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GEOSTAT: A Computer System for Spherical Semi-Variogram Modeling and Kriging

by

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Acknowledgements

The software subsystems incorporated into GEOSTAT were written by various people, and later adapted or synthesized into other subsystems. Initial workers were A.T. Miesch, G. VanTrump Jr., and W.D. Grundy of the U.S. Geological Survey (USGS) for subsystems related to the Statistical Package (STATPAC) and basic statistics while the initial geostatistical subsystems were contained in documents published by J.A. Skrivan and M.R. Karlinger (1980) of the USGS, H.P. Knudsen and Y.C. Kim (1978), M.David (1977), and A.G. Journel and C.J. Huigbregts (1978). W.D. Grundy and N.J. Bridges improved, adapted, and/or combined subsytems. After considerable research concerning geostatistics and the several geostatistical software systems, the author enhanced, improved, and/or synthesized subsytems in order to mathematically simplify the use of a portion of geostatistics, to make the use of a portion of geostatistics more user-oriented, to produce a menu-driven system, and to fashion a system more amenable to coal applications.

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Abstract

GEOSTAT is a menu-driven FORTRAN 77 computer system that allows spherical semi-variogram modeling and kriging, either at a point or in a block, on Prime minicomputers. GEOSTAT was developed for use with coal data, but other data may be used if they are in the required input format.

Introduction

Kriging allows the user to obtain an unbiased linear estimate of minimum variance of a spatially correlated variable. This menu-driven FORTRAN 77 system, called GEOSTAT, allows semi-variogram modeling and subsequent kriging either at a point or in a block on the Prime computers of the National Coal Resources Data System (NCRDS) in the Branch of Coal Geology (BCG), Geologic Division (GD), U.S. Geological Survey (USGS). It may be run using any terminal connected to one of the Prime computers of NCRDS. GEOSTAT is a sophisticated tool; thus, the user should be thoroughly familiar with the theory of kriging as explained in Mining Geostatistics by A.G. Journel and C.J. Huijbregts, 1978 and Geostatistical Ore Reserve Estimation by M. David, 1977. In addition, the user should also be familiar with the PACER and GARNET systems of the NCRDS even though GEOSTAT may be used without this knowledge. The purpose of this document is to provide the information necessary to use GEOSTAT. This will be done by providing general system information, detailing input data requirements, briefly describing each subsystem, and furnishing a sample run of the system. A later document will be devoted to the practical aspects of kriging.

General System Information

By using Prime System commands, the user may record an interactive session. The user would type the following and press RETURN:

```
COMO FILENAME
```

where FILENAME is any name consisting of up to 32 letters or numbers and periods (.) where the first character is alphabetic. Generally, throughout this document, the user should press the RETURN (or ENTER) key after typing in a command. After the interactive session is completed, the user may end the COMO session by typing:

```
COMO -END.
```

GEOSTAT records the name of the current input data set along with the column identifiers for data corresponding to the X and Y coordinates and variable under analysis. Likewise, the name, data set type, and number and name of the GEOSTAT step which creates each data set are recorded. The REVIEW subsystem can then be used to examine the data set status.

Input Data

GEOSTAT requires all input data to be in the STATPAC (STATistical PACkage) format used within the USGS. This data format was developed as a USGS standard for storing geochemical data that requires qualifying codes to indicate the relative reliability of the data.

The major user of GEOSTAT is the BCG which uses the PACER System of the National Coal Resources Data System (NCRDS) to store coal information in a non-STATPAC format, and it is assumed that the user is familiar with PACER.

A computer program exists to convert a PACER LIST data set to a STATPAC data set; it is called PACR2STP. The PACER format for an input record to this program follows:

```
POINTID 1 16 (4A4)
LATITUD 20 9 (I9)
LONGTUD 31 10 (I10)
SURFELV 42 9 (F9.3)
FROMFT 52 9 (F9.3)
TOFT 62 9 (F9.3)
THKFT 72 9 (F9.3)
BED 82 20 (5A4)
KEY 103 8 (I8)
```

The above record format may be stored in a disk data set that Pacer can access by use of the .STORED instruction under the LIST command when the prompt "ENTER THE LIST OF ITEM NAMES" appears. PACR2STP sums multiple bench thicknesses within a bed within a drillhole; this accumulated thickness may then be subsequently kriged. SURFELV, FROMFT, and TOFT are names of variables which the user prefers to view when kriging on thickness. Although it does not make sense to perform kriging on these variables, other variables with the same format and amenable to kriging may be substituted in their place. Likewise, another variable may be substituted for THKFT; however, any variable in this place will be summed just as thicknesses are summed.

A required input to this program is the longitude of the central meridian, in decimal degrees, of the data being used. The user may average the beginning and ending longitudes and use it as the central meridian. Also, the user must exclude headers from the PACER LIST output file.

A representative PACER session showing how to produce a PACER LIST data set for input to PACR2STP followed by an execution of PACR2STP is shown in Appendix A. Note that the DEFINE command of PACER must be used to convert the FROM, TO, and THK variables to feet to create the new variables FROMFT, TOFT, and THKFT. The BED and KEY fields are not processed by PACR2STP. North and east coordinates in kilometers, based on the UTM coordinate system are placed on the STATPAC file in place of the non-processed fields.

Description of the System

The user may start a session in GEOSTAT by typing GEOSTAT and pressing the RETURN key. The following welcome to the system will appear:

```
**************************************************

WELCOME TO THE MAGICAL WORLD OF GEOSTATISTICS

WHERE SEMI-VARIOGRAMS AND KRIGING ARE THE IN THINGS.

           X   X  X

        X

      X

    X

  X

 X

X

**************************************************

*** PAUSE -PLEASE TYPE START AND PRESS ENTER OR RETURN TO

CONTINUE.
```

After the user performs the above instruction, a menu will appear:

GEOSTAT SUBSYSTEMS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR GEOSTAT SUBSYSTEMS.

2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.

3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.

4) CALCULATE BASIC STATISTICS.

5) PLOT A SYMBOL MAP AT THE TERMINAL.

6) CREATE CONTROL FILE OF SEMI-VARIOGRAM PARAMETERS.

7) COMPUTE SEMI-VARIOGRAM.

8) CROSS-VALIDATE SEMI-VARIOGRAM.

9) KRIG A GRID OF POINTS.

10) KRIG A SINGLE POLYGON AS A WHOLE.

11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.

12) TEST FOR NORMALITY OF A VARIABLE.

13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.

14) REVIEW STATUS OF INPUT/OUTPUT FILES.

15) EXIT GEOSTAT SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.

**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY

STEP 1, IT IS MANDATORY TO DO IT NOW.

CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.

The user must then type in a number from one to fifteen and press RETURN/ENTER. An actual session using all the subsystems with representative options appears in Appendix B. If a readable data set is produced by a subsystem, the data set will appear after the subsystem execution even though the data set does not print as the user executes GEOSTAT. This is done to present related information without having to scramble through this document. The individual subsystems will now be briefly described.

Prepare STATPAC File for GEOSTAT Subsystems

This subsystem (SS2DPREP) prepares a STATPAC file for input to the kriging subsystems. It reads a STATPAC file and sorts it by east coordinate of the hole within the north coordinate. Subsequently, the records are checked for duplicate locations, and duplicates are displayed on the terminal. The duplicates must be resolved and removed from the input file before the subsystem will produce the proper output. If the input file has numeric fields with no data, each data field must be preflagged with a qualifier or the user must tell the system via interaction what unique numeric value, such as -999, is used to indicate missing data in a field. The subsystem will enter a qualifier of 'B' if it sees a unique numeric value such as -999. This step is necessary to insure that the kriging subsystems do not use invalid data.

Transform STATPAC File to Readable/Editable File

This subsystem (FILTER) transforms a STATPAC file into a readable ASCII file that can be edited using the Prime Editor. Each record requires two lines on the printed page. The first row of headings applies to the first row of data and the second row of headings applies to the second row of data per record. Latitude and longitude may appear both in degrees, minutes, and seconds and in decimal degrees.

Transform Readable/Editable File to STATPAC File

This subsystem (UNFILTER) transforms the readable ASCII data set created by the subsystem FILTER to a STATPAC file.

Calculate Basic Statistics

This subsystem (BASTAT) calculates the following statistics for data in a STATPAC data set: minimum, maximum, mean, and standard deviation. Also, it optionally produces correlations, histograms, and percentiles for the whole or a selected portion of the input data set. This subsystem allows processing of several data sets without returning to the GEOSTAT menu. If a statistic can not logically be computed, a value of 1.0000E+35, which means 1×10^{35}, will appear.

Plot a Symbol Map at the Terminal

This subsystem (MAPPLT) plots a scatter diagram which, with the assist of a table, shows the range of the variable under analysis for each sample location. Optionally, the user may also create a supplementary plot which shows the number of samples per location. The user may provide the boundaries in kilometers or accept default boundaries. The range of the sample variable is divided into ten equal classes where the symbols 0-9 are used to represent these ten classes. If more than one sample occurs per location, the symbol for the class representing the mean of the samples is plotted. The user must furnish the direction in which the sample location cooordinates increase: east or west, north or south.

Create Control File of Semi-Variogram Parameters

This subsystem (SS2DVCTL) requires the user to furnish the name for the control file, a title for the empirical semi-variogram, the class interval which is used to group distances in kilometers between holes, and the direction and the window for the semi-variogram. The subsystem allows 20 class intervals for grouping distances; thus, the range to be covered by the class intervals should be no more than 20 times the class interval chosen. The choice of a class interval is generally arrived at by trial and error. This will be better understood after performing this step and step 7 several times.

Compute Semi-Variogram

This subsystem (SS2DGAMH) computes an empirical semi-variogram. Input to this subsystem is the STATPAC output file produced by subsystem SS2DPREP. The user must also furnish the name of the control file created by the subsystem SS2DVCTL, and supply a name for the readable semi-variogram output file. The output file provides a listing of the answers the user furnished to create the control file; the number of samples, the mean, the variance, and the standard deviation of the data being kriged; and a table and graphic representation of the empirical spherical semi-variogram created which contains the number of pairs, the gamma value (semi-variogram value) and average distance for each distance grouping.

Cross-Validate Semi-Variogram

This subsystem (SS2DXVAL) is a two-dimensional point kriging system that performs cross-validation on the theoretical spherical semi-variogram the user derives from the empirical semi-variogram computed by subsystem SS2DGAMH. There are three methods to accomplish cross-validation. One, the value for each hole is suppressed and is estimated using values for all other holes. Two, values for odd-numbered holes are estimated by using the values at even-numbered holes. Three, the rows (or records) from the specified row number to the last row in the input STATPAC data set are estimated using data from the first row of the file to the row just before the specified row number. This last option may be used in predicting the values of hypothetical data points which have not been sampled.

Input files to this subsystem are the STATPAC file created by the subsystem SS2DPREP, and the control file created by the subsystem SS2DVCTL. The user must have decided on the nugget, C, and A values for the empirical semi-variogram computed by subsystem SS2DGAMH and supply them to this subsystem. Also, the user must decide the maximum distance in kilometers from points to be kriged for a hole to be included for kriging (a circular neighborhood), and the maximum number of holes to be used within the circular neighborhood.

