

Rerum Naturalium Fragmenta No. 354

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Rerum Naturalium Fragmenta

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MAGRA : Gravity Attraction of a Two-Dimensional Model

by T. Jasko

Adapted from MGPRO1 (written by Bob Walker, IGS, 1979).

Description

The program computes the anomaly in the Earth's gravitational field along a profile perpendicular to parallel horizontal prisms of infinite lateral extension and specified density.

The prisms may be of arbitrary polygonal cross-section and are specified by the co-ordinates of their corners (X, Z). '+Z' is measured vertically downwards and '+X' horizontally to the right, at right angles to the prism axes.

The program evaluates the contribution of all points in the polygonal sides and sums them for each field point in turn.

For details of the mathematics, see:

Hubbert, M.K. (1948): A line-integral method of Computing the gravimetric effects of two-dimensional masses. Geophysics, 13, 214-225.

Talwani, M.; Worzel, J.M. & Landisman, M. (1959): Rapid gravity calculations for two-dimensional bodies, with application to the Mendocino submarine fracture Zone. J. Geophys. Res., 64, 49-59.

Optionally, observed values of gravity along the profile may be

input and residual anomalies calculated. There is also an Option to produce a plot of the model and the calculated and residual anomalies.

Input file format

Format	Variable	Explanation
i5	iff	iff = 1, anomaly graph only iff = 2, input model only iff = 3, both
4f10.3	x1, x2, y1, y2	Max, min values of the x, y axis for input model. Enter only if iff = 2 or 3.
4f10.3,i5	u1,u2,u3,v,n	Field points are at spacing u2 from u1 to u3 on the plane z = v. $u2 > 0$, $u1 < u3$. $n = 0$ for distances in nautical miles, $n = 1$ for distances in km.
*f10.3	d	density of prism in g/ml
*i5	k	no. of corners in prism.
*8 f10.3	a(i), b(i)	(x,z) coordinates of corners in prism. 4 pairs per line, in clockwise order. The first corner is not repeated at the end of the list.
f10.3	1234.	Indicates end of data for prisms.
8f10.3	r(i)	Observed values of gravity at the field points specified. (optional)

Key: * = As many sets of this data as required.

Notes: Max. permissible no. of prism corners (in toto) = 200

Max. permissible no. of field points = 500

Output

The Output from the program is a table giving the x-coordinate of each field point, the calculated anomaly at that field point and, if observed gravity values have been given, the observed gravity and residual anomalies at the field point.

How to run on SEL 32/87

Prepare input data and store in a file. To get results displayed at the terminal, type in TSM>

MAG filename

(It is advisable to check all data by terminal display before plotting.)

