

1983/29. A FORTRAN program for calculating elevation differences from barometric pressure readings (Revision 1).

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*Abstract*

This program calculates the elevation difference corresponding to successive pairs of pressure readings, the running sum of the elevation differences, and the elevation difference between the first and last stations of a batch. It is assumed that each batch of pressure readings is made at an approximately constant temperature.

THE PROGRAM

*BAROHT (Appendix 1)*

This program reads elevation unit options, temperature, and barometric pressure on logical unit 5. All output is on logical unit 5. The program incorporates no correction for pressure drift and computes elevation differences from the simplified formula:

$$h = \frac{-\log_e P / P_0}{Mg/RT} \quad (\text{cm})$$

(Leaman, 1981)

where h = height  
 P = pressure at station  
 P<sub>0</sub> = reference pressure  
 M = molecular weight of air = 29  
 g = acceleration due to gravity = 980  
 R = gas constant = 8.31 x 10<sup>7</sup>  
 T = absolute temperature

The following data is read from logical unit 5:

AOK - M if elevation differences are to be output in metres, F if the differences are to be output in feet.  
 TEMP - the temperature to be used in the formula (Celsius)  
 AFIRST - the reference pressure. If AFIRST = 0 the program stops.  
 ANEW - the station pressure. If ANEW = 0 the running elevation difference and the elevation difference between the last station input and the reference station are output. The program then requests a new reference pressure.

Output is the elevation difference corresponding to the last two pressure values input.

REFERENCE

LEAMAN, D.E. 1981. Gravity survey and reduction techniques. *Geophys. Spec.Rep.Dep.Mines Tasm.* 9.

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## APPENDIX 1

## Program BAROHT

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$TITL  BAROHT.FTN - BAROMETRIC HEIGHTING
C A PROGRAM TO CALCULATE A SERIES OF BAROMETRIC HEIGHT DIFFERENCES, THE
C SUM OF THE DIFFERENCES AND THE DIFFERENCE BETWEEN THE FIRST AND LAST
C STATIONS OF THE BATCH.
C THE HEIGHT DIFFERENCES MAY BE IN METRES OR FEET.
C THE TEMPERATURE MUST BE SPECIFIED IN DEGREES CENTIGRADE.
  INTEGER*2 METRES, FEET, AOK
  LOGICAL IER
  DATA METRES/1HM/, FEET/1HF/
  OPEN(UNIT=5, FILE='CON:')
C OPEN THE CONSOLE AS LU 5
  10 WRITE(5,100)
  100 FORMAT(' DIFFERENCES IN METRES OR FEET?')
  READ(5,101) AOK
  101 FORMAT(A1)
  IF (AOK .EQ. METRES) FACT=1
  IF (AOK .EQ. FEET) FACT=3.28084
C FACTOR FROM METRES TO FEET
  IF (AOK .NE. FEET .AND. AOK .NE. METRES) GOTO 10
C
  WRITE(5,102)
  102 FORMAT(' TEMPERATURE?')
  READ(5,*) TEMP
C READ TEMPERATURE IN DEGREES CENTIGRADE IN FREE FORMAT
C
C NOW CALCULATE THE CONSTANT
  CONST=0.01*(8.31E7*(273.0+TEMP))/(29.*980.)
C H(METRES)=RT/100Mg
C LEAMAN - GEOPHYSICS SPECIAL REPORT NO. 9
  12 WRITE(5,103)
  103 FORMAT(' FIRST PRESSURE?')
  READ(5,*) AFIRST
C FIRST READING OF BATCH
  IF (AFIRST .EQ. 0.) STOP
C END OF RUN
  DIFTOT=0.
C RUNNING HEIGHT DIFFERENCE
  ALAST=AFIRST
  14 WRITE(5,104)
  104 FORMAT(' PRESSURE?')
  READ(5,*) ANEW
C THE REST OF THE PRESSURE READINGS READ HERE
  IF (ANEW .LE. 0.) GOTO 16
C END OF BATCH SO WANT RUNNING TOTAL AND MISCLOSURE PRINTED TO CHECK
C POSSIBLE ERRORS

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        DIFF=-CONST*ALOG(ANEW/ALAST)
        WRITE(5,105) DIFF
105  FORMAT(F10.2)
        ALAST=ANEW
C  WANT RUNNING DIFFERENCES
        DIFTOT=DIFTOT+DIFF
C  RUNNING HEIGHT TOTAL
        GOTO 14
C  BACK ROUND
C
        16 CONTINUE
C  END OF BATCH
        WRITE(5,106) DIFTOT

106  FORMAT(' TOTAL DIFFERENCE=',F10.2)
        DIFF=-CONST*ALOG(AFIRST/ALAST)
        WRITE(5,107) DIFF
107  FORMAT(' DIFFERENCE BETWEEN FIRST AND LAST ',
        ' STATIONS=',F10.2)
        GOTO 12
        END
```