A character (readable) file and a STATPAC file will be created. The STATPAC file contains the same tabular data which apears in the character file. The tabular data in both files contain the hole number, X and Y UTM cooordinates in kilometers, the value of the variable (assay or Z value) being kriged, the kriged value, the kriging error, and the kriging standard deviation. The character file, in addition, contains the information provided by the user; the kriged average error, the root mean square error, and the reduced mean square error. The STATPAC file can be analyzed by using the STATPAC statistical subsystems included in GEOSTAT. The output at the terminal consists of the kriged average error, kriged root mean square error, and the kriged reduced mean square error in addition to understandable messages.

Krig a Grid of Points

This subsystem (SS2DGRID) is a two-dimensional kriging system which will krig a grid of points specified by the user. Optionally, it will also produce GARNET grid data sets for the kriged value and the kriging variance. The input data set is the one created by the subsystem SS2DPREP. At the terminal, the user must supply the nugget, the C value, and the A value of the empirical semi-variogram computed by the subsystem SS2DGAMH; the maximum distance in kilometers from a grid point for a drillhole to be included for kriging; the maximum number of holes to be used within a circular neighborhood of the grid point; the number of points in each direction to form the grid; the distance in kilometers between grid points in each direction; the column numbers, which are given in a prompt by this subsystem, for the north coordinate, the east cooordinate, and the value to be kriged; the northing and the easting of the southwest corner of the grid; and the file names for input and output. Also, if the user wishes to produce GARNET grid data sets for the kriged value and kriging variance, the central meridian for the data must be furnished. The user may average the beginning and ending longitudes and use it as the central meridian.

The outputs on the terminal are understandable messages. A character (readable) disk file and a STATPAC disk file are always created when the subsystem successfully runs. Each of these files contain X and Y coordinates in kilometers in the UTM system, the kriged value, and the kriged variance for each point on the grid. When there are not enough points within the search radius to obtain a kriged value at a grid point, a value of zero is assigned as the kriged value and to the kriging variance. The character file also contains answers that the user provided when executing this subsystem as well as headings for the tabular data. Optional outputs are two GARNET (.GRD) files which are readable by the user familiar with GARNET. The user may employ GARNET to transform these files into contours of the kriged value and the kriging variance. As was mentioned earlier, it is assumed that the user is familiar with GARNET.

Krig a Single Polygon As a Whole

This subsystem (SS2DBLOK) is a two-dimensional kriging system which computes kriged mean value and the kriging variance over a polygon. One of three inputs is the data set created by the subsystem SS2DPREP (step 1). The corners or nodes of the polygon must also be provided. If the sides of the polygon are parallel to the coordinate axes, the corners of the polygon must be entered at the terminal. Otherwise, the corners may be entered at the terminal or from a disk file. If a disk file is used, the format should be as follows:

Y_1, X_1
Y_2, X_2
.
.
.

Y_n, X_n.

In all cases, data must be entered in a clockwise direction with the northing, the y value, specified first in each pair of coordinates. At the terminal, the user must supply the nugget, the C value, and the A value of the empirical semi-variogram computed by the subsystem SS2DGAMH; the maximum distance in kilometers from the center of a the polygon for a drillhole to be included for kriging; the maximum number of holes to be used within a circular neighborhood of the center of the polygon; the number of grid points in the north and east directions; the column numbers, which are given in a prompt by this subsystem, for the north coordinate, the east coordinate, and the variable to be kriged; and the data set names for the input and output. The outputs on the terminal are understandable messages. A character (readable) disk data set is always created when the system successfully executes. This file contains, in addition to answers provided by the user, the area of the polygon, the number of holes read from the input file, the block variance, the number of grid points used, the number of holes used in kriging, the X and Y coordinates of the center of the polygon, the kriging mean for the polygon, the kriging variance, and a table showing hole number, north coordinate, east coordinate, sample value, and kriging weight for each drill hole.

Kriging Multiple Rectangular Blocks Within a Polygon

This subsystem (MULTBLK) is a two-dimensional kriging system which computes the kriging mean and the kriging variance for user-defined rectangular blocks within a polygon. One of the inputs is the data set created by the subsystem SS2DPREP.

At the terminal, the user must supply the names of the input and output files; a description of the equal-sized rectangles within the polygon; the nugget, C value, and A value of the empirical semi-variogram computed by the subsystem SS2DGAMH; the maximum distance from the center of a rectangle for a drill hole to be included for kriging; the maximum number of holes to be used within a circular neighborhood of the center of a rectangle; and the column numbers, which are given in a prompt by the subsystem, for the north coordinate, the east coordinate, and the variable to be kriged.

Other inputs are the corners or nodes of the encompassing polygon. If the sides of the polygon are parallel to the coordinate axes, the corners of the polygon must be entered at the terminal. Otherwise, the corners may be entered at the terminal or from a disk file. If a disk file is used, the format should be as follows:

Y_1, X_1
Y_2, X_2
.
.
.
Y_n, X_n.

In all cases, the data must be entered in a clockwise direction with the northing specified first in each pair of coordinates.

The outputs on the terminal are understandable messages. A character (readable) data set is always created when the subsystem successfully runs. This file contains, in addition to answers provided by the user, the area of the polygon, the block variance, the number of holes read from the input file, the average kriged value of the variable under study, and a table giving the coordinates of the center of each rectangle, the kriging mean and the kriging variance for each rectangle.

Test for Normality of a Variable

This subsystem (NORCHI) performs a Chi-Square test for normality of a STATPAC variable. The user is required to specify only the column number, which the subsystem provides for all variables via a prompt, of the variable to be tested, and whether the data are to be logarithmically transformed before testing. The output provides summary statistics including mean, variance, standard deviation, skewness, kurtosis, maximum value, minimum value, and range. Also, class intervals for the tested variable with observed and theoretical frequencies are provided. In conclusion, the chi-square value, the degrees of freedom, and the probability level are listed. In making use of this subsystem, keep in mind that the variable being analyzed by kriging is spatially correlated.

Create New STATPAC File by Sorting STATPAC File

This subsystem (STPSORT) sorts a STATPAC data set by primary row identification, by secondary row identification, or by one, two, or three STATPAC variables. If a sort on a STATPAC variable is requested, the user may specify ascending or descending order and whether the absolute value of the variable should be used. The subsystem will currently deal with a file of 3000 rows and 100 columns. The user is required to supply the name of the input and output files as well as the answers to the prompts concerning how the file should be sorted.

Review Status of Input/Output Files

This program (REVIEW) will list the current input data set and all output data sets. For the input, it will give the column number for the north and east coordinates and the variable being analyzed. It will list the name and type of each output data set as well as that subsystem created it.

Exit Kriging System

This option will allow the user to exit the GEOSTAT System and return to normal use of the Prime computer.

Selected References

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APPENDIX A

Representative PACER Session Showing How to Produce a PACER LIST Data Set for Input to PACR2STP

```
OK PACER
**************************************************************************
*                                                                        *
*                                PACER                                   *
*                                                                        *
*            Program to Analyze Coal Energy Resources                    *
*                                                                        *
**************************************************************************

Welcome to the NCRDS Data Retrieval System.

Loading program...

Do you want BRIEF MODE [default: YES]? Y

ENTER A NAME OR A NUMBER FOR THE DESIRED DATA BASE.
  1 - USCOAL
  2 - USALYT
  3 - USPEAT
  4 - USCHEM
  5 - USGEOL
  6 - BMALYT
  7 - USTRAT
  8 - WRKSTRAT
  9 - BMRESBAS
 10 - USPET
 11 - ICHEM
   WHICH? 7

DO YOU WISH TO SEE THE LIST OF MASTER FILE NAMES? N


P> COND


ENTER YOUR SEARCH CRITERIA.
A.  BED EQ DIETZ
B.  LITH EQ COAL
C.


P> LOGIC
```

```
 ENTER YOUR LOGIC.
 A.AND.B

 P> SEARCH

 WHAT IS THE NAME OF THE FILE TO BE SEARCHED? SCLOGS

 WHAT IS YOUR OUTPUT FILE NAME? LEWSC

 SEARCH IN PROGRESS.  PLEASE STANDBY...

  ALL 112 RECORDS OF SCLOGS SEARCHED.

 8 RECORDS FOUND WHICH SATISFY THE REQUEST.
 THEY HAVE BEEN STORED IN LEWSC.
  DO YOU WANT TO SEARCH ANOTHER INPUT FILE? N

P> DEFINE

 ENTER LIST OF NEW VARIABLE DEFINITIONS.
 1. FROMFT = FROM/12.
 2. TOFT = TO/12.
 3. THKFT = THK/12.
 4.

P> LIST

WHAT IS THE NAME OF THE FILE YOU WANT TO LIST? LEWSC

HOW MANY LINES DO YOU WISH TO PRINT/PAGE? 60

PRESS <RETURN> TO CONTINUE, <A> AND <RETURN> TO ABORT.

SELECT C, F, OR R. F

OUTPUT TO DISK? Y

DISK FILE NAME? LEWSCD

DO YOU WISH HEADINGS OUTPUTTED TO THE DISK FILE? N
```

```
ENTER THE LIST OF ITEM NAMES.
1.  POINTID 1 16 (4A4)
2.  LATITUD 20 9 (I9)
3.  LONGTUD 31 10 (I10)
4.  SURFELV 42 9 (F9.3)
5.  FROMFT 52 9 (F9.3)
6.  TOFT 62 9 (F9.3)
7.  THKFT 72 9 (F9.3)
8.  BED 82 29 (5A4)
9.  KEY 103 8 (I8)
10.

LISTING IN PROGRESS...

P> QUIT


 THE FOLLOWING FILES HAVE BEEN ACCESSED
 OR CREATED DURING THIS SESSION:
    1      LEWSC
    2      LEWSCD
 USE PRIME'S DELETE COMMAND TO DELETE
 ANY UNWANTED FILES.

**** STOP PACER
```

Execution of PACR2STP Which Converts a PACER LIST Data Set to a

STATPAC Data Set

```
 OK PACR2STP
 THIS PROGRAM QUALIFIES ALL ZERO VALUES WITH A "B"
 WHAT IS NAME OF PACER INPUT FILE ?:
LEWSCD
 GIVE A NAME FOR THE STATPAC OUTPUT FILE :
LEWSTP
 WHAT IS THE LONGITUDE OF THE CENTRAL MERIDIAN
IN DECIMAL DEGREES ?:
107.
     THE STATPAC FILE HAS BEEN WRITTEN
     THE FILE ID IS ALL BEDS      N =    8      M =   8
     RUN STATPAC FILE THROUGH PROGRAM TO PREPARE STATPAC FILE
     FOR KRIGING TO FIND ANY DUPLICATED POSITIONS.
**** STOP NORMAL END OF PROGRAM
```

