OCEAN CLIMATOLOGY EXTRACTION AND ADJUSTMENT PROGRAM FOR THE MEDITERRANEAN PROGRAM S OVEL

BY

TAIVO LAEVASTU

10 JULY 1973

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CONTENTS

1. INTRODUCTION .................................................. 1
2. INPUT DATA AND REQUEST CARDS ................................. 4
3. LIST OF ESSENTIAL ABBREVIATIONS ............................... 5
4. SUMMARY OF ROUTINES BY FUNCTION ............................... 7
5. LISTINGS OF PROGRAMS AND SUBROUTINES .......................... 9

Program SOVEL ..................................................... 10
Subroutine J02 .................................................... 11
Subroutine J03 .................................................... 12
Subroutine J04 .................................................... 13
Subroutine SOR ..................................................... 15
Subroutine GRAD ................................................... 18
Subroutine MEDCLM ............................................... 20
Subroutine INTRP .................................................. 22

LIST OF ILLUSTRATIONS

Figure 1. Example of tabular printout of salinity, temperature and sound speed profile ............ 2

Figure 2. Example of graphical printing of a salinity, temperature and sound speed profile ........ 3
I. INTRODUCTION

SOVEL was written as part of the Ocean Thermal Structure Analysis package for Fleet Weather Central, Rota, Spain. Its primary purpose is to extract the temperature and salinity levels (by one-degree squares) in desired locations from an ocean climatology tape. It takes the corresponding analyzed sea-surface temperature and the mixed layer depth at given locations which are read from input cards and adjusts the upper standard levels to these parameters. An additional feature of the program is the adjustment of the temperature and salinity gradients below the mixed layer depth. These gradients can be sharp indeed in the Mediterranean. Their sharpness varies with various parameters and seasons and this variation has been taken directly into consideration with this program.

The program outputs are (a) the interpolated ocean (salinity and temperature) climatology (optional); (b) the tabulated adjusted ocean climatology (salinity and temperature) and sound speed (Figure 1); and (c) graphical printing of the above parameters (Figure 2).

The subroutines MEDCLM and INTRP were written by Mr. Roger Bauer and the climatology tape was also prepared by him. The program will run on any CDC computer (CDC 1604, 3100, 6500, etc.) with FORTRAN IV or FORTRAN Extended compiler.
<table>
<thead>
<tr>
<th>DATE</th>
<th>12</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAT.</td>
<td>40.04</td>
<td>LONG.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>TEMP.</th>
<th>SALIN.</th>
<th>VELOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15.90</td>
<td>37.67</td>
<td>1513.50</td>
</tr>
<tr>
<td>30</td>
<td>15.90</td>
<td>37.67</td>
<td>1513.98</td>
</tr>
<tr>
<td>60</td>
<td>15.90</td>
<td>37.67</td>
<td>1514.47</td>
</tr>
<tr>
<td>80</td>
<td>15.90</td>
<td>37.67</td>
<td>1514.80</td>
</tr>
<tr>
<td>91</td>
<td>15.43</td>
<td>37.71</td>
<td>1513.59</td>
</tr>
<tr>
<td>103</td>
<td>14.96</td>
<td>37.76</td>
<td>1512.35</td>
</tr>
<tr>
<td>125</td>
<td>14.02</td>
<td>38.09</td>
<td>1510.13</td>
</tr>
<tr>
<td>150</td>
<td>13.38</td>
<td>38.17</td>
<td>1508.55</td>
</tr>
<tr>
<td>200</td>
<td>13.06</td>
<td>38.27</td>
<td>1508.44</td>
</tr>
<tr>
<td>250</td>
<td>13.07</td>
<td>38.36</td>
<td>1509.41</td>
</tr>
<tr>
<td>300</td>
<td>13.12</td>
<td>38.42</td>
<td>1510.47</td>
</tr>
<tr>
<td>400</td>
<td>13.17</td>
<td>38.46</td>
<td>1512.34</td>
</tr>
<tr>
<td>500</td>
<td>13.14</td>
<td>38.45</td>
<td>1513.88</td>
</tr>
<tr>
<td>600</td>
<td>13.07</td>
<td>38.45</td>
<td>1515.30</td>
</tr>
<tr>
<td>700</td>
<td>13.01</td>
<td>38.43</td>
<td>1516.73</td>
</tr>
<tr>
<td>800</td>
<td>12.96</td>
<td>38.43</td>
<td>1518.22</td>
</tr>
<tr>
<td>900</td>
<td>12.95</td>
<td>38.42</td>
<td>1519.84</td>
</tr>
<tr>
<td>1000</td>
<td>12.94</td>
<td>38.42</td>
<td>1521.46</td>
</tr>
<tr>
<td>1200</td>
<td>12.94</td>
<td>38.40</td>
<td>1524.77</td>
</tr>
<tr>
<td>1500</td>
<td>12.96</td>
<td>38.40</td>
<td>1529.85</td>
</tr>
</tbody>
</table>

