

1984/36. SEDSAM: A FORTRAN program for size of sediment analysis
(Revision 1)

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Abstract

SEDSAM is a program which analyses the results of size separation of the particles of a sediment. Mean, sorting, skewness and kurtosis are calculated, the formulae employed being controlled by the highest and lowest cumulative percentage weights. Linear interpolation is used.

INTRODUCTION

The program SEDSAM was written in response to a need for sediment grain size distribution analysis. The program calculates various parameters directly from the weights on the sieves without recourse to graph plotting. The user may elect to include or exclude the weight fraction which has passed through the finest sieve. Various formulae have been employed for calculation of the required parameters and the program automatically chooses the most efficient (King, 1966, p. 283) formulae which may be used. The program is written in FORTRAN and runs interactively through a .CSS on the Department of Mines Perkin Elmer 8/32 minicomputer. The program has been revised in response to differing user requirements.

RUNNING THE PROGRAM

The program is run interactively and the user initiates the run by typing "SEDSAM". The user is asked for the sample identification (up to 20 characters) and the number of sieves used (enter in integer form). The program uses phi values for calculation but users have the option to input sieve sizes in millimetres by giving the appropriate response to the next question. The user is then repeatedly prompted for the sieve size (as phi or millimetre value, depending on the choice previously made by the user) and the corresponding retained weight. Sieve sizes must be entered in correct order from coarse to fine. If this condition is not met the program will write a message to that effect and return the user to data pairs entry starting point. After the number of pairs of values entered is equal to the number of sieves entered, the program will request the weight passing all sieves. This weight will appear on the screen as a percentage of the total sediment weight and the user will choose whether to include this weight, exclude it and readjust the percentage weights held on the sieves to total one hundred percent, or run the analysis twice - once each way. The program then calculates the mean and, if it has sufficient information, also calculates sorting, skewness and kurtosis. Intermediate phi values are obtained by linear interpolation.

In the case that more than 16% sediment by weight is passed by all sieves (unless this is to be ignored) or is left on the coarsest sieve then no calculations are carried out and an appropriate message appears on the screen. After the program has completed its task with a sample the user will be prompted for another sample by "AGAIN? (N/Y)". Responding with "N" will terminate the program but responding with "Y" will take the user to the start of the program for another sample. The sample identification, phi values and corresponding cumulative weight percentages, mean, skewness, sorting and kurtosis and certain messages will be printed (if appropriate).

REFERENCE

KING, C.A.M. 1966. *Techniques in geomorphology*. Edward Arnold Ltd : London.

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APPENDIX 1

Program SEDSAM (Revision 1)

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COMMON /DATA/ PHI(30), PCENT(30), N
CHARACTER*1 ANS
CHARACTER*3 SIZE
CHARACTER*20 SAMPLE
REAL CUMWT(30), MEAN, KURT
LOGICAL V95, V97, ADJUST, XMM, BOTH
10 SIZE='PHI'
V95=.FALSE.
V97=.FALSE.
ADJUST=.FALSE.
XMM=.FALSE.
BOTH=.FALSE.
WRITE(5,40)
40 FORMAT(1X, 'ENTER SAMPLE IDENTIFICATION (20 CHARS. MAX)')
READ(5,42) SAMPLE
42 FORMAT(A20)
WRITE(6,44) SAMPLE
44 FORMAT(////, 1X, A20, /)
WRITE(5,50)
50 FORMAT(1X, 'ENTER NUMBER OF SIEVES USED')
READ(5,*) N
WRITE(5,53)
53 FORMAT(1X, 'SIEVE SIZE IN PHI OR MM? (P/M)')
54 READ(5,55) ANS
55 FORMAT(A1)
IF(ANS.NE.'M'.AND.ANS.NE.'P') THEN
WRITE(5,56)
56 FORMAT(1X, 'ANSWER P OR M')
GO TO 54
ENDIF
IF(ANS.EQ.'M') THEN
XMM=.TRUE.
SIZE='MM'
ENDIF
89 WRITE(5,90)
90 FORMAT(1X, 'ENTER SIZE AND CORRESPONDING WEIGHT VALUES, ONE ',
1/PAIR OF VALUES', /, 1X, 'AT A TIME AS PROMPTED. ', /, 1X, 'SIEVE ',
2/SIZES MUST BE IN ORDER FROM COARSE TO FINE.')
DO 100 J=1, N
WRITE(5,95) SIZE
95 FORMAT(1X, 'ENTER ', A3, ' VALUE AND CORRESPONDING RETAINED WEIGHT'
1/, /, ' SEPARATE VALUES BY A COMMA')
READ(5,*) PHI(J), WT
IF(XMM) THEN
PHI(J)=-ALOG10(PHI(J))/ALOG10(2.0)
ENDIF
IF((PHI(J).LT.PHI(J-1)).AND.(J.GT.1)) THEN
WRITE(5,97)
97 FORMAT(1X, 'PHI ORDERING ERROR - ORDER MUST BE COARSE TO FINE',
1/, 1X, 'START AGAIN')
GO TO 89
ENDIF
IF(J.EQ.1) THEN
CUMWT(J)=WT
ELSE
CUMWT(J)=CUMWT(J-1)+WT
ENDIF
100 CONTINUE
WRITE(5,105)