APPENDIX B

Actual Session Using All the Subsystems of GEOSTAT System

```
OK GEOSTAT
**********************************************************
WELCOME TO THE THE MAGICAL WORLD OF GEOSTATISTICS

WHERE SEMI-VARIOGRAMS AND KRIGING ARE THE IN THINGS.

                X  X  X
             X
          X
       X
     X
   X
 X

**********************************************************
**** PAUSE -PLEASE TYPE START AND PRESS ENTER OR RETURN TO CONTINUE.
OK START

KRIGING STEPS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR KRIGING PROGRAMS.
2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
5) PLOT A SYMBOL MAP AT THE TERMINAL.
6) CREATE CONTROL FILE OF SEMI-VARIOGRAM PARAMETERS.
7) COMPUTE SEMI-VARIOGRAM.
8) CROSS-VALIDATE SEMI-VARIOGRAM.
9) KRIG A GRID OF POINTS.
10) KRIG A SINGLE POLYGON AS A WHOLE.
11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.
12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
1
```

```
 WHAT IS THE  NAME OF THE STATPAC INPUT FILE - 32 CHARACTERS OR LESS?
CLARKFE.STP
 GIVE A  NAME FOR THE STATPAC OUTPUT FILE - 32 CHARACTERS OR LESS:
CLARKFE.PR


     STATPAC INPUT FILE IS : CLARKFE.STP      ;   COLUMN ID'S ARE:

  1)X-COOR     2)Y-COOR     3)% Fe

     ENTER STATPAC FILE DESCRIPTORS

 WHAT IS COLUMN NUMBER OF NORTH COORDINATE
2
  WHAT IS COLUMN NUMBER OF EAST COORDINATE?
1
     DO ANY ROWS OF THE STATPAC FILE HAVE MISSING DATA?
     ANSWER YES OR NO:
NO

 NOW READING STATPAC INPUT FILE

NUMBER OF RECORDS PROCESSED =   50
 NOW SEARCHING FOR DUPLICATES


      RECORD OF DUPLICATED COORDINATES IN FILE CLARKFE.STP

 PRIMARY-ID  ROW-NUMBER  MATCHES  PRIMARY-ID  ROW-NUMBER
 NO DUPLICATED LOCATIONS WERE FOUND

 NOW WRITING STATPAC OUTPUT FILE

NUMBER OF RECORDS PROCESSED =   50
 THE PREPROCESSED STATPAC FILE HAS BEEN WRITTEN
 THE STATPAC INPUT FILE WAS CLARKFE.STP
 THE STATPAC OUTPUT FILE IS CLARKFE.PR
NORMAL END OF PROGRAM

KRIGING STEPS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR KRIGING PROGRAMS.
2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
5) PLOT A SYMBOL MAP AT THE TERMINAL.
6) CREATE CONTROL FILE OF SEMI-VARIOGRAM PARAMETERS.
7) COMPUTE SEMI-VARIOGRAM.
8) CROSS-VALIDATE SEMI-VARIOGRAM.
9) KRIG A GRID OF POINTS.
10) KRIG A SINGLE POLYGON AS A WHOLE.
11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.
12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.
```

```
ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
2
ENTER THE NAME OF STATPAC INPUT FILE:
CLARKFE.STP
              N =    50          M =     3
      X-COOR          Y-COOR          % Fe

 DO YOU WANT TO CONTINUE? Y/N:
Y
 ENTER A NAME FOR THE PRINTER FILE:
CLARKFE.FI
 GIVE NUMBERS OF FIRST AND LAST ROWS TO BE TYPED (XX,XXX):
1,50
   50 ROWS WILL BE WRITTEN ON THE OUTPUT FILE.
         ..........READING DATA
 NUMBER OF RECORDS WRITTEN =    50
 TYPE PRINTER FILE CLARKFE.FI

 NORMAL END OF FILTER ROUTINE.



 Contents of Data Set CLARKFE.FI:


              N =    50                M =     3
 PRIM ID    SEC ID         LAT(DMS)   LON(DMS)
      X-COOR          Y-COOR          % Fe
 HOLE  1                          0           0      ROW NO:     1
    0.000000     170.000000      34.300003
 HOLE  2                          0           0      ROW NO:     2
   10.000000      40.000000      35.500000
 HOLE  3                          0           0      ROW NO:     3
   15.000000     135.000000      28.599998
 HOLE  4                          0           0      ROW NO:     4
   55.000000     145.000000      28.599998
 HOLE  5                          0           0      ROW NO:     5
  125.000000      20.000000      41.500000
 HOLE  6                          0           0      ROW NO:     6
  175.000000      50.000000      36.800003
 HOLE  7                          0           0      ROW NO:     7
  120.000000     180.000000      33.400001
 HOLE  8                          0           0      ROW NO:     8
  160.000000     175.000000      36.000000
 HOLE  9                          0           0      ROW NO:     9
  240.000000     185.000000      30.200001
 HOLE 10                          0           0      ROW NO:    10
  260.000000     115.000000      33.199997
 HOLE 11                          0           0      ROW NO:    11
  235.000000      15.000000      33.699997
```

```
HOLE 12                          0          0      ROW NO:    12
 365.000000     60.000000      34.300003
HOLE 13                          0          0      ROW NO:    13
 285.000000    110.000000      35.300003
HOLE 14                          0          0      ROW NO:    14
 345.000000    115.000000      31.000000
HOLE 15                          0          0      ROW NO:    15
 334.999999    170.000000      27.400001
HOLE 16                          0          0      ROW NO:    16
 325.000000    195.000000      33.900001
HOLE 17                          0          0      ROW NO:    17
 350.000000    235.000000      37.599998
HOLE 18                          0          0      ROW NO:    18
 290.000000    229.999999      39.900001
HOLE 19                          0          0      ROW NO:    19
  10.000000    390.000000      27.200001
HOLE 20                          0          0      ROW NO:    20
  85.000000    379.999999      34.199997
HOLE 21                          0          0      ROW NO:    21
  50.000000    270.000000      30.200001
HOLE 22                          0          0      ROW NO:    22
 200.000000    280.000000      30.400001
HOLE 23                          0          0      ROW NO:    23
 400.000000    354.999999      39.900001
HOLE 24                          0          0      ROW NO:    24
 359.999999    334.999999      40.000000
HOLE 25                          0          0      ROW NO:    25
 334.999999    310.000000      40.599998
HOLE 26                          0          0      ROW NO:    26
   5.000000    195.000000      33.900001
HOLE 27                          0          0      ROW NO:    27
  20.000000    105.000000      32.500000
HOLE 28                          0          0      ROW NO:    28
  25.000000    155.000000      29.599998
HOLE 29                          0          0      ROW NO:    29
  50.000000     40.000000      30.599998
HOLE 30                          0          0      ROW NO:    30
 155.000000     15.000000      40.400001
HOLE 31                          0          0      ROW NO:    31
 145.000000    125.000000      30.099998
HOLE 32                          0          0      ROW NO:    32
 130.000000    185.000000      35.300003
HOLE 33                          0          0      ROW NO:    33
 175.000000    185.000000      41.400001
HOLE 34                          0          0      ROW NO:    34
 220.000000     90.000000      28.500000
HOLE 35                          0          0      ROW NO:    35
 205.000000      0.000000      40.099998
HOLE 36                          0          0      ROW NO:    36
 265.000000     65.000000      24.400001
HOLE 37                          0          0      ROW NO:    37
 390.000000     65.000000      31.599998
HOLE 38                          0          0      ROW NO:    38
 325.000000    105.000000      39.500000
HOLE 39                          0          0      ROW NO:    39
 310.000000    150.000000      34.800003
```

```
HOLE 40                    0          0      ROW NO:   40
 385.000000     165.000000      29.900001
HOLE 41                    0          0      ROW NO:   41
 325.000000     220.000000      37.800003
HOLE 42                    0          0      ROW NO:   42
 375.000000     215.000000      29.799999
HOLE 43                    0          0      ROW NO:   43
 200.000000     229.999999      37.400001
HOLE 44                    0          0      ROW NO:   44
  55.000000     375.000000      27.400001
HOLE 45                    0          0      ROW NO:   45
 245.000000     395.000000      36.500000
HOLE 46                    0          0      ROW NO:   46
 165.000000     354.999999      40.800003
HOLE 47                    0          0      ROW NO:   47
 270.000000     285.000000      32.900001
HOLE 48                    0          0      ROW NO:   48
 365.000000     340.000000      40.000000
HOLE 49                    0          0      ROW NO:   49
 330.000000     320.000000      44.099998
HOLE 50                    0          0      ROW NO:   50
 330.000000     290.000000      41.400001


KRIGING STEPS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR KRIGING PROGRAMS.
2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
5) PLOT A SYMBOL MAP AT THE TERMINAL.
6) CREATE CONTROL FILE OF SEMI-VARIOGRAM PARAMETERS.
7) COMPUTE SEMI-VARIOGRAM.
8) CROSS-VALIDATE SEMI-VARIOGRAM.
9) KRIG A GRID OF POINTS.
10) KRIG A SINGLE POLYGON AS A WHOLE.
11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.
12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
3
 ENTER THE FILTER OUTPUT FILE:
CLARKFE.FI
 ENTER A NAME FOR THE STATPAC OUTPUT FILE:
CLARKFE.UN
 READING DATA.....
```

```
NUMBER OF RECORDS WRITTEN =     50
 STATPAC FILE = CLARKFE.UN                          HAS BEEN WRITTEN
 ID= ABCDEFGH  N=    50  M=     3
NORMAL END OF EDIT TO STATPAC ROUTINE.

KRIGING STEPS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR KRIGING PROGRAMS.
2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
5) PLOT A SYMBOL MAP AT THE TERMINAL.
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7) COMPUTE SEMI-VARIOGRAM.
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10) KRIG A SINGLE POLYGON AS A WHOLE.
11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.
12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
4
ENTER INPUT STATPAC FILE NAME =
CLARKFE.PR
 NO OF ROWS    =     50
 NO OF COLUMNS=      3

 DO YOU WANT SELECTED ROWS ?
N

 DO YOU WANT SELECTED COLUMNS ?
N

 WHAT DO YOU WANT INCLUDED IN BASIC STATISTICS ?
          1-ONLY UNQUALIFIED DATA
          2-ONLY QUALIFIED DATA
          3-ALL DATA(IGNORING QUALIFYING CODES)
 TYPE 1, 2, OR 3 :
3
           READING DATA...
RECORDS READ =    50
```

UNIVARIATE STATISTICS

VAR	COLUMN	MINIMUM	MAXIMUM	MEAN	DEVIATION	VALID	B	L	N	G	OTHER
1	X-COOR	0.000E-01	4.000E+02	2.119E+02	1.2728E+02	50	0	0	0	0	0
2	Y-COOR	0.000E-01	3.950E+02	1.857E+02	1.1216E+02	50	0	0	0	0	0
3	% Fe	2.440E+01	4.410E+01	3.449E+01	4.7704E+00	50	0	0	0	0	0

DO YOU WANT TO SEE THE CORRELATIONS ?
Y

CORRELATIONS - COMPUTED USING ORIGINAL DATA

	1	2	3
1	1.00	0.11	0.30
2	0.11	1.00	0.15
3	0.30	0.15	1.00

DO YOU WANT HISTOGRAMS FOR ANY SELECTED COLUMNS ?
Y

ENTER COL NO. FOR WHICH HISTOGRAM IS DESIRED =
3

DO YOU WANT TO ENTER LWR LIMIT & CLASS INTERVAL FOR THIS COL?
IF NOT THE MINIMUM VALUE FOR THIS COL AND STURGES' RULE WILL BE USED TO COMPUTE THE HISTOGRAM.
NO

READING DATA...