Figure 1. Example of tabular printout of salinity, temperature and sound speed profile.
**Graphic Display of Temperature, Salinity, and Velocity Change with Depth**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Temperature (°C)</th>
<th>Salinity (%)</th>
<th>Velocity (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70-80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80-90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90-100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100-120</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>120-150</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 2. Example of graphical printing of a temperature, salinity and sound speed profile.*
2. INPUT DATA AND REQUEST CARDS

The climatological input data is available on a special tape prepared by Mr. Roger Bauer from data provided by Mrs. Margaret Robinson of Scripps Institution of Oceanography. The tape includes data from the Mediterranean Sea, Black Sea, and the eastern Atlantic from the coast of Portugal, Gulf of Cadiz and Moroccan coast to 15° west longitude (20 to 50N; 15W to 45E).

The synoptically analyzed sea-surface temperature and mixed layer depth data are read from cards in Subroutine J02. The first input card contains the number of profiles (L0P, Format I3). (See listing for Subroutine J02.)

All sea-surface temperature data follow on one or several cards in Format 10F6.2 and the mixed layer depth is provided in the same format. (See listing for Subroutine J02.)

The location cards (one card for each position) are read in Subroutine MEDCLM. The card format is: NLAT, NLATH, NLONG, NLONH, MONTH, IDAY. NLAT and NLONG are latitude and longitudes in whole degrees in Format I4. NLATH and NLONH are indicators of north/south latitudes or east/west longitudes (i.e., N, S, E or W only). The month and day are given with two numbers each in Format 2I2. (See listing for Subroutine MEDCLM.)
3. LIST OF ESSENTIAL ABBREVIATIONS IN THE PROGRAM

ALAT  Latitude of the profile
ALONG  Longitude of the desired profile
DEDE  Depth in kilometers
DEP  Depth of the levels in meters
DEPTH  Depth of a given level in upper layers (above 150 m)
DEPTH2  Depth of a given level in lower layers
EDP  An additional depth counter in sorting of the values of a profile
ICNT  A counter for records per page
KE  A counter for the number of levels in a profile
LINE  Number of characters in a line in printing a program
LLM  A counter
LO  A counter for the number of profiles under computation
LOP  The number of profiles requested by the program
ND  The number of values for lower layers for which annual mean values of salinity and temperature are available
NLATH  Indicator for north or south latitude
NLONH  Indicator east or west of longitude
NNN  A counter
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS</td>
<td>The number of levels in upper layers</td>
</tr>
<tr>
<td>NUM</td>
<td>A counter</td>
</tr>
<tr>
<td>PLD</td>
<td>Mixed layer depth in meters</td>
</tr>
<tr>
<td>SAL</td>
<td>Salinity in 0/00</td>
</tr>
<tr>
<td>SALTD</td>
<td>Salinity at a given level in lower layers</td>
</tr>
<tr>
<td>SALTS</td>
<td>Salinity at a given level in upper layers</td>
</tr>
<tr>
<td>SDEP</td>
<td>An intermediate storage for depth values</td>
</tr>
<tr>
<td>SSAL</td>
<td>An intermediate storage for salinity values</td>
</tr>
<tr>
<td>SST</td>
<td>Sea surface temperature in degree Celsius</td>
</tr>
<tr>
<td>STEMP</td>
<td>An intermediate storage for temperature values</td>
</tr>
<tr>
<td>TEMP</td>
<td>Temperature in degrees Celsius</td>
</tr>
<tr>
<td>TEMPD</td>
<td>Temperature at a given level in lower layers</td>
</tr>
<tr>
<td>TEMPS</td>
<td>Temperature at a given level in upper layers</td>
</tr>
<tr>
<td>VEL</td>
<td>Sound velocity meters per second</td>
</tr>
<tr>
<td>VOS</td>
<td>An intermediate computation of sound speed</td>
</tr>
<tr>
<td>VOP</td>
<td></td>
</tr>
<tr>
<td>VOT</td>
<td></td>
</tr>
<tr>
<td>VSI</td>
<td></td>
</tr>
</tbody>
</table>
4. SUMMARY OF ROUTINES BY FUNCTION