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105 FORMAT(1X, 'ENTER WEIGHT PASSED THROUGH ALL SIEVES')
    READ(5,*) FINES
    TOTWT=CUMWT(N)+FINES
    FPCENT=100.0*FINES/TOTWT
    WRITE(5,110) FPCENT
110 FORMAT(1X, 'FRACTION PASSING ALL SIEVES IS ', F5.1, ' PERCENT',
1/, 10X, 'DO YOU WISH TO IGNORE THIS FRACTION?      (N/Y)',
2/, '      OR TRY IT BOTH WAYS?      (B)')
111 READ(5,55) ANS
    IF(ANS.NE.'N'.AND.ANS.NE.'Y'.AND.ANS.NE.'B') THEN
        WRITE(5,114)
114 FORMAT(1X, 'ANSWER N OR Y')
        GO TO 111
    ENDIF
110 IF(ANS.EQ.'Y'.OR.BOTH) THEN
    TOTWT=TOTWT-FINES
    ADJUST=.TRUE.
    ENDIF
    IF(ANS.EQ.'B') BOTH=.TRUE.
    DO 130 J=1,N
        PCENT(J)=100.0*CUMWT(J)/TOTWT
        WRITE(5,120) PHI(J),PCENT(J)
        WRITE(6,120) PHI(J),PCENT(J)
120 FORMAT(1X, 'PHI VALUE', F7.2, ' PERCENT', F6.1)
130 CONTINUE
    IF(PCENT(1).GT.16.0) THEN
        WRITE(5,135)
        WRITE(6,135)
135 FORMAT(1X, 'PERCENTAGE ON COARSEST SIEVE GREATER THAN 16 PERCENT',
1/, ' SUGGEST YOU RESIEVE THIS PORTION WITH COARSER SIEVES')
        GO TO 800
    ENDIF
    IF(.NOT.ADJUST) THEN
    IF(FPCENT.GT.16.0) THEN
        WRITE(5,138)
        WRITE(6,138)
138 FORMAT(1X, 'PERCENTAGE PASSING ALL SIEVES GREATER THAN 16%',
1/, ' SUGGEST YOU RESIEVE THIS PORTION WITH FINER SIEVES OR',
2/ ' IGNORE')
        IF(BOTH) THEN
            GO TO 118
        ELSE
            GO TO 800
        ENDIF
    ENDIF
    ENDIF
    IF(PCENT(1).LT.5.0.AND.(ADJUST.OR.FPCENT.LT.5.0)) THEN
    IF(PCENT(1).LT.3.0.AND.(ADJUST.OR.FPCENT.LT.3.0)) THEN
        V97=.TRUE.
    ENDIF
        V95=.TRUE.
    ENDIF
    CALL LININT(84.0, PHI84)
    CALL LININT(80.0, PHI80)
    CALL LININT(75.0, PHI75)
    CALL LININT(70.0, PHI70)
    CALL LININT(65.0, PHI65)
    CALL LININT(55.0, PHI55)
    CALL LININT(50.0, PHI50)

