181

RPOR EE AMP-S 12 2 28.26 420.0 0.62 58.4 181

GRYR EE IAML 12 2 28.35 210.0 0.84 66.3 101

GRYR EE AMP-S 12 2 31.14 140.0 0.88 66.3 101

GOYR EE AMP-S 12 2 32.54 370.0 0.66 72.1 272

GOYR EE IAML 12 2 34.59 350.0 0.76 72.1 272

SHA1 EZ AMP-P 12 2 42.13 40.0 0.34 198 106

KBZ BZ AMP-P 12 2 45.81 1740.0 0.55 217 105

SHA1 EN AMP-S 12 3 7.13 220.0 0.52 198 106

SHA1 EN IAML 12 3 6.13 210.0 0.60 198 106

KBZ B1 AMP-S 12 3 11.43 4900.0 0.60 217 105

KBZ B1 IAML 12 3 11.31 6310.0 1.00 217 105

Below is shown an example run:

c:\seismo\WOR\gsrnor

Give input hypo file

sep.bin

Give input arr file

sep.arr

Give operator, max 3 chars

jh

Time difference in secs for wav file to be include in s-file, def 600s (enter)

Number of waveform files 35

Model number 6

Number of phases found in hypo file 50

Waveform file added 2020-09-01-0049-29M.TEST\_\_075

2020 9 1 059 6.06L 43.997 39.142 7.59 GS 25 1.0 3.4LGS 4.9 GS 3.4LGS

Model number 8

Number of phases found in hypo file 6

Waveform file added 2020-09-01-1038-00M.TEST\_\_009

2020 9 1 1040 31.78LE 44.808 37.642 0.00 GS 3 .28 3.4LGS 2.0 GS 3.4LGS

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Model number 8

Number of phases found in hypo file 8

Waveform file added 2020-09-23-1034-59M.TEST\_\_012

2020 923 1037 19.38LE 44.835 37.638 0.00 GS 4 .29 3.1LGS 2.2 GS 3.1LGS

Number of waveform files not used 13

File not used: 2020-09-08-1104-59M.TEST\_\_009

File not used: 2020-09-15-1025-59M.TEST\_\_012

File not used: 2020-09-29-0423-59M.TEST\_\_015

Number of events without waveform file 2

Events which did not get a waveform file name

2020 9 3 1046 45.6

2020 916 2157 0.2

Output file name is gsrnor.out

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Special option for rewriting SAC response files

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The GSR response files are not written in a standard way as used by SEISAN so they have to be rewritten and renamed.

A GSR response could have the name GOYR\_EHZ\_2017jul14.sac while the corresponding name in SEISAN is GOYR\_EH\_Z.2017\_07\_14\_0000\_SAC. The date in both cases indicate the date from which it is valid.

The GSR file looks like

# Station GOYR

# Channel EHZ

# Location ??

# Network OBN

# Time 2017.07.14 00:00:00

ZEROS 3

POLES 6

-2.9102 0

-1.5196 0

-176.198 -420.291

-176.198 +420.291

-336.6282 -84.213

-336.6282 +84.213

CONSTANT 1.548e19

while the SEISAN file is

ZEROS 3

POLES 6

-2.9102 0

-1.5196 0

-176.198 -420.291

-176.198 +420.291

-336.6282 -84.213

-336.6282 +84.213

CONSTANT 1.548e19

When converting, the file is read and start date, station and component codes are read from the file, if not in the file, it is read from the file name. Wrong component codes are corrected (some are lower case, some have orientation code in position 2 instead of 3). If the input file does not have a date, it is set to year 2000.

How it works:

Make a dirf of the response files to convert to create the filenr.lis of the file names

Start gsrnor and use ‘resp’ for input hypo file.