SOVEL
This is a control program which sets the counters LO (the number of profiles) and KE (the number of levels in any given profile). It calls several subroutines and checks at the end that all desired profiles have been computed.

J02
This subroutine reads from the cards the number of profiles required in the particular computation, and the sea-surface temperature and the mixed layer depth for each profile. Calls Subroutine MEDCLM.

J03
This subroutine computes the sound speed for each level in each profile. The latest version of the sound speed computation formula from SACLANT (NATO) ASW Research Center, La Spezia, Italy is used. ¹

J04
This subroutine first prints, in tabular form, the month, day, latitude, longitude and the depth, temperature, salinity and sound speed for each profile. Thereafter, the values are graphically printed out for checking and eventual subjective correction. (See Figures 1 and 2)

<table>
<thead>
<tr>
<th>Subroutine</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOR</strong></td>
<td>This subroutine sorts the various levels in the profile after additional levels have been inserted below the mixed layer depth by Subroutine <strong>GRAD</strong>.</td>
</tr>
<tr>
<td><strong>GRAD</strong></td>
<td>This subroutine adjusts the temperature and salinity gradients below the mixed layer depth and adds additional levels, if so required.</td>
</tr>
<tr>
<td><strong>MEDCLM</strong></td>
<td>This subroutine extracts climatological data from a special ocean climatology tape. The tape is sorted from north to south and west to east. Data to be printed is selected on the basis of a request card (locations on the card must be in the same order as the tape). The coordinate system used in sorting the tape is as follows: Longitudes are sorted starting with $0^\circ$ east and ending with $0^\circ$ west. Latitudes are sorted with all data from a given latitude appearing before any data from the next southern latitude.</td>
</tr>
</tbody>
</table>
5. LISTINGS OF PROGRAMS AND SUBROUTINES

Listings for each of the programs and subroutines are presented in the same order in which they are summarized in section 4.
PROGRAM SOVEL

3200 FORTRAN (3,0)/RTS 05/25/73

PROGRAM SOVEL
DIMENSION TEMP(33), DEP(33), SAL(33), VEL(33), SST(25), PLD(25), EDP(25, 15), LNI(110), SDEP(12), STEMP(32), SSAL(32), NNN(25)
COMMON TEMP, DEP, SAL, VEL, SST, PLD, EDP, LNI, SDEP, STEMP, SSAL, NNN, NUM, L
LOP, LT, LO, V7, KE, KEP, NUC, NLAT, NLATH, NLAG, NLAGH, MONTH, IDAY
LO=1
K=1
3 CALL J02
CALL GRAN
CALL SOR
CALL J03
CALL J04
L0=LO=1
1 IF (LOP-LO)5,3,3
5 STOP
END