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CALL LININT(45.0, PHI45)
CALL LININT(35.0, PHI35)
CALL LININT(30.0, PHI30)
CALL LININT(25.0, PHI25)
CALL LININT(20.0, PHI20)
CALL LININT(16.0, PHI16)
CALL LININT(10.0, PHI10)
IF(V95) THEN
CALL LININT(5.0, PHI5)
CALL LININT(15.0, PHI15)
CALL LININT(85.0, PHI85)
CALL LININT(95.0, PHI95)
ENDIF
IF(V97) THEN
CALL LININT(3.0, PHI3)
CALL LININT(90.0, PHI90)
CALL LININT(97.0, PHI97)
ENDIF
IF(V95) THEN
MEAN=(PHI5+PHI15+PHI25+PHI35+PHI45
1+PHI55+PHI65+PHI75+PHI85+PHI95)/10.0
SKEW=(PHI16+PHI84-2*PHI50)/(2*(PHI84-PHI16))
1+(PHI5+PHI95-2*PHI50)/(2*(PHI95-PHI5))
KURT=(PHI95-PHI5)/(2.44*(PHI75-PHI25))
IF(V97) THEN
SORT=(PHI70+PHI80+PHI90+PHI97-PHI3-PHI10-PHI20-PHI30)/9.1
ELSE
SORT=(PHI84-PHI16)/4.0+(PHI95-PHI5)/6.6
ENDIF
WRITE(5,170) MEAN, SORT, SKEW, KURT
WRITE(6,170) MEAN, SORT, SKEW, KURT
170 FORMAT(1X, '      MEAN IS', F8.3, 'X', ' SORTING IS', F8.3,
1/, ' SKEWNESS IS', F8.3, 'X', ' KURTOSIS IS', F8.3, '/')
ELSE
MEAN=(PHI16+PHI84)/2.0
WRITE(5,180) MEAN
WRITE(6,180) MEAN
180 FORMAT(1X, 'MEAN IS ', F6.2, '      NO SORTING, SKEWNESS OR KURTOSIS',
1' CALCULATED', '/')
ENDIF
IF(BOTH.AND..NOT.ADJUST) GO TO 118
800 WRITE(5,802)
802 FORMAT(1X, 'AGAIN?'           (N/Y)')
804 READ(5,55) ANS
IF(ANS.EQ.'Y') THEN
GO TO 10
ENDIF
IF(ANS.EQ.'N') GO TO 910
WRITE(5,808)
808 FORMAT(1X, 'ANSWER N OR Y')
GO TO 804
910 WRITE(6,911)
911 FORMAT(/)
STOP
END

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SUBROUTINE LININT(XCENT,YPHI)
COMMON /DATA/ Y(30),X(30),N
DO 100 I=1,N
IF(XCENT.LT.X(I)) THEN
GO TO 200
ENDIF
100 CONTINUE
WRITE(5,105)
105 FORMAT(1X,'LININT ERROR')
GO TO 900
200 YPHI=Y(I-1)+(Y(I)-Y(I-1))*(XCENT-X(I-1))/(X(I)-X(I-1))
RETURN
900 WRITE(5,905) XCENT,X(I)
905 FORMAT(1X,'XCENT IS ',F6.2,' X(I) IS ',F6.2)
STOP
END

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LOCATION AND NAME

Station 10 is located on the north side of the island, about 1/2 mile from the shore. The island is about 1/2 mile long and 1/4 mile wide. The station is located on the north side of the island, about 1/2 mile from the shore. The island is about 1/2 mile long and 1/4 mile wide. The station is located on the north side of the island, about 1/2 mile from the shore. The island is about 1/2 mile long and 1/4 mile wide.

DESCRIPTION

The island, which has an area of 100 acres, is located on the north side of the island, about 1/2 mile from the shore. The island is about 1/2 mile long and 1/4 mile wide. The station is located on the north side of the island, about 1/2 mile from the shore. The island is about 1/2 mile long and 1/4 mile wide. The station is located on the north side of the island, about 1/2 mile from the shore. The island is about 1/2 mile long and 1/4 mile wide. The station is located on the north side of the island, about 1/2 mile from the shore. The island is about 1/2 mile long and 1/4 mile wide.

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