To Output to line printer (without plotting) type in TSM>

MAGPRT filename

To produce plot (and line printer output) type in TSM>

MAGZ filename

To plot on graphic terminal (i.e. Tektronix or Westward) type in TSM>

MAGT filename

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MAG-ST15
1. MAG-ST15 TJ XER
2. TJ=PLOT2
3. Gravity Model ST15
4. 3.
5. 0., 226., 0., 50.,
6. 0., 2., 226., 0., 1.,
7. -1.67,
8. 12,
9. -500., 0.25, -500., 0., 700., 0., 700., 0.15,
10. 212., 0.15, 176., 0.15, 138., 0.8, 124., 1.1,
11. 110., 1.15, 86., 1.0, 60., 1.14, 20., 0.25,
12. -0.3,
13. 21,
14. -500., 3.6, -500., 0.25, 20., 0.25, 60., 1.14,
15. 86., 1.0, 110., 1.15, 124., 1.1, 138., 0.8,
16. 176., 0.15, 212., 0.15, 200., 0.6, 200., 1.0,
17. 182., 1.15, 156., 3.25, 132., 4.35, 114., 4.25,
18. 86., 4.25, 48., 3.8, 44., 4.4, 20., 4.8,
19. 0.0, 3.6,
20. 0.5,
21. 17,
22. -500., 3.6, -500., 1.3, 0.0, 1.3, 20., 1.8,
23. 21., 2.2, 36., 1.9, 46., 2.35, 54., 2.15,
ENTER CR FOR MORE
24. 60., 3.15, 86., 3.15, 104., 3.25, 98., 3.75,
25. 66., 3.75, 48., 3.8, 44., 4.4, 20., 4.8,
26. 0.0, 3.6,
27. -0.25,
28. 31,
29. -500., 5., -500., 3.6, 0.0, 3.6, 20., 4.8,
30. 44., 4.4, 48., 3.8, 86., 4.25, 114., 4.25,
31. 132., 4.35, 156., 3.25, 182., 1.15, 200., 1.,
32. 206., 0.6, 198., 2.5, 190., 1.8, 184., 2.25,
33. 180., 2., 166., 6., 160., 5.2, 138., 7.0,
34. 120., 6.5, 104., 7., 86., 8., 70., 6.5,
35. 62., 7., 54., 5.5, 38., 6.5, 30., 6.0,
36. 20., 6.5, 16., 6.0, 0., 5.5,
37. -0.2,
38. 59,
39. -500., 6., -500., 5., -4.0, 5.5, -2., 5.5,
39.1 0., 5.5, 6., 6., 16., 6., 20., 6.5,
40. 30., 6.0, 38., 6.5, 54., 5.5, 62., 7.,
41. 70., 6.5, 86., 8., 104., 7., 120., 6.5,
42. 138., 7.0, 160., 5.0, 166., 6., 180., 2.,
43. 184., 2.25, 190., 1.8, 198., 2.5, 206., 0.6,
44. 212., 0.15, 209., 0.85, 206., 0.7, 198., 3.25,
45. 190., 2., 186., 3.2, 182., 2.5, 180., 2.7,
ENTER CR FOR MORE
46. 176., 5.5, 172., 7.5, 170., 8.3, 160., 5.9,
47. 156., 7.2, 154., 6.7, 146., 9.5, 140., 8.5,
48. 138., 8.25, 136., 8.0, 134., 8.5, 126., 7.5,
49. 126., 8., 120., 7., 116., 8.5, 110., 7.5,
50. 100., 10., 78., 11., 70., 7.5, 58., 8.5,
51. 54., 6.5, 34., 8., 30., 7., 18., 8.,
52. 16., 7., 0., 7.5, -2., 6.5,
53. 0.5,
54. 9,
55. -500., 50., -500., 28., 20., 28., 60., 22.,
56. 130., 21.5, 160., 25.5, 210., 27., 500., 27.,
57. 560., 50.,
58. -0.05,
59. 4,
60. 226., 2., 212., 0.15, 500., 0.15, 500., 2.,
61. 0.04,
62. 7,
63. 212., 0.15, 226., 2., 226., 0.5, 194., 8.5,
64. 198., 3.25, 206., 0.7, 209., 0.85,
65. 1234.,
66. 23., 23., 24., 25., 26., 25., 27., 28.,
67. 29., 29., 28., 27., 24., 24., 23., 23.,
68. 22., 22., 22., 20., 18., 14., 11., 11.,
ENTER CR FOR MORE
69. 10., 10., 8., 4., 1., -2., -4., -6.,
70. -7., -9., -10., -11., -10., -10., -10., -10.,
71. -11., -11., -9., -11., -11., -12., -13., -14.,
72. -16., -14., -13., -12., -10., -9., -8., -7.,
73. -6., -6., -7., -7., -6., -3., -8., -8.,
74. -6., -7., -10., -11., -10., -6., -12., -11.,
75. -12., -11., -11., -10., -9., -8., -7., -6.,
76. -2., 5., 10., 13., 15., 16., 17., 22.,
77. 27., 32., 35., 37., 40., 42., 43., 42.,
78. 41., 39., 39., 40., 43., 47., 52., 61.,
79. 65., 66., 67., 66., 65., 63., 60., 58.,
80. 50., 47.,
TSM>

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Fig.1 MAGRA Example of input data