CONTROL PROGRAM
SUBROUTINE J02

SUBROUTINE J02
DIMENSION TEMP(25), DEP(25), SAL(25), VEL(19), SST(25), PLD(25), EUP(25),
LINE(110), SDEP(32), STEMP(32), SSAL(32), NNN(25)
COMMON TEMP, DEP, SAL, VEL, SST, PLD, EUP, LINE, SDEP, STEMP, SSAL, NNN, NUM, L
COMMON LT, LD, VEL, SST, PLD, EUP, LINE, SDEP, STEMP, SSAL, NNN, NUM, L
10, LT, LD, VEL, SST, PLD, EUP, LINE, SDEP, STEMP, SSAL, NNN, NUM, L
C JO2 HEADING OF VALUES
C MAX 20 PROFILES, 27 DEPTHS EACH.
C NUM IS NUMBER OF DEPTHS IN THE PROFILE
C LOP IS NUMBER OF PROFILES
C POC IS PROFILE NAME
C DEP DEPTH IN METERS
C TEMP IS TEMPERATURE IN DEGREES C
C SAL IS SALINITY IN PROFILE
C LAT IS LATITUDE OF THE PROFILE
C LTS IS TEMP. SCALE IN PLOTTING
C LTS =10 THEN 0 TO 10 DEG, IF LTS=4 THEN 0 TO 25 DEG.
C SST IS IN CENTIGRADE
C PLD IS THE MIXED LAYER DEPTH IN METERS
21 FORMAT(13)
23 FORMAT(10F6.2)
40 V0=1492.9
HEAD 21, LOP
READ 21,(SST(I),I=1, LOP)
READ 25,(PLD(I),I=1, LOP)
READ 25,(SST(I),I=1, LOP)
28 CONTINUE
CALL MDCLM
RETURN
C CALLING SUBROUTINE FOR EXTRACTION OF CLIMATOLOGY FROM TAPE.
END
SUBROUTINE JO3
3200 FORTRAN (3,0)/NTS 05/25/73

SUBROUTINE JO3
DIMENSION TEMP(23), DEP(23), SAL(23), VEL(23), SST(25), PLD(25), EEP(25),
LINE(10), SDEP(12), STEMPL(23), SSAL(32), NNN(25),
COMMON TEMP, DEP, SAL, VEL, SST, PLD, EEP, LINE, SDEP, STEMPL, SSAL, NNN, NUM, L
10, PET, T, VKE, KEP, YUC, NLAT, NLATH, NLONG, NLOHY, MONTH, IDAY