HISTOGRAM FOR COL NO. 3(% Fe)

LIMIT - UPPER	OBS FRQ	CUM FRQ	PER FRQ	CUM FRQ	CLASS MIDPOINT	DISTRIBUTION
N	0	0	0.0	0.0		
L	0	0	0.0	0.0		
2.440E+01- 2.690E+01	1	1	2.0	2.0	2.565E+01	X
2.690E+01- 2.940E+01	6	7	12.0	14.0	2.815E+01	XXX
2.940E+01- 3.190E+01	10	17	20.0	34.0	3.065E+01	XXXXX
3.190E+01- 3.440E+01	10	27	20.0	54.0	3.315E+01	XXXXX
3.440E+01- 3.690E+01	7	34	14.0	68.0	3.565E+01	XXXX
3.690E+01- 3.940E+01	3	37	6.0	74.0	3.815E+01	XX
3.940E+01- 4.190E+01	12	49	24.0	98.0	4.065E+01	XXXXXX
4.190E+01- 4.440E+01	1	50	2.0	100.0	4.315E+01	X
G	0	50	0.0	100.0		
B	0	50				

DO YOU WANT ANOTHER HISTOGRAM ?
N

DO YOU WANT PERCENTILES FOR SELECTED DATA ?
Y

```
 VAR ID      25.0      50.0      75.0      80.0      85.0      90.0      95.0      99.0
 X-COOR    111.1111  226.6667  331.6667  340.0000  350.0000  366.6667  386.6667  413.3333
 Y-COOR    100.9444  179.0667  263.3333  302.8333  329.1667  355.5000  381.8333  408.1667
 % Fe       30.4976   34.3438   38.9561   39.5033   40.0506   40.6853   41.3420   44.1000

 DO YOU WANT ANOTHER SET OF COMPUTATIONS ?
N

 DO YOU WANT TO PROCESS DATA FROM ANOTHER FILE ?
N

KRIGING STEPS CURRENTLY AVAILABLE:

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2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
5) PLOT A SYMBOL MAP AT THE TERMINAL.
6) CREATE CONTROL FILE OF SEMI-VARIOGRAM PARAMETERS.
7) COMPUTE SEMI-VARIOGRAM.
8) CROSS-VALIDATE SEMI-VARIOGRAM.
9) KRIG A GRID OF POINTS.
10) KRIG A SINGLE POLYGON AS A WHOLE.
11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.
12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
5
 THE PLOTTED MAP WILL BE ON PLOTFILE
 ENTER NAME OF STATPAC INPUT FILE:
CLARKFE.PR

 N=    50
 M=     3
  X-COOR     Y-COOR     % Fe

 WHICH VARIABLE IS BEING MAPPED? - GIVE NUMBER:
3
 WHICH VARIABLE IS THE EAST-WEST COORDINATE ?:
1
 DOES THIS COORDINATE INCREASE TO THE 1.EAST OR 2.WEST - TYPE 1 OR 2:
1
 WHICH VARIABLE IS THE NORTH-SOUTH COORDINATE ?:
2
 DOES THIS COORDINATE INCREASE TO THE 1.NORTH OR 2.SOUTH    TYPE 1 OR 2:
1
 DO YOU WANT TO 1) SELECT THE MAP BOUNDARIES, OR
 2) ACCEPT DEFAULT BOUNDARIES?
 ANSWER 1 OR 2:
2
```
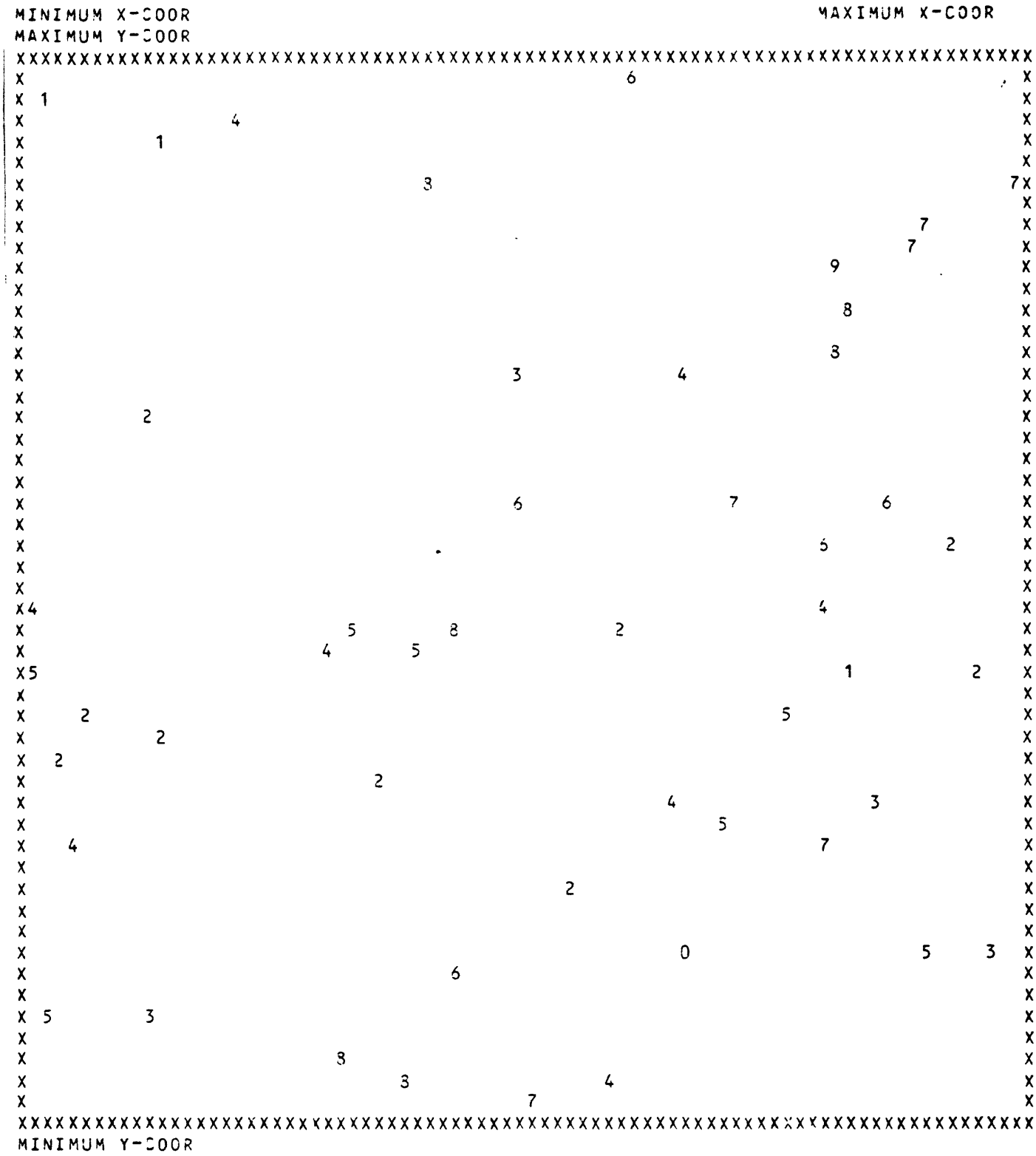

```
 ANOTHER MAP ?:
N

 DO YOU WANT A MAP SHOWING THE NUMBER OF SAMPLES PER CELL ?:
Y
MAPPLT - TYPE OUT PLOTFILE ON PRINTER
NORMAL END OF PROGRAM
```

Contents of Data Set PLOTFILE:

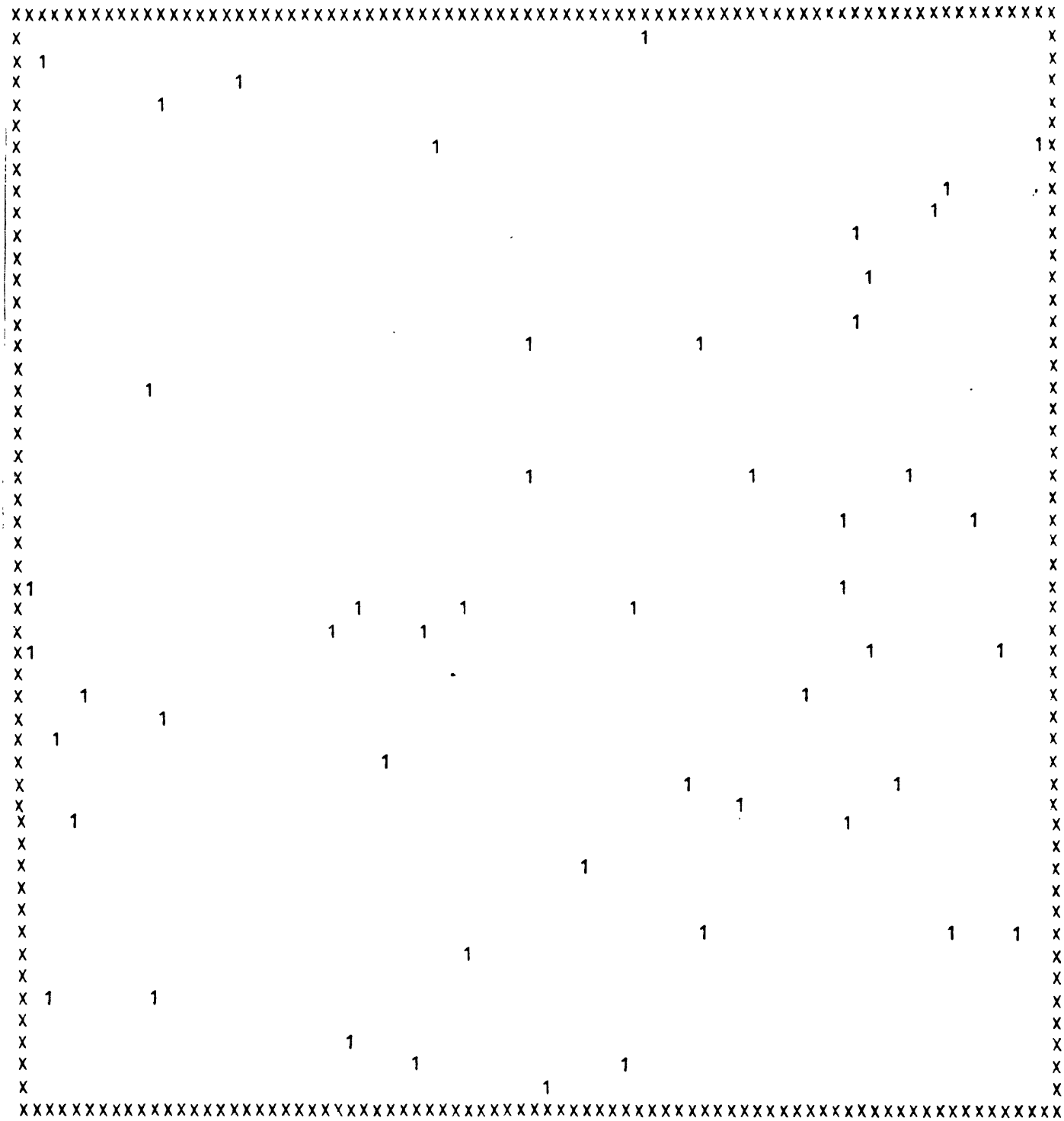


X-COOR
MINIMUM= 0.0000
MAXIMUM= 400.0000

Y-COOR
MINIMUM= 0.0000
MAXIMUM= 395.0000

MAP SYMBOL	RANGE OF % Fe	
0	24.4000	26.3700
1	26.3700	28.3400
2	28.3400	30.3100
3	30.3100	32.2800
4	32.2800	34.2500
5	34.2500	36.2200
6	36.2200	38.1900
7	38.1900	40.1600
8	40.1600	42.1300
9	42.1300	44.1000