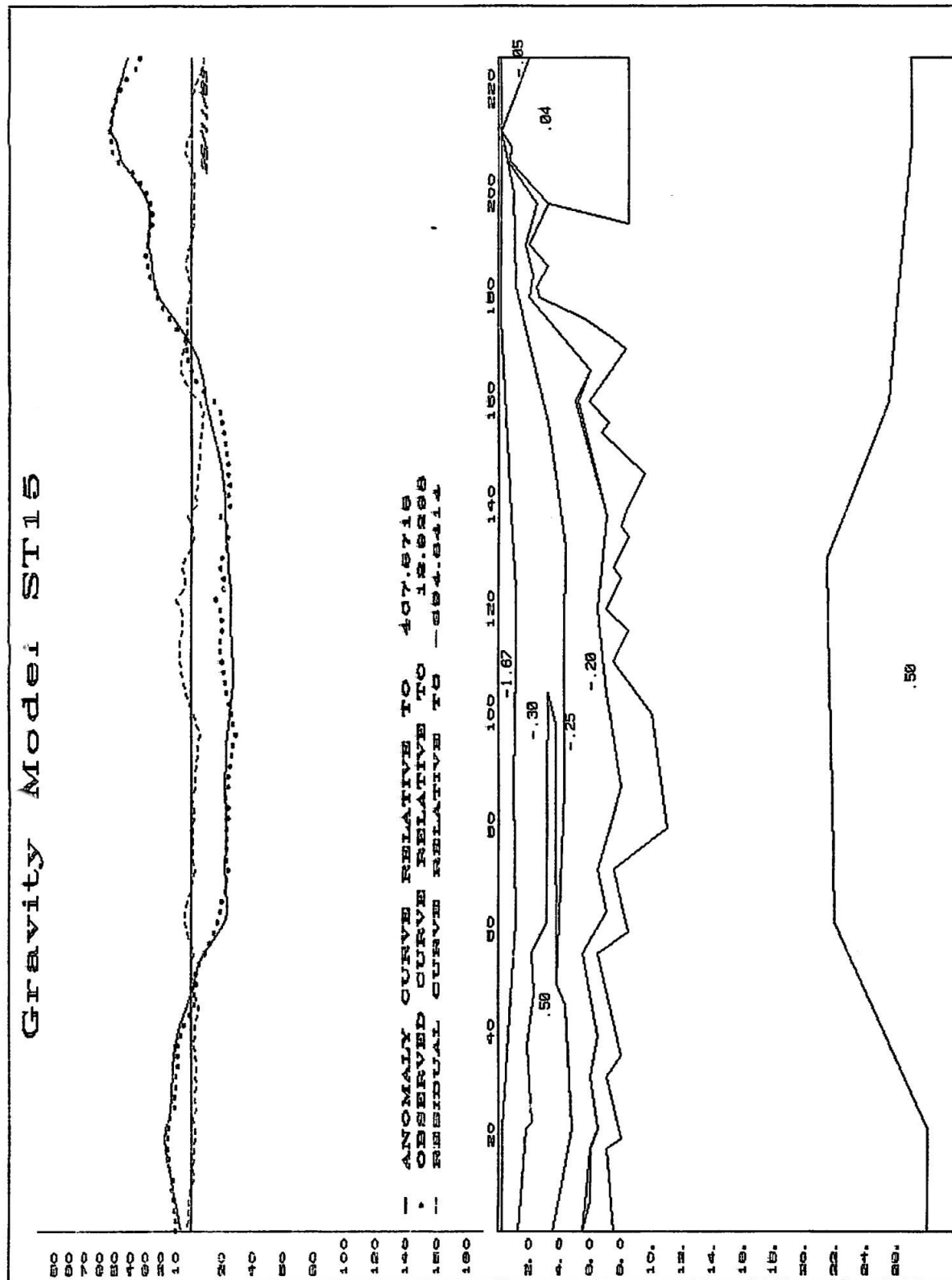


Fig.2 Graphic output from MAGRA. (See Fig.1 for input data)
 [Software Update no.17: 17 February 1983]

TIMENOW: Display of current date and time

by T. Jasko

This program prints the current system date and time on the screen (if used online) or to the SLO file (in batch).

Online/batch environment is checked internally.

Can be used to indicate time of run for batch runs where the printout is diverted to an SLOF file. Lacking banner headings the SLOF file does not display the time of the run automatically.

Usage: insert \$TIMENOW after the \$JOB card (or some other convenient place) in the JCL.

Online in TSM> typing TIMENOW prints the same information on the screen e.g. TUESDAY 2ND APRIL 1983 AT 11:39

Source: (TJ)TI-MEN

(Software Update, No.9, 1983)

DISDM Digitised Seismic Data Merging and Listing Program

by T. Jasko

TJ.DISDM merges the contents of two input files to produce an output file. The heading card is copied from the first (main) input to output, then 6 columns of numbers are read from the first file and 1 column from the secondary file to produce 7 columns of output.

As a default, data read from the secondary file will be the 6th column of data in output. To insert at a different column, specify the column desired as OPTION, i.e. OPTION 3 to have secondary input data as 3rd column of output. Range of options is from 2 to 5, inclusive.