50 COMPTATION
ALAT = FLOAT((4LAT-5)/10)
501 DEP(I) = DEP(I)*100.
505 VOT = 3*(TEMP(I)-10)*0.006*(ABS(TEMP(I)-10)**2)*0.4*(ABS(T
10)**2)*1.2*(SAL(I)**1.2)*0.1*(TEMP(I)-15.3)**1.55*(SAL(I)**35.3)
2)*DEP(I)/64.
506 VOP = 0.1*ABS(DEVDE)**2*(0.002*ABS(DDE)**2)*ABS(TEMP(I)-16.)
1**2)*0.1*DEP(I)/90.
VOS = 2.0E-7*TEMP(I)*ABS(TEMP(I)-10)**4
VSI = 0.015*(ABS(SAL(I)**35.3)**2)*1*DEVDE
50 VEL(I) = V0 + VOT*VOP + VOS + VSI
RETURN
END
SUBROUTINE J04
INTEGER XIYF
DIMENSION TEMP(23), DEP(23), SAL(23), VEL(27), SST(25), PLD(25), EDP(25),
LINE(11), SOEP(32), STEM(32), SSAL(37), NNN(25)
COMMON TEMP, DEP, SAL, VEL, SST, PLD, EDP, LINE, SOEP, STEM, SSAL, NNN, NUM, L
10, PLT, LO, V, KE, KEP, NUC, WLAT, NLAT, WLONG, NLONG, MONTH, IDAY
ALAT = FLOAT(WLAT (WLAT = 5)/10)
ALONG = FLOAT((WLONG - 9)/10)
C F04 PRINTING OF VALUES
42 FORMAT (25X, 5H0.06, 6X, 5HTMP, 6X, AWSALIN, 6X, 6HVELOC, 7)
43 FORMAT (25X, F5.0, 6X, F5.0, 6X, F5.0, F5.0, 5HTMP, 7.2)
251 FORMAT (9X, 4H-ALAT, F7.1, A2, 4X, 5H0.005, 7.1, A2, 7)
253 FORMAT (1H1.29X, 4H0.005, 10, 4X, 16, 100, 79)
KKE = KE
PRINT 253, MONTH, IDAY
PRINT 251, ALAT, NLAT, ALONG, WLONG, Writing (D, T, S, V in tabular form)
PRINT 72
C GRAPHING OF VALUES
50 FORMAT (4H1.20, 75H GRAPHIC DISPLAY OF TEMPERATURE, SALINITY, AND
1VELOCITY CHANGE WITH DEPTH, 7) /
261 FORMAT (1X, 1H, 3X, 1H5, 18X, 2H10, 18X, 2H15, 18X, 2H20, 18X, 2H25, 18X, 2H30
19X)
57 FORMAT (1X, 1H5, 2X, 2H30, 18X, 2H32, 18X, 2H34, 18X, 2H36, 18X, 2H38, 18X,
19X)
53 FORMAT (1X, 1H5, 3X, 1H0, 18X, 2H20, 18X, 2H40, 18X, 2H60, 18X, 2H80, 17X,
19X)
15H00
PRINT 50
PRINT 261
PRINT 52
PRINT 53
II = IHT
ISELIHS
IV = IHY
IX = IXH
IPLNKE = 1N
IPEL = IPEL
I = IPEL
II = IHT
DO 64 I = 1, 100
64 LINE(I) = 1M
DO 66 I = 100, 1, 0
66 LINE(I) = 1P
PRINT 11, (LINE(I), I = 1, 100)
11X FORMAT (19X, 1H4, 100A1)
DO 68 I = 1, 99
68 LINE(I) = BLANK
71 TAKE
IF DEP(I) = 150., 74, 75, 72
72 DEU = DEP(I) - DEP(I = 1)
IF DEP(I) = 150., 73, 730, 720
730 KX = FIX(Delu/100,)
GO TO 74
730 KX = KX + (DEU/50,)
740 KAK = 1
73 PRINT 200, (LINE(L), L = 1, 99)
200 FORMAT (1X, 1H4, 99A1, 1H4)
IF (KAK = KX) = 14, 75, 75
74 KAK = 1
- 13 -
SUBROUTINE J04 (continued)

   GO TO 73
   C TEMPERATURE
      75 DO 210 L=10,100,10
      210 LINE(L)=IP
         J=JXFIXF(TEP(I)*4.,I)*20
         IF(J)62,62,63
      62 J=1
      63 IF(J=100)95,84,84
      84 J=99
      85 LINE(J)=IT
   C SALINITY
      H=JXFIXF(SAL(I)*10,-300)
      IF(M)92,92,93
      92 M=1
      93 IF(M=100)94,94,94
      94 M=99
      95 IF(M=M)97,97,97
      96 LINE(M)=IX
      GO TO 100
      97 LINE(M)=IS
   C VELOCITY
      100 J=JXFIXF(VEL(I)*100)
         IF(J)702,102,103
      102 J=1
      103 IF(J=110)105,104,104
      104 J=99
      105 IF(J=110)106,106,108
      106 LINE(J)=1F
      GO TO 110
      108 LINE(JJ)=jV
      110 IF(J=JJ)114,112,114
      112 LINE(J)=IZ
      IF(DEP(I)=100,400,114
      400 DEP(I)=1
      414 IF(DEP=XP(100))
         PRINT 310,1DEP,(LINE(I),1#1,99)
      310 FORMAT(10X,1I8,1X,1H.,99A1,1H.)
      320 DO 333 I=1,99
      333 LINE(I)=IBLANK
      334 K=KKE+1
      IF(K=KKE)71,71,345
      345 K=KKE
      RETURN
      END
SUBROUTINE SOR