NUMBERS OF SAMPLES
* MEANS MORE THAN 9



```
KRIGING STEPS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR KRIGING PROGRAMS.
2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
5) PLOT A SYMBOL MAP AT THE TERMINAL.
6) CREATE CONTROL FILE OF SEMI-VARIOGRAM PARAMETERS.
7) COMPUTE SEMI-VARIOGRAM.
8) CROSS-VALIDATE SEMI-VARIOGRAM.
9) KRIG A GRID OF POINTS.
10) KRIG A SINGLE POLYGON AS A WHOLE.
11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.
12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
6
 ENTER A NAME FOR THE CONTROL FILE TO BE CREATED:
CLARKFE.CT2
     ENTER TITLE FOR VARIOGRAM RUN (79 CHARS OR LESS):
TEST RUN
     GIVE CLASS INTERVAL TO GROUP DISTANCES
     BETWWEN HOLES :
45
     ENTER DIRECTION (DEC DEG) FOR VARIOGRAM :
90.
     ENTER WINDOW (DEC DEG) FOR VARIOGRAM :
90.
 THE VARIOGRAM CONTROL FILE HAS BEEN WRITTEN
 CONTROL FILE NAME IS CLARKFE.CT2
NORMAL END OF PROGRAM


Contents of Data Set CLARKFE.CT2:

TEST RUN



TEST RUN
0 0 0 1 0 1        45.000          0.00000
 90.00       90.00
0         0.000          0.000          0.000          0.000
```

```
KRIGING STEPS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR KRIGING PROGRAMS.
2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
5) PLOT A SYMBOL MAP AT THE TERMINAL.
6) CREATE CONTROL FILE OF SEMI-VARIOGRAM PARAMETERS.
7) COMPUTE SEMI-VARIOGRAM.
8) CROSS-VALIDATE SEMI-VARIOGRAM.
9) KRIG A GRID OF POINTS.
10) KRIG A SINGLE POLYGON AS A WHOLE.
11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.
12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
7
 WHAT IS THE NAME OF THE STATPAC INPUT FILE?
CLARKFE.PR
 WHAT IS THE NAME OF THE VARIOGRAM CONTROL FILE?
CLARKFE.CT2
 GIVE A NAME FOR THE VARIOGRAM OUTPUT FILE:
CLARKFE.VAR


 COLUMN ID'S ARE:
  1)X-COOR     2)Y-COOR     3)% Fe

     ENTER STATPAC FILE DESCRIPTORS

     WHAT IS COLUMN NUMBER OF THE NORTH COORDINATE? :
2
     WHAT IS COLUMN NUMBER OF THE  EAST COORDINATE? :
1
     WHAT IS COLUMN NUMBER OF THE ASSAY VALUE?      :
3


 NOW READING STATPAC INPUT FILE


NUMBER OF DATA POINTS PROCESSED =    50
+  50 UNQUALIFIED DATA POINTS HAVE BEEN STORED
 NOW COMPUTING VARIOGRAM(S)
```

```
 NUMBER OF DATA POINTS PROCESSED =    50
 NOW COMPUTING MEAN AND STANDARD DEVIATION
 NOW WRITING RESULTS ON OUTPUT FILE(S)


 THE OUTPUT FILE(S) HAVE BEEN WRITTEN
 THE STATPAC INPUT FILE WAS CLARKFE.PR
 THE VARIOGRAM CONTROL FILE WAS CLARKFE.CT2
 THE VARIOGRAM OUTPUT FILE IS CLARKFE.VAR
 NORMAL END OF PROGRAM
```

Contents of Data Set CLARKFE.VAR:

VARIOGRAM
VARIABLE ID: % Fe

TEST RUN

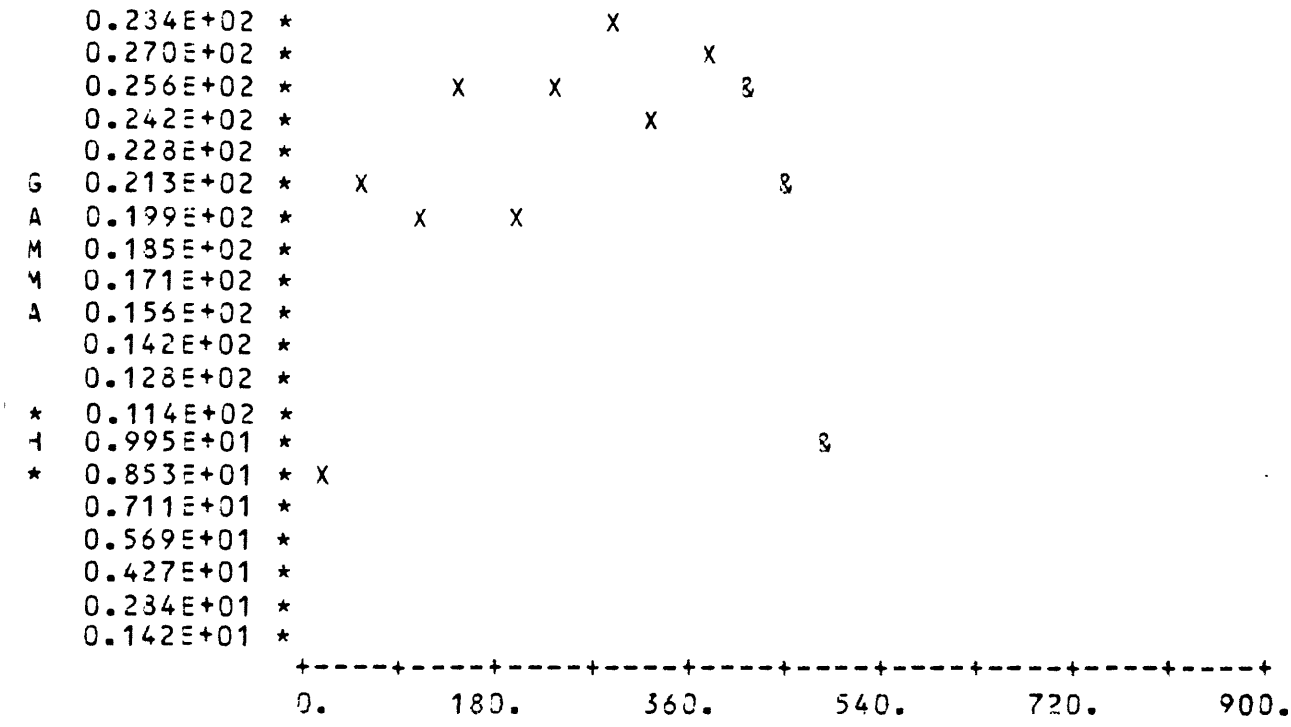
DIRECTION = 90. WINDOW 90.
CLASS SIZE = 45.0
MAX. DISTANCE = 900.

DATA USED IN CACULATIONS
MEAN = 0.345E+02
VARIANCE = 0.228E+02
STD DEVIATION = 0.477E+01
NO.OF SAMPLES = 50

DISTANCE	PAIRS	GAMMA (H)	AVER DIST
0 - 45	37	0.797E+01	30.74
45 - 90	106	0.203E+02	67.21
90 - 135	157	0.192E+02	113.91
135 - 180	187	0.244E+02	158.15
180 - 225	179	0.196E+02	202.09
225 - 270	174	0.251E+02	246.10
270 - 315	135	0.234E+02	290.83
315 - 360	128	0.241E+02	337.15
360 - 405	87	0.257E+02	380.50
405 - 450	27	0.249E+02	424.73
450 - 495	6	0.203E+02	464.90
495 - 540	2	0.968E+01	500.67

VARIABLE ID: % Fe

TEST RUN



KRIGING STEPS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR KRIGING PROGRAMS.
2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
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12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
8

```
 WHAT IS THE PATH NAME OF THE STATPAC INPUT FILE?          (MAX. OF 28 CHARS)
CLARKFE.PR
 GIVE A PATH NAME FOR THE CHARACTER OUTPUT FILE:
CLARKFE.XVC
 GIVE A PATH NAME FOR THE STATPAC OUTPUT FILE:
CLARKFE.XVS


     DO YOJ WANT 1) HOLE-BY-HOLE SUPPRESSION, 2) EVERY-OTHER-SAMPLE
     OR 3) SELECTED-ROW VALIDATION?
                    ANSWER 1, 2, OR 3 :
1


     ENTER PARAMETERS OF THE VARIOGRAM


     ENTER THE NUGGET VALUE - USE DECIMAL :
0.
     ENTER C-VALUE OF VARIOGRAM - USE DECIMAL :
19.8
     ENTER A-VALUE OF VARIOGRAM - USE DECIMAL :
85.
     ENTER THE MAXIMUM DISTANCE FROM POINT TO
     BE KRIGED - OR CENTER OF BLOCK IF BLOCK KRIGING -
     FOR A HOLE TO BE INCLUDED FOR KRIGING
     (THIS DEFINES CIRCULAR NEIGHBORHOOD - USE DECIMAL):
200.
     ENTER THE MAXIMUM NUMBER OF HOLES TO BE
     USED WITHIN THE CIRCULAR NEIGHBORHOOD - NO DECIMAL :
16

     COLUMN  IDS ARE:


     1) X-COOR     2) Y-COOR     3) % Fe

        ENTER STATPAC FILE DESCRIPTORS

        WHAT IS COLUMN NUMBER OF THE NORTH COORDINATE? :
   2
        WHAT IS COLUMN NUMBER OF THE  EAST COORDINATE? :
   1
        WHAT IS COLUMN NUMBER OF THE ASSAY VALUE?      :
   3


           READING DATA FROM STATPAC INPUT FILE
   50      JNQUALIFIED DATA POINTS HAVE BEEN STORED IN RAM
        NOW KRIGING DATA POINTS
 NUMBER OF POINTS CROSS VALIDATED =     50
```

KRIGED AVERAGE ERROR = -0.1753
KRIGED ROOT MEAN SQUARE ERROR = 3.4740
KRIGED REDUCED ROOT MEAN SQUARE ERROR = 0.9249

THE DISK FILES HAVE BEEN WRITTEN
THE INPUT FILE WAS CLARKFE.PR
THE STATPAC OUTPUT FILE IS CLARKFE.XVS
THE CHARACTER OUTPUT FILE IS CLARKFE.XVC

SS2DXVAL - NORMAL END OF PROGRAM.