Alternatively, OPTION 9 can be used to add shot point numbers as first data column. If OPTION 9 is present, other options are ignored, and no secondary input file(s) are used.

Output shot point numbers are generated using the starting shot point and increment specified in the heading.

Procedure: in TSM> type
TJ.DISDM.

The program will request 3 filenames (main input, secondary input, output) in turn. All 3 must be existing files. After merging and listing the files the user is again prompted for another set of files.

Type X to exit from program.

Source: (TJ)DI-SDM, DI-MERGE

(Software Update, no.10, 1983)

MER.D: Merging and Selecting Statistical Data

by
T. Jasko

This program allows merging files of statistical data by matching the names of variables and samples. Subsets of data can be selected by sample (row) and/or variable (column) selection.

Undefined table entries are filled by zeros. Names of variables and/or samples can be changed both before and after merging. The merged/selected set can be written to a disk file.

Procedure

In TSM> type MER.D — after initialisation, the main menu will be displayed. Enter R (read), S (select, rename, check), M (merge) or W (write) to start the corresponding Operation.

There is no prescribed order of operations but to get meaningful results it is best to start with a Read and finish with a Write.

Several sets/files can be processed in one session.

Input

Three Input formats are accepted:

- Ratiplot general card image format (default)
- Old style Nova format
- New Style Nova format

Enter format type(s) and file name(s) as prompted by the Read routine.

At each read the contents of buffer 1 are pushed Into buffer 2 and the input is read into buffer 1.

Output

Enter Output file name as prompted by the Write routine. Output format is in Ratiplot general format in any case. Buffer 1 is compacted (according to selection flags) into buffer 2 and the contents of buffer 2 are written to the designated file. This file can be the same as an Input file.

Selection of variables

After entering the Select routine, type 1 to access variables of buffer 1, type 3 to access variables of buffer 2. Names of variables will be displayed with selection Status.

If an item needs to changing type Y on prompt. Each variable will be displayed for entering S to select or I to Ignore. Entering just a CR will leave the Status unchanged.

If the user enters R (rename) the program asks for the new name of the variable. After the last variable, variable names and Status are displayed again for further changes/corrections.

Selection of samples

After entering the Select routine type 2 to access samples of buffer 1, type 4 to access samples of buffer 2. Otherwise, proceed as for selecting/renaming variables.

Merging files

First fill both buffers e.g. by reading 2 files. Each of these can be edited to select a set of samples/variables or to change their names. Returning to the main menu, enter M for merge.

Buffer 2 will be merged to buffer 1 according to the following rules:

- 1) Samples/variables flagged to 'ignore' will be ignored.
- 2) Samples/variables are matched by name. Each sample will be placed in the row with the same sample name if there is such a sample (row) in buffer 1. The same applies to variables (columns of data).
- 3) Where no match is found, each variable of buffer 2 will add a new variable (column) to buffer 1.
- 4) Where no match is found, each sample of buffer 2 will add a new sample (row) to buffer 1.
- 5) After the merging any cells not receiving data will contain 0.

Example of merging 2 files

File 1

	VA	VB
81	1	1
82	1	1

File 2

	VA	VC
81	2	2
83	2	2

Merging File 2 into 1 gives:

	VA	VB	VC
81	2	1	2
82	1	1	0
83	2	0	2

Merging File 1 into 2 gives

	VA	VC	VB
81	1	2	1
83	2	2	0
82	1	0	1

Notice that the only value affected by the order of reading the files is VA in 81. This is the intersection of variable(s) and sample(s) common to both files.

[Software Update no.19: 24 March 1983]

WAIF: Wait for File Availability

by
T. Jasko

This Utility can be used to test the availability of one or more files. It will check the specified files, send a message if they are available. If a file is not available the program waits a minute before checking again. The utility can be used to wait for files being created or restored by a (different) batch run.

Procedure

In TSM> type FA.TWA, then enter filenames one by one, finish list by typing X or CR.

Press break to stop the program waiting for nonexistent files e.g. when a typing mistake was done.

In batch jobs, enter \$FA.TWA, followed by the names of files one per card (A8 format), ending with X. Job execution will get suspended at this point till all named files become available.

Fortran programs can access this facility by

CALL FA:WAIF (Number, List, Fstatus)

where

Number [integer] is the number of files in list;

List [integer*8 array] contains the names of files wanted;

Fstatus [integer array] will be 0 for each file on normal return.

FA:WAIF is in TJ:LIB

[Software Update, no.18, 23 March 1983]