DIMENSION TEMP(23), DEP(23), SAL(23), VEL(23), SST(25), PLD(25), ELP(25), 
LINE(10), SNSP(32), TSTP(32), SSAL(32), NNN(25), 
COMMON TEMP, DEP, SAL, VEL, SST, PLD, ELP, LINE, SNSP, TSTP, SSAL, NNN, NUM, L 

L0=0

IF (L0 < 7) L0 = 100, 13, 14, 1

4 NNN(L0)=L0+2

10 IF (L0 = 5) L0=5, 6

11 NNN(L0)=L0+3

12 IF (L0 = 17, 16, 17)

16 NNN(L0)=L0+3

17 NNN(L0)=L0+4

8 KKE=KE

16 NNN(KE)=NNN(L0)=1

20 KEE=KE

8 KKE=KE

9 NNN(KE)=NNN(L0)=1

11 L0=L0+1

13 L0=L0+10

14 IF (L0 = 240, 70, 40

15 IF (L0 = 240, 70, 40

15 IF (L0 = 15, 21, 20)

20 IF (L0 = 224, 23, 22)

20 IF (L0 = 24, 23, 22)

20 IF (L0 = 24, 23, 22)

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20 IF (L0 = 24, 23, 22)
SUBROUTINE SOR (continued)

\[
\begin{align*}
SDFP(i+1) &= PLD(LD) \\
1 &= 1 + 1 \\
KE &= KE + 2 \\
LU &= 1 \\
&\text{GO TO 104} \\
24 SSAL(i-1) &= SAL(KE-1) + SAL(KF) + SAL(KF+1))/3, \\
SSAL(i) &= SSAL(i-1) \\
SSAL(i+1) &= SSAL(i) \\
STEMP(i) &= SST(LD) \\
STEMP(i+1) &= SST(LD) \\
STEMP(i+2) &= SST(LD) \\
SSAL(i-2) &= SSAL(i) \\
SDEP(i) &= DEP(KF) \\
SDEP(i+1) &= DEP(KF+1) \\
SDEP(i+2) &= PLD(LD) \\
&\text{IF (DEP(KF+3) + PLD(LD))) 28, 26, 25} \\
25 KE &= KE + 2 \\
&\text{GO TO 27} \\
26 KE &= KE + 3 \\
27 = 1 + 2 \\
LU &= 1 \\
&\text{GO TO 105} \\
28 SDP(i+2) &= SDP(KE+2) \\
STMP(i+3) &= SST(LD) \\
SSAL(i+3) &= SSAL(i) \\
SDP(i+3) &= PLD(LD) \\
&\text{IF (DEP(KF+3) + PLD(LD))) 32, 30, 29} \\
29 KE &= KE + 3 \\
&\text{GO TO 21} \\
30 KE &= KE + 4 \\
31 KE &= KE + 4 \\
31 &= 1 + 3 \\
LU &= 1 \\
&\text{GO TO 104} \\
32 SSAL(i-1) &= SAL(KE-1) + SAL(KF) + SAL(KF+1) + SAL(KF+2) + SAL(KF+3))/5, \\
SSAL(i) &= SSAL(i-1) \\
SSAL(i+1) &= SSAL(i) \\
SSAL(i+2) &= SSAL(i) \\
SSAL(i+3) &= SSAL(i) \\
SSAL(i+4) &= SSAL(i) \\
STMP(i+4) &= SST(LD) \\
SDP(i+3) &= DEP(KF+3) \\
&\text{IF (DEP(KF+4) + PLD(LD))) 36, 34, 33} \\
33 SDP(i+4) &= PLD(LD) \\
KE &= KE + 4 \\
&\text{GO TO 21} \\
34 SDP(i+4) &= DEP(KF+4) \\
KE &= KE + 5 \\
35 = 1 + 4 \\
LU &= 1 \\
&\text{GO TO 104} \\
36 SDP(i+4) &= DEP(KF+4) \\
SSAL(i+5) &= SSAL(i+4) \\
STMP(i+5) &= SST(LD) \\
&\text{IF (PLD(LD) = 000)) 32, 30, 31} \\
361 PLD(LD) &= 200, \\
362 SDP(i+5) &= PLD(LD) \\
&\text{IF (DEP(KF+5) + PLD(LD))) 28, 30, 37} \\
37 KE &= KE + 5 \\
&\text{GO TO 21} \\
38 KE &= KE + 3 \\
39 = 1 + 6 \\
LU &= 1 \\
\end{align*}
\]
SUBROUTINE SOR (continued)