Contents of Data Set CLARKFE.XVC:

VARIOGRAM PARAMETERS

NUGGET = 0.000 SILL = 19.800 C-VALUE = 19.800
A-VALUE = 85.000

SEARCH RADIUS = 200.00
MAXIMUM NUMBER OF HOLES USED = 16

OUTPUT OF MODEL VARIOGRAM TEST RESULTS

HOLE NO.	X-COORD.	Y-COORD.	ASSAY VALUE	KRIGED VALUE	KRIGING ERROR	KRIGING STD.DEV	ERROR/ STD.DEV
HOLE 35	205.000	0.000	40.10	35.20	4.90	3.91	1.25
HOLE 30	155.000	15.000	40.40	39.38	1.02	3.60	0.28
HOLE 11	235.000	15.000	33.70	35.10	-1.40	3.99	-0.35
HOLE 5	125.000	20.000	41.50	35.80	5.70	3.94	1.45
HOLE 2	10.000	40.000	35.50	33.10	2.40	4.27	0.56
HOLE 29	50.000	40.000	30.60	34.81	-4.21	4.28	-0.98
HOLE 6	175.000	50.000	36.80	35.50	1.30	4.20	0.31
HOLE 12	365.000	60.000	34.30	32.60	1.70	3.67	0.46
HOLE 36	265.000	65.000	24.40	32.04	-7.64	4.25	-1.80
HOLE 37	390.000	65.000	31.60	32.93	-1.33	3.73	-0.36
HOLE 34	220.000	90.000	28.50	32.44	-3.94	4.26	-0.93
HOLE 27	20.000	105.000	32.50	31.07	1.43	3.88	0.37
HOLE 38	325.000	105.000	39.50	33.21	6.29	3.24	1.94
HOLE 13	285.000	110.000	35.30	35.68	-0.38	3.27	-0.12
HOLE 10	260.000	115.000	33.20	31.87	1.33	3.51	0.38
HOLE 14	345.000	115.000	31.00	36.15	-5.15	3.42	-1.51
HOLE 31	145.000	125.000	30.10	33.23	-3.13	4.49	-0.70

HOLE 3	15.000	135.000	28.60	31.32	-2.72	3.05	-0.89
HOLE 4	55.000	145.000	28.60	31.50	-2.90	3.94	-0.73
HOLE 39	310.000	150.000	34.80	31.72	3.08	3.72	0.83
HOLE 28	25.000	155.000	29.60	30.20	-0.60	2.97	-0.20
HOLE 40	385.000	165.000	29.90	30.60	-0.70	4.33	-0.16
HOLE 1	0.000	170.000	34.30	32.08	2.22	3.23	0.69
HOLE 15	335.000	170.000	27.40	31.83	-4.43	3.26	-1.36
HOLE 8	160.000	175.000	36.00	38.23	-2.23	2.90	-0.77
HOLE 7	120.000	180.000	33.40	34.07	-0.67	2.64	-0.25
HOLE 32	130.000	185.000	35.30	34.11	1.19	2.48	0.48
HOLE 33	175.000	185.000	41.40	35.93	5.47	3.12	1.75
HOLE 9	240.000	185.000	30.20	35.55	-5.35	4.55	-1.18
HOLE 26	5.000	195.000	33.90	33.87	0.03	3.69	0.01
HOLE 16	325.000	195.000	33.90	33.25	0.65	3.08	0.21
HOLE 42	375.000	215.000	29.80	34.81	-5.01	3.86	-1.30
HOLE 41	325.000	220.000	37.80	37.32	0.48	3.02	0.16
HOLE 43	200.000	230.000	37.40	35.06	2.34	4.26	0.55
HOLE 18	290.000	230.000	39.90	35.96	3.94	4.06	0.97
HOLE 17	350.000	235.000	37.60	35.19	2.41	3.42	0.70
HOLE 21	50.000	270.000	30.20	33.55	-3.35	4.69	-0.71
HOLE 22	200.000	280.000	30.40	36.10	-5.70	4.47	-1.27
HOLE 47	270.000	285.000	32.90	36.70	-3.80	4.51	-0.84
HOLE 50	330.000	290.000	41.40	38.70	2.70	3.31	0.82
HOLE 25	335.000	310.000	40.60	42.82	-2.22	2.29	-0.97
HOLE 49	330.000	320.000	44.10	39.58	4.52	2.60	1.74
HOLE 24	360.000	335.000	40.00	40.29	-0.29	2.03	-0.14
HOLE 48	365.000	340.000	40.00	39.62	0.38	2.06	0.18
HOLE 46	165.000	355.000	40.80	34.85	5.95	4.66	1.28
HOLE 23	400.000	355.000	39.90	36.61	3.29	4.25	0.78
HOLE 44	55.000	375.000	27.40	32.27	-4.87	3.77	-1.29
HOLE 20	85.000	380.000	34.20	30.85	3.35	4.00	0.84
HOLE 19	10.000	390.000	27.20	31.62	-4.42	4.62	-0.96
HOLE 45	245.000	395.000	36.50	36.91	-0.41	4.70	-0.09

KRIGED AVERAGE ERROR = -0.1753
KRIGED ROOT MEAN SQUARE ERROR = 3.4740
KRIGED REDUCED ROOT MEAN SQUARE ERROR = 0.9249

```
KRIGING STEPS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR KRIGING PROGRAMS.
2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
5) PLOT A SYMBOL MAP AT THE TERMINAL.
6) CREATE CONTROL FILE OF SEMI-VARIOGRAM PARAMETERS.
7) COMPUTE SEMI-VARIOGRAM.
8) CROSS-VALIDATE SEMI-VARIOGRAM.
9) KRIG A GRID OF POINTS.
10) KRIG A SINGLE POLYGON AS A WHOLE.
11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.
12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
9
 WHAT IS THE PATH NAME OF THE STATPAC INPUT FILE?        (MAX. OF 28 CHARS)
CLARKFE.PR
 GIVE A PATH NAME FOR THE CHARACTER OUTPUT FILE:
CLARKFE.GRC
 GIVE A PATH NAME FOR THE STATPAC OUTPUT FILE:
CLARKFE.GRS


     ENTER PARAMETERS OF THE VARIOGRAM


     ENTER THE NUGGET VALUE - USE DECIMAL :
0.
     ENTER C-VALUE OF VARIOGRAM - USE DECIMAL :
19.8
     ENTER A-VALUE OF VARIOGRAM - USE DECIMAL :
35.
     ENTER THE MAXIMUM DISTANCE FROM POINT TO
     BE KRIGED - OR CENTER OF BLOCK IF BLOCK KRIGING -
     FOR A HOLE TO BE INCLUDED FOR KRIGING
     (THIS DEFINES CIRCULAR NEIGHBORHOOD - USE DECIMAL):
35.
     ENTER THE MAXIMUM NUMBER OF HOLES TO BE
     USED WITHIN THE CIRCULAR NEIGHBORHOOD - NO DECIMAL :
16


     ENTER DESCRIPTORS OF GRID OF POINTS TO BE KRIGED

     ENTER NUMBER OF POINTS IN NORTH-SOUTH DIRECTION
     NO DECIMAL :
4
```

```
     ENTER DISTANCE BETWEEN POINTS IN NORTH-SOUTH DIRECTION     USE DECIMAL :
100.
     ENTER NUMBER OF POINTS IN EAST-WEST DIRECTION
     NO DECIMAL :
4
     ENTER DISTANCE BETWEEN POINTS IN EAST-WEST DIRECTION
     USE DECIMAL :
100.
     ENTER NORTHING OF SOUTHWEST CORNER OF GRID OF POINTS
     USE DECIMAL :
0.
     ENTER EASTING OF SOUTHWEST CORNER OF GRID OF POINTS
     USE DECIMAL :
0.


     STATPAC INPUT FILE ID IS: ABCDEFGH ;   COLUMN  IDS ARE:

  1) X-COOR    2) Y-COOR    3) % Fe

     ENTER STATPAC FILE DESCRIPTORS

     WHAT IS COLUMN NUMBER OF THE NORTH COORDINATE? :
2
     WHAT IS COLUMN NUMBER OF THE  EAST COORDINATE? :
1
     WHAT IS COLUMN NUMBER OF THE ASSAY VALUE?      :
3


          READING DATA FROM STATPAC INPUT FILE
  50      UNQUALIFIED DATA POINTS HAVE BEEN STORED IN RAM

          NOW KRIGING GRID POINTS
 THE DISK FILES HAVE BEEN WRITTEN
 THE INPUT FILE WAS CLARKFE.PR
 THE STATPAC OUTPUT FILE IS CLARKFE.GRS
 THE CHARACTER OUTPUT FILE IS CLARKFE.GRC


 DO YOU WANT TO CREATE GARNET KRIGED-VALUE AND
 KRIG-VARIANCE GRID FILES - ANSWER Y OR N
Y
    1 GRID POINTS COULD NOT BE KRIGED BECAUSE OF TOO FEW POINTS IN THE SEARCH
 RADIUS.  FOR GRID POINTS THAT COULD NOT BE KRIGED, THE KRIGED VALUE
 AND THE KRIGING VARIANCE ARE SET TO ZERO SO THAT YOU WILL HAVE
 A COMPLETE GRID. YOU MAY WISH TO RERUN THIS PROGRAM USING A
 LARGER SEARCH RADIUS.



NUMBER OF GRID POINTS  =   16
SS2DGRID NORMAL END OF ROUTINE
```

Contents of Data Set CLARKFE.GRC:

VARIOGRAM PARAMETERS

NUGGET = 0.000 SILL = 19.800 C-VALUE = 19.800
A-VALUE = 65.000

SEARCH RADIUS = 85.00
MAXIMUM NUMBER OF HOLES USED = 16

NUMBER OF POINTS IN NORTH-SOUTH DIRECTION = 4
DISTANCE BETWEEN POINTS IN NORTH-SOUTH DIRECTION = 100.00
NUMBER OF POINTS IN EAST-WEST DIRECTION = 4
DISTANCE BETWEEN POINTS IN EAST-WEST DIRECTION = 100.00
NORTHING OF SOUTHWEST CORNER OF GRID OF POINTS = 0.00
EASTING OF SOUTHWEST CORNER OF GRID OF POINTS = 0.00
SEARCH RADIUS = 85.00
MAXIMUM NUMBER OF HOLES USED = 16

