UR1982_15

1/5

1982/15. A FORTRAN program for calculating elevation differences from barometric pressure readings.

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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:

$$h = \frac{-\log_e {}^{P}/_{Po}}{Mg/RT} \text{ (cm)}$$

(Leaman, 1981)

where $h$ = height
$P$ = pressure at station
$P_o$ = reference pressure
$M$ = molecular weight of air = 29
$g$ = acceleration due to gravity = 980
$R$ = gas constant = $8.31 \times 10^7$
$T$ = absolute temperature

Non-standard subroutines are:

SYSCOM (I, 'AS 0899*') - assign logical unit 8 to the core buffer.

FRINIT (ANUM, IER, ILUN) - read one real number in free format from logical unit ILUN and store it in ANUM. If there is an error IER is TRUE.

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.

2/5

## 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

```
ITL  BAROHT - BAROMETRIC HEIGHTING
A PROGRAM TO CALCULATE A SERIES OF BAROMETRIC HEIGHT DIFFERENCES, THE
SUM OF THE DIFFERENCES AND THE DIFFERENCE BETWEEN THE FIRST AND LAST
STATIONS OF THE BATCH.
THE HEIGHT DIFFERENCES MAY BE IN METRES OR FEET.
THE TEMPERATURE MUST BE SPECIFIED IN DEGREES CENTIGRADE.
    INTEGER*2 METRES,FEET,AOK
    LOGICAL IER
    DATA METRES/1HM/,FEET/1HF/
    CALL SYSCOM(I,'AS 0899*')
SET UP CORE BUFFER
 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
FACTOR FROM METRES TO FEET
    IF (AOK .NE. FEET .AND. AOK .NE. METRES) GOTO 10

 11 WRITE(5,102)
102 FORMAT(' TEMPERATURE?')
    CALL FRINIT(TEMP,IER,5)
    IF (IER) GOTO 11
READ TEMPERATURE IN DEGREES CENTIGRADE IN FREE FORMAT

NOW CALCULATE THE CONSTANT
    CONST=0.01*(8.31E7*(273.0+TEMP))/(29.*980.)
 H(METRES)=RT/100Mg
LEAMAN - GEOPHYSICS SPECIAL REPORT NO. 9
 12 WRITE(5,103)
103 FORMAT(' FIRST PRESSURE?')
    CALL FRINIT(AFIRST,IER,5)
    IF (IER) GOTO 12
FIRST READING OF BATCH
    IF (AFIRST .EQ. 0.) STOP
END OF RUN
    DIFTOT=0.
RUNNING HEIGHT DIFFERENCE
    ALAST=AFIRST
 14 WRITE(5,104)
104 FORMAT(' PRESSURE?')
    CALL FRINIT(ANEW,IER,5)
    IF (IER) GOTO 14
THE REST OF THE PRESSURE READINGS READ HERE
    IF (ANEW .LE. 0.) GOTO 16
END OF BATCH SO WANT RUNNING TOTAL AND MISCLOSURE PRINTED TO CHECK
POSSIBLE ERRORS
    DIFF=-CONST*ALOG(ANEW/ALAST)
    WRITE(5,105) DIFF
105 FORMAT(F10.2)
    ALAST=ANEW
WANT RUNNING DIFFERENCES
    DIFTOT=DIFTOT+DIFF
RUNNING HEIGHT TOTAL
    GOTO 14
BACK ROUND

 16 CONTINUE
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
```