GO TO 105
40 IF (TEMP(L,1)) = 0,75,70,41
41 IF (TEMP(L,2)) = 0,52,44,44
42 IF (TEMP(L,5)) = 43,43,45
43 SDEP(L) = ED(L,1)
SDEP(L+1) = ED(L,3)
STEP(1) = ED(L,5)
STEP(1+1) = ED(L,5,4)
DET = SSAL(1) - SAL(KF))/4.
SSAL(1) = SSAL(1+1) - SDI
SSAL(1+1) = SSAL(1+1+1) - SDI
I = I+1
GO TO 105
44 SDEP(L) = ED(L,1)
SDEP(L+1) = ED(L,3)
SDEP(L+2) = ED(L,5)
STEP(1) = ED(L,5,2) - 100.
STEP(1+1) = ED(L,5,4)
STEP(1+2) = ED(L,6,4)
DET = SSAL(1) - SAL(KF))/4.
SSAL(1) = SSAL(1+1) - SDI
SSAL(1+1) = SSAL(1+1+1) - SDI
I = I+1
GO TO 105
45 SDEP(L) = ED(L,1)
SDEP(L+1) = ED(L,3)
SDEP(L+2) = ED(L,5)
STEP(1) = ED(L,5,2) - 100.
STEP(1+1) = ED(L,5,4)
STEP(1+2) = ED(L,6,4)
DET = SSAL(1) - SAL(KF))/4.
SSAL(1) = SSAL(1+1) - SDI
SSAL(1+1) = SSAL(1+1+1) - SDI
I = I+1
GO TO 105
70 SDEP(L) = ED(L,1)
STEP(1) = ED(L,1) - 0.05
STEP(1) = ED(L,1) - 0.05
GO TO 312
312 SDEP(L) = ED(L,1)
STEP(1) = ED(L,1) - 0.05
STEP(1) = ED(L,1) - 0.05
GO TO 315
315 SSAL(1) = SSAL(1+1) - SAL(KF))
I = I+1
CONTINUE
KE = KF
GO TO 201
201 KE = KF
CONTINUE
RETURN
END
SUBROUTINE GRAD (continued)

IF(ST(J)-TEMP(J)/4.
  IF(0.1<270,270,271
  270 IF(SAL(J)-AL(J))/2.272
  272 DIF=0.
  GO TO 271

773 DIF=J

771 EDP(J,2)+SST(J)=DIF+75*DF.

772 EDP(J,4)=EDP(J,2)-DIF=0.1*DF.

774 EDP(J,6)=EDP(J,4)-0.8*DF.

280 IF(SAL(J)-AL(J))/4.

281 IF(J,2)+SST(J)=DIF+DF.

282 EDP(J,4)+SST(J)=DIF=0.1*DF.

283 EDP(J,6)=EDP(J,4)-0.7*DF.

GO TO 281

283 DIF=J

284 EDP(J,2)=SST(J)=DIF=0.1*DF.

285 EDP(J,4)=EDP(J,2)-DIF=0.1*DF.

286 EDP(J,6)=EDP(J,4)-0.8*DF.

GO TO 281

C HLD APPROX. BETWEEN TWO LEVELS.