OUTPUT OF KRIGED RESULTS

COLUMN	ROW	X-COORD.	Y-COORD.	VALUE	KRG VAR.
1	1	0.000	0.000	33.97	24.0315
1	2	0.000	100.000	32.64	11.8343
1	3	0.000	200.000	33.74	4.7777
1	4	0.000	300.000	0.00	0.0000
2	1	100.000	0.000	38.21	17.5396
2	2	100.000	100.000	31.96	20.7928
2	3	100.000	200.000	33.51	16.0782
2	4	100.000	300.000	31.94	26.3587
3	1	200.000	0.000	40.09	3.2181
3	2	200.000	100.000	30.51	12.1448
3	3	200.000	200.000	37.99	10.3024
3	4	200.000	300.000	32.27	11.6956
4	1	300.000	0.000	29.26	29.2253
4	2	300.000	100.000	36.19	7.7943
4	3	300.000	200.000	36.34	10.5059
4	4	300.000	300.000	38.59	11.5355

```
KRIGING STEPS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR KRIGING PROGRAMS.
2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
5) PLOT A SYMBOL MAP AT THE TERMINAL.
6) CREATE CONTROL FILE OF SEMI-VARIOGRAM PARAMETERS.
7) COMPUTE SEMI-VARIOGRAM.
8) CROSS-VALIDATE SEMI-VARIOGRAM.
9) KRIG A GRID OF POINTS.
10) KRIG A SINGLE POLYGON AS A WHOLE.
11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.
12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
10
     WHAT IS THE PATH NAME OF THE STATPAC INPUT FILE?
CLARKFE.PR
     GIVE A PATH NAME FOR THE CHARACTER OUTPUT FILE:
CLARKFE.BLC


     ENTER PARAMETERS OF THE VARIOGRAM


     ENTER THE NUGGET VALUE - USE DECIMAL :
0.
     ENTER C-VALUE OF VARIOGRAM - USE DECIMAL :
19.8
     ENTER A-VALUE OF VARIOGRAM - USE DECIMAL :
35.
     ENTER THE MAXIMUM DISTANCE FROM POINT TO
     BE KRIGED - OR CENTER OF BLOCK IF BLOCK KRIGING -
     FOR A HOLE TO BE INCLUDED FOR KRIGING
     (THIS DEFINES CIRCULAR NEIGHBORHOOD - USE DECIMAL):
200.
     ENTER THE MAXIMUM NUMBER OF HOLES TO BE
     USED WITHIN THE CIRCULAR NEIGHBORHOOD - NO DECIMAL :
50
ENTER DESCRIPTORS FOR ENCOMPASSING POLYGON TO BE KRIGED:
     IS POLYGON RECTANGULAR WITH SIDES PARALLEL TO
     COORDINATE AXES? ANSWER YES OR NO :
YES
     ENTER MINIMUN NORTHING OF POLYGON - USE DECIMAL :
0.
```

```
     ENTER MAXIMUM NORTHING OF POLYGON - USE DECIMAL :
400.
     ENTER MINIMUM EASTING OF POLYGON - USE DECIMAL :
0.
     ENTER MAXIMUM EASTING OF POLYGON - USE DECIMAL :
400.

     ENTER DESCRIPTORS OF THE KRIGING GRID

     ENTER NUMBER OF GRID POINTS IN NORTH DIRECTION :
25
     ENTER NUMBER OF GRID POINTS IN  EAST DIRECTION :
25
     IS A DRILL HOLE LIST WANTED? YES OR NO  :
YES
     IS LISTING OF BOUNDARY NODES WANTED? YES OR NO  :
YES

  COLUMN  IDS ARE:

  1) X-COOR     2) Y-COOR     3) % Fe

     ENTER STATPAC FILE DESCRIPTORS

     WHAT IS COLUMN NUMBER OF THE NORTH COORDINATE? :
2
     WHAT IS COLUMN NUMBER OF THE  EAST COORDINATE? :
1
     WHAT IS COLUMN NUMBER OF THE ASSAY VALUE?      :
3

          READING DATA FROM STATPAC INPUT FILE
  50      UNQUALIFIED DATA POINTS HAVE BEEN STORED IN RAM

 EXECUTING...
 SETTING UP GRID OF  POINTS FOR COVARIANCE CALCULATIONS
 COMPUTING COORDINATES OF CENTROID OF BLOCK
 COMPUTING BLOCK VARIANCE - THIS MAY TAKE CONSIDERABLE
 TIME DEPENDING ON NUMBER OF NODES FOR POLYGON.
```

```
 SEARCHING FOR DRILL HOLES WITHIN SEARCH RADIUS
 SETTING UP SYSTEM OF SIMULTANEOUS EQUATIONS
 SOLVING SYSTEM OF SIMULTANEOUS EQUATIONS
THIS MAY TAKE CONSIDERABLE TIME - IT IS DEPENDENT ON
NUMBER OF DATA POINTS AND RECTANGULAR BLOCKS.
 COMPUTING MEAN AND VARIANCE
 WRITING RESULTS TO OUTPUT FILE


 COMPUTATIONS COMPLETE
 THE STATPAC INPUT FILE WAS CLARKFE.PR
 THE CHARACTER OUTPUT FILE IS CLARKFE.BLC



 NORMAL END OF SS2DBLOK


 Contents of Data Set CLARKFE.BLC:

                          VARIOGRAM PARAMETERS


                          VARIOGRAM PARAMETERS
       NUGGET =       0.000     SILL =      19.800     C-VALUE =      19.300
   A-VALUE =      35.000


NO. OF Y-GRID POINTS       25
NO. OF X-GRID POINTS       25
DEFINITION OF BLOCK - NODES
    NORTHING          EASTING
( 0.40000000E+03, 0.00000000E+00)
( 0.40000000E+03, 0.40000000E+03)
( 0.00000000E+00, 0.40000000E+03)
( 0.00000000E+00, 0.00000000E+00)
AREA OF BLOCK =  0.16000000E+06
SEARCH RADIUS =  0.20000000E+03
NUMBER OF HOLES READ FROM DATA FILE =     50


BLOCK VARIANCE =                          0.66516


NUMBER OF GRID POINTS USED  625
NUMBER OF HOLES USED   36
```

OUTPUT OF KRIGED RESULTS

X-COORD.	Y-COORD.	KRIGING MEAN	KRIGING VARIANCE
199.993	200.000	34.099	0.620

HOLE NO.	NORTH COORD.	EAST COORD.	SAMPLE VALUE	KRIGING WEIGHT
HOLE 33	185.000	175.000	41.400	0.0260
HOLE 43	230.000	200.000	37.400	0.0322
HOLE 9	185.000	240.000	30.200	0.0438
HOLE 8	175.000	160.000	36.000	0.0075
HOLE 32	185.000	130.000	35.300	0.0149
HOLE 22	280.000	200.000	30.400	0.0437
HOLE 7	180.000	120.000	33.400	0.0277
HOLE 31	125.000	145.000	30.100	0.0446
HOLE 18	230.000	290.000	39.900	0.0339
HOLE 10	115.000	260.000	33.200	0.0242
HOLE 47	285.000	270.000	32.900	0.0419
HOLE 34	90.000	220.000	28.500	0.0345
HOLE 39	150.000	310.000	34.800	0.0239
HOLE 13	110.000	285.000	35.300	0.0130
HOLE 16	195.000	325.000	33.900	0.0136
HOLE 41	220.000	325.000	37.800	0.0088
HOLE 15	170.000	335.000	27.400	0.0143
HOLE 36	65.000	265.000	24.400	0.0315
HOLE 6	50.000	175.000	36.800	0.0360
HOLE 17	235.000	350.000	37.600	0.0253
HOLE 4	145.000	55.000	28.600	0.0402
HOLE 38	105.000	325.000	39.500	0.0220
HOLE 50	290.000	330.000	41.400	0.0194
HOLE 46	355.000	165.000	40.800	0.0509
HOLE 21	270.000	50.000	30.200	0.0515
HOLE 14	115.000	345.000	31.000	0.0265
HOLE 25	310.000	335.000	40.600	0.0132
HOLE 42	215.000	375.000	29.800	0.0227
HOLE 49	320.000	330.000	44.100	0.0303
HOLE 28	155.000	25.000	29.600	0.0029
HOLE 11	15.000	235.000	33.700	0.0376
HOLE 40	165.000	385.000	29.900	0.0325
HOLE 30	15.000	155.000	40.400	0.0152
HOLE 5	20.000	125.000	41.500	0.0334
HOLE 26	195.000	5.000	33.900	0.0351
HOLE 3	135.000	15.000	28.600	0.0251

SUM OF WEIGHTS = 1.0000

```
KRIGING STEPS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR KRIGING PROGRAMS.
2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
5) PLOT A SYMBOL MAP AT THE TERMINAL.
6) CREATE CONTROL FILE OF SEMI-VARIOGRAM PARAMETERS.
7) COMPUTE SEMI-VARIOGRAM.
8) CROSS-VALIDATE SEMI-VARIOGRAM.
9) KRIG A GRID OF POINTS.
10) KRIG A SINGLE POLYGON AS A WHOLE.
11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.
12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
11
     WHAT IS THE PATH NAME OF THE STATPAC INPUT FILE?
CLARKFE.PR
     GIVE A PATH NAME FOR THE CHARACTER OUTPUT FILE:
CLARKFE.MUC
ENTER DESCRIPTORS FOR MULTIPLE RECTANGULAR BLOCKS
WITIHIN ENCOMPASSING POLYGON. DESCRIPTORS FOR
ENCOMPASSING POLYGON WILL BE ASKED FOR LATER.

ENTER MINIMUM NORTHING FOR CALCULATION OF MULTIPLE
BLOCKS -USE DECIMAL:
0.
 ENTER MINIMUM EASTING FOR CALCULATION OF MULTIPLE
 BLOCKS - USE DECIMAL:
0.
ENTER SIZE (IN Y-COORD. UNITS) OF RECTANGLE IN NORTH
DIRECTION - USE DECIMAL:
25.
ENTER SIZE (IN X-COORD. UNITS) OF RECTANGLE IN EAST
DIRECTION - USE DECIMAL:
25.
ENTER TOTAL NUMBER OF BLOCKS (NORTH DIRECTION) TO
BE KRIGED - NO DECIMAL:
16
ENTER TOTAL NUMBER OF BLOCKS (EAST DIRECTION) TO
BE KRIGED - NO DECIMAL:
16
```

```
     ENTER PARAMETERS OF THE VARIOGRAM


     ENTER THE NUGGET VALUE - USE DECIMAL :
0.
     ENTER C-VALUE OF VARIOGRAM - USE DECIMAL :
19.8
     ENTER A-VALUE OF VARIOGRAM - USE DECIMAL :
85.
     ENTER THE MAXIMUM DISTANCE FROM POINT TO
     BE KRIGED - OR CENTER OF BLOCK IF BLOCK KRIGING -
     FOR A HOLE TO BE INCLUDED FOR KRIGING
     (THIS DEFINES CIRCULAR NEIGHBORHOOD - USE DECIMAL):
85.
     ENTER THE MAXIMUM NUMBER OF HOLES TO BE
     USED WITHIN THE CIRCULAR NEIGHBORHOOD - NO DECIMAL :
16
ENTER DESCRIPTORS FOR ENCOMPASSING POLYGON TO BE KRIGED:
     IS POLYGON RECTANGULAR WITH SIDES PARALLEL TO
     COORDINATE AXES? ANSWER YES OR NO :
YES
     ENTER MINIMUM NORTHING OF POLYGON - USE DECIMAL :
0.
     ENTER MAXIMUM NORTHING OF POLYGON - USE DECIMAL :
400.
     ENTER MINIMUM EASTING OF POLYGON - USE DECIMAL :
0.
     ENTER MAXIMUM EASTING OF POLYGON - USE DECIMAL :
400.


  COLUMN  IDS ARE:
  1) X-COOR     2) Y-COOR     3) % Fe

     ENTER STATPAC FILE DESCRIPTORS

     WHAT IS COLUMN NUMBER OF THE NORTH COORDINATE? :
2
     WHAT IS COLUMN NUMBER OF THE  EAST COORDINATE? :
1
     WHAT IS COLUMN NUMBER OF THE ASSAY VALUE?      :
3


          READING DATA FROM STATPAC INPUT FILE
  50      UNQUALIFIED DATA POINTS HAVE BEEN STORED IN RAM
 SETTING UP SYSTEM OF SIMULTANEOUS EQUATIONS
 SOLVING SYSTEM OF SIMULTANEOUS EQUATIONS
 THIS MAY TAKE CONSIDERABLE TIME - IT IS DEPENDENT ON
 NUMBER OF DATA POINTS AND RECTANGULAR BLOCKS.
```