35 DIF=0.

36 DIF=ST(J)-TEMP(J)/3.

37 EDP(J,2)=DIF.

38 EDP(J,4)=DIF.

39 EDP(J,6)=DIF.

40 CONTINUE

RETURN

END
SUBROUTINE MEDCLM

SUBROUTINE MEDCLM

PROGRAM MEDCLM RETRIEVES CLIMATOLOGY DATA FROM TAPE.

FORMAT (14,41,14,41,14,1212)

CHECK FOR THE LAST CARD

IF (LAT = LAT) STOP

CHECK LATITUDE AND LONGITUDE

IF (LAT = LAT) STOP

LAT = LAT

CHECK TAPE RECORD, AND CHECK AGAINST REQUEST CARD

IF (LAT = LAT) STOP

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SUBROUTINE MEDCLM (continued)

C "HAVE PROPER TAPE RECORD, WHICH PRINT REQUEST.

100 CALL INTYP (MONTH, DAY, TEMP, TEMP1, S, NO, TEMP)
200 I = 1, 45
300 DEP(I) = DEPTH(I)
400 SAL(I) = SALTS(I)
500 IF (NS, GE, 6) GO TO 411
600 NS = NS + 1
700 10 1 = NS, 23
800 DEP(I) = TEMP(I) = 0.
900 RETURN
100 10 1 = DEP(I) = DEPTH(I).
200 1 = NS, 6
300 NS = NS + 1
400 10 1 = NS, 23
500 DEP(I) = TEMP(I) = 0.
600 RETURN
700 END
SUBROUTINE INTRP

3200 FORTRAN (7,0) HTS
05/28/73

SUBROUTINE INTRP(MNTH, DAY, TEMPS, TEMPNS, ND, T)
DIMENSION TEMPS(12), TEMPNS(12,5), A(5), B(5), TNAM(12)
1, C(12,5), S(I(12,5)
DATA (TNAM,=31, 28, 31,30,31,30,31,31,30,31,30,31,)
(4076, 279987299), (C0(1)=0,)
C COMPUTE CONSTANTS USED IN HARMONIC ANALYSIS
IF (TNAM(1)=90) 150, 90
90 NO 100 I=1,12
& NO 100 K=1,5
& ANG=FLOAT(I-1)*RADIN*FLOAT(K)/180
100 S(I,K)=ANP(AN)
C FIND ANGLE IN ANNUAL CYCLE FOR THE GIVEN DAY
150 ANG=FLOAT(DAY-19)*TNAM(1)*TNAM(1)*FLOAT(MONTH)+*FLOAT(MONTH))*
& RADIN
C COMPUTE THE 12 HARMONIC TERMS AND THEN FIND THE TEMP ON THE GIVEN DAY
DO 400 I=1,12
ANG=ANP(AN)
DO 160 K=1,5
A(K)=AK(K)
160 DO 170 I=1,12
& ANP=ANP(ANP)
& IF (I/2*2.0) 170, 180
170 ANP=ANP(ANP)
DO 200 I=1,200
180 ANP=ANP(ANP)
200 CONTINUE
T(1)=T(J)=ANG*COSF(ANG)/12,
DO 240 I=1,15
ANG=ANG*FLOAT(I)
240 T(J)=T(J)=ANG*COSF(ANG)+B(I)*SINF(ANG)/6.
IF (J.EQ.1) 240, 241
241 IF (T(J),GT,T(J-1)) 245, 400
245 B(I)=B(I)
IF (I.EQ.1) 240, 250
250 B(I)=B(I)
255 B(I)=B(I)
260 IF (T(J),GT,T(J-1)) 240, 270
270 B(I)=B(I)
275 B(I)=B(I)
280 IF (T(J),GT,T(J-1)) 240, 280
290 T(J)=T(J)-1
400 CONTINUE
DO 420 I=1,10
420 T(I+4)=T(I+4)
DO 450 I=1,10
450 T(I+4)=T(I+4)
C banner 1 TO 1+5 1+4 20, 420+2.55
500 CONTINUE
510 RETURN
END

- 22 -