Contents of Data Set CLARKFE.MUC:

VARIOGRAM PARAMETERS

NUGGET = 0.000 SILL = 19.600 C-VALUE = 19.600
A-VALUE = 85.000
AREA OF POLYGON = 160000.00000

DESCRIPTION OF RECTANGULAR BLOCKS

MINIMUM NORTHING = 0.0000 MINIMUM EASTING = 0.0000
EACH BLOCK IS: 100.000 BY 100.000
THERE ARE 4 BLOCKS IN THE N-S DIRECTION AND 4 IN THE E-W DIRECTION.

BLOCK VARIANCE = 5.33096

NO. OF PRESET Y-GRID POINTS PER RECTANGULAR BLOCK = 4
NO. OF PRESET X-GRID POINTS PER RECTANGULAR BLOCK = 4
SEARCH RADIUS PER RECTANGULAR BLOCK = 85.00000
NUMBER OF HOLES READ FROM DATA FILE = 50

OUTPUT OF KRIGED RESULTS

COLUMN	ROW	CENTER OF RECTANGLE X-COORD.	CENTER OF RECTANGLE Y-COORD.	KRIGING MEAN	KRIGING VARIANCE
1	1	50.000	50.000	33.828	2.254
1	2	50.000	150.000	30.991	1.509
1	3	50.000	250.000	31.585	5.249
1	4	50.000	350.000	29.511	3.772
2	1	150.000	50.000	36.941	1.916
2	2	150.000	150.000	34.256	1.668
2	3	150.000	250.000	35.199	5.894
2	4	150.000	350.000	38.405	5.020
3	1	250.000	50.000	30.478	1.257
3	2	250.000	150.000	32.806	1.830
3	3	250.000	250.000	34.723	1.891
3	4	250.000	350.000	34.928	7.981
4	1	350.000	50.000	34.556	4.216
4	2	350.000	150.000	31.538	0.688
4	3	350.000	250.000	36.965	1.484
4	4	350.000	350.000	41.145	3.052

AVERAGE KRIGED VALUE = 0.342408E+02

```
KRIGING STEPS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR KRIGING PROGRAMS.
2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
5) PLOT A SYMBOL MAP AT THE TERMINAL.
6) CREATE CONTROL FILE OF SEMI-VARIOGRAM PARAMETERS.
7) COMPUTE SEMI-VARIOGRAM.
8) CROSS-VALIDATE SEMI-VARIOGRAM.
9) KRIG A GRID OF POINTS.
10) KRIG A SINGLE POLYGON AS A WHOLE.
11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.
12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
12
 WHAT IS NAME OF STATPAC INPUT FILE?
CLARKFE.PR


 CHI-SQUARE TEST FOR NORMALITY OF STATPAC VARIABLE



 COLUMN IDS ARE:

  X-COOR     Y-COOR     % Fe

 WHAT IS COLUMN NUMBER OF THE VARIABLE? :
3
 LOGARITHMIC TRANSFORMATION WANTED? YES OR NO ?
NO

 TEST VARIABLE = % Fe


                    SERV-UR-SELF CHI-SQUARE PROGRAM
                         NORMALITY TEST


    SUMMARY STATISTICS
        NO. POINTS          50
        MEAN          0.34487938E+02
        VARIANCE      0.22759010E+02
        STD.DEV.      0.47706404E+01
        SKEWNESS      0.24636749E-01
        KURTOSIS      0.20352335E+01
        MAX VALUE     0.44099998E+02
        MIN VALUE     0.24400001E+02
```

```
        RANGE        0.1969997E+02


                                                OBSERVED    THEORETICAL
            CLASS INTERVAL                      FREQUENCY    FREQUENCY

          LESS THAN    0.18983356E+02              0     0.00000000E+00
    0.18983356E+02     0.21368675E+02              0     0.00000000E+00
    0.21368675E+02     0.23753994E+02              0     0.00000000E+00
    0.23753994E+02     0.26139316E+02              0     0.00000000E+00
    0.26139316E+02     0.28524635E+02              5     0.52824993E+01
    0.28524635E+02     0.30909954E+02             10     0.60489988E+01
    0.30909954E+02     0.33295273E+02              5     0.87329998E+01
    0.33295273E+02     0.35680595E+02             11     0.98709984E+01
    0.35680595E+02     0.38065918E+02              6     0.87329998E+01
    0.38065918E+02     0.40451233E+02              7     0.60439988E+01
    0.40451233E+02     0.42836555E+02              6     0.52824993E+01
    0.42836555E+02     0.45221878E+02              0     0.00000000E+00
    0.45221878E+02     0.47607193E+02              0     0.00000000E+00
    0.47607193E+02     0.49992515E+02              0     0.00000000E+00
      GREATER THAN     0.49992515E+02              0     0.00000000E+00
        COMPUTED CHI-SQUARE    0.54228620E+01
        DEGREES OF FREEDOM              4
        PROBABILITY LEVEL      0.24551356E+00
DO YOU WANT TO TEST ANOTHER VARIABLE? Y/N :
N
 DO YOU WANT TO PROCESS DATA FROM ANOTHER FILE? Y/N :
N
NORMAL END OF CHI-SQUARE TEST

KRIGING STEPS CURRENTLY AVAILABLE:

1) PREPARE STATPAC FILE FOR KRIGING PROGRAMS.
2) TRANSFORM STATPAC FILE TO READABLE/EDITABLE FILE.
3) TRANSFORM READABLE/EDITABLE FILE TO STATPAC FILE.
4) CALCULATE BASIC STATISTICS.
5) PLOT A SYMBOL MAP AT THE TERMINAL.
6) CREATE CONTROL FILE OF SEMI-VARIOGRAM PARAMETERS.
7) COMPUTE SEMI-VARIOGRAM.
8) CROSS-VALIDATE SEMI-VARIOGRAM.
9) KRIG A GRID OF POINTS.
10) KRIG A SINGLE POLYGON AS A WHOLE.
11) KRIG MULTIPLE RECTANGULAR BLOCKS WITHIN A POLYGON.
12) TEST FOR NORMALITY OF A VARIABLE.
13) CREATE NEW STATPAC FILE BY SORTING STATPAC FILE.
14) REVIEW STATUS OF INPUT/OUTPUT FILES.
15) EXIT KRIGING SYSTEM.

ENTER A NUMBER 1-15 OR CARRIAGE RETURN.
**** IF INPUT STATPAC FILE NOT PREVIOUSLY PROCESSED BY
STEP 1, IT IS MANDATORY TO DO IT NOW.
CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
13
```

```
 WHAT IS NAME OF STATPAC INPUT FILE?
CLARKFE.PR
 GIVE A NAME FOR THE STATPAC OUTPUT FILE:
CLARKFE.SOS
 DO YOU WANT TO SEE THE COLUMN IDS? Y/N:
Y

     N=   50 M=  3
    COLUMN IDS ARE:

 1)X-COOR     2)Y-COOR     3)% Fe


    DO YOU WANT TO SORT FILE CLARKFE.PR
         1) BY PRIMARY ROW ID
         2) BY SECONDARY ROW ID
         3) BY A SELECTED STATPAC VARIABLE,
         4) BY TWO SELECTED STATPAC VARIABLES, OR
         5) BY THREE SELECTED STATPAC VARIABLES?
            ANSWER 1, 2, 3, 4, OR 5:
1
    DO YOU WANT TO SORT ROW IDS
         1) IN ASCENDING ORDER, OR
         2) IN DESCENDING ORDER?
            ANSWER 1 OR 2:
1


 NOW READING STATPAC INPUT FILE

RECORDS PROCESSED =   50
 NOW SORTING ARRAY OF POINTERS
 NOW WRITING STATPAC OUTPUT FILE

RECORDS PROCESSED =   50
 THE SORTED STATPAC FILE HAS BEEN WRITTEN
 THE OUTPUT FILE IS CLARKFE.SOS
 FILEID= ABCDEFGH   N=   50   M=  3




 NORMAL END OF STPSORT ROUTINE.
```

```
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14


 INPUT FILENAME: CLARKFE.PR
 NORTH COORDINATE   COLUMN NO:   2   ID: Y-COOR
 EAST COORDINATE    COLUMN NO:   1   ID: X-COOR
 ASSAY VALUE        COLUMN NO:   3   ID: % Fe


                    OUTPUT FILES CREATED
 FILENAME:                      FILE TYPE:  CREATED BY:
 CLARKFE.PR                     STATPAC     1) PREP STATPAC FILE

 CLARKFE.FI                     CHARACTER   2) STATPAC TO EDIT
 CLARKFE.UN                     STATPAC     3) EDIT TO STATPAC
 PLOTFILE                       CHARACTER   5) SYMBOL MAP
 CLARKFE.CT2                    CHARACTER   6) CR CONTROL FILE
 CLARKFE.CT2                    CHARACTER   6) CONT. FILE
 CLARKFE.VAR                    CHARACTER   7) SEMI-VARIOGRAM
 CLARKFE.XVC                    CHARACTER   8), 9) XVAL OR GRID
 CLARKFE.XVS                    STATPAC     8), 9) XVAL OR GRID
 CLARKFE.GRC                    CHARACTER   8), 9) XVAL OR GRID
 CLARKFE.GRS                    STATPAC     8), 9) XVAL OR GRID
 CLARKFE.BLC                    CHARACTER   10-11) KRIG POLYGON
 CLARKFE.MJC                    CHARACTER   10-11) KRIG POLYGON
 CLARKFE.SOS                    STATPAC     13) STATPAC SORT
```

```
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CARRIAGE RETURN WILL CAUSE MENU TO REAPPEAR.
15
**** STOP
```