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Catalog of Computer-Based NOAA Climatological Data Relative to U.S.G.S. Earthquake Research in California

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Since 1973, the U. S. Geological Survey has maintained a set of rainfall and temperature data for a number of locations along various active fault systems in California. In order to study relationships between climatological changes and the responses of various sorts of geophysical instrumentation used in earthquake research (Johnston, 1978; Mortensen, 1975) it is important to keep historical as well as current climate data in an easily accessible medium.

The purpose of this report is to provide a convenient summary of climatological station locations chosen by the U. S. Geological Survey for inclusion in a computer-based dataset on the MULTICS computer system in Menlo Park. The major source of station data is the National Oceanic and Atmospheric Administration (NOAA). Long term plots of data have been included for each station, along with location maps and instructions for accessing, updating, and manipulating the data on the MULTICS computer system.

Sources and Selection of Climate Data

Approximately every four weeks a monthly report called Climatological Data: California is received from the National Oceanic and Atmospheric Administration. This report, usually four months behind the actual calendar date, contains maximum and minimum daily Fahrenheit temperatures and rainfall data in hundredths of an inch for a number of locations thoughout California. From this report, 22 climate stations located near the San Andreas, Calavaras, Hayward, Sierra Madre, San Jacinto, and Cucamonga fault systems have been selected for inclusion in an ongoing climatological dataset on the MULTICS computer in Menlo Park.

The data for the SLCR and CARR stations (Parkfield, California area) are taken from NOAA's Hourly Precipitation Catalog and the HOLR data comes from the City of Hollister Department of Roads.

The data for the Alaskan stations YAGR, YAKR, YAGT, and YAGR are taken from Climatological Data: Alaska, another NOAA publication.

Updating the Station Data

At the present time, there are two directories on the MULTICS system which contain climatological data. The first, >udd>isp>data>climate.cards, contains the raw data in ASCII alpha-numeric format which has been typed in from the NOAA publications. This is where any new data for the currently existing station files should be added. After additions are made, the Geolab "Oplib Climate" operators can be used to convert this data into binary form and move it into the directory >udd>isp>data>climate from where the data can be plotted.

Rainfall

1. Log into MULTICS.

2. Type the command: cwd >udd>isp>data>climate.cards
   to change the working directory to climate.cards. All of the rainfall raw data files (or "segments") are found in this directory, with each station's data in a separate file named for the appropriate station.

3. Each Rainfall raw data file needs a 'header statement' as its first line and a *finish as its last line. The header statement should have (1) the station name, (2) the number of the year in which the data begins, (3) the julian day on which the data begins, and (4) a .01 which allows the data to be typed in hundreths of an inch with no decimal points. So the header statement will look like

brkr 73 263 .01 (spacing is important)

if the station is Berkeley, the data starts in year 1973, and the first julian day of data is 263. See Table 4 for an additional example.

4. Take each station, one by one, into the text editor (see "First Look at TED", S. Miranda, for text editor instructions) and add the new data. Follow the format as shown in Table 4. There is usually a one-line entry per station per month, which will look like:

2m 11d 20 13d 10 27d 137

if the month is February, and there are .20, .13, and 1.37 inches of rain on days 11, 13, and 27 respectively. List only the days which have rainfall in hundreths of an inch--do not include decimal points.

5. In the event that there is no rain reported for a particular month, show this by giving the number of the month and the number of the first day of the month followed by a zero. This will be plotted as zero for the entire month.

```
3m 1d 0
```

6. To skip ahead in time when no data is available, enter the date to which you wish to skip, preceded by a minus sign. This notation will cause the intervening days to be filled with the missing data symbol instead of zeros (in order to represent "no data available for this period"). When no data is available for an entire month, enter a zero for the last day of the preceding month, and a minus sign before the date for the following month.

For example, if there is no data available for the month of March:

```
2m 11d 20 13d 10 22d 137 28d 0
-4m 10d 15
```

7. In the first month of a year, the number of the year is also given when the data is entered:

```
80y 1m 4d 29d 10
```

Temperature

1. Log into MULTICS.

2. Type the command: cwd >udd>isp>data>climate.cards
to change the working directory to climate.cards. All of the temperature files reside within this directory. The data for each station is in a separate file having the same name as the station itself.

3. Each temperature raw data file needs a "header statement" as its first line, a *mean between the maximum and minimum temperatures, and a *finish at the end of the data. The header statement should contain (1) the station name, (2) the beginning year of the data, and (3) the beginning julian day, and will look like

sbrt 79 001 (spacing is important)

if the station is sbrt, the data starts in year 1979, and the first julian day of data is 001.

4. Take each station, one at a time, into the text editor (see "First Look at TED" for text editor instructions), and add the new data. Two entries will be necessary for each station. The temperature files are set up so that each station is listed twice, once in the first half of the file, under maximum daily temperatures, and again in the second half, under minimum daily temperatures.

5. See sections 5 and 6 in the preceding Rainfall section for directions on how to represent missing data.

6. In the first month of a year, the number of the year is also given when the data is entered:

```
80y 1m 1d 56 57 56 ...
```

6. When the climate operators are used to read these rainfall data into the climate directory for eventual plotting, the mean daily temperature is computed from the daily maximum and minimum data in this climate.cards directory.

Oplib Climate

There is a library of operators in Geolab (Herriot & Ward, 1978) on the MULTICS computer system designed to manipulate and plot the climate data once this data been typed into the climate.cards directory. (See Appendices I and II for complete operator library and source code listings.)

1. pltclim (sens)

This operator plots all available data for a specified rainfall or temperature station. To use it from Geolab type:

```
oplib climate
pltclim 'brkr' (specifying whichever station you wish to plot)
```

The interval, beginning day, and year will be set automatically by the pltclim operator. If you don't want to use the default input directory of >udd>isp>data>climate.cards, type '>udd>mydir'=inputdir, putting in the name of the directory you wish to use.

2. allclim

This operator moves all data which is in >udd>isp>data> climate.cards (including any newly added data) into >udd>isp>data>climate changing the data from ASCII to binary form so that it can be plotted on a Tektronix display terminal. Allclim also does a "shoclim" (see below) for each station as it is moved, so 'allclim' executes an automatic movclim/shoclim for each and every station. This is the operator used to move all the new data in one automatic operation when a new month's data has been typed into "climate.cards".

3. movclim 'sens'

This operator moves data from climate.cards to the climate directory for one selected station, converting the data to binary form. This is a useful capability when only selected stations are updated.

4. shoclim 'sens'

This operator shows beginning year, julian day, interval, and ending year and julian day for any partiular station in the climate directory.

Station I.D.s

Tables 1, 2, and 3 list the California and Alaska Rainfall and Temperature stations, giving the station i.d., place name, the fault system near which the station is located and the general location when that may not be obvious.

Station Location Maps

Figures 1, 2, and 3 show the locations of the various stations with relation to particular fault systems.

Plotted Data

Actual plots of the available data for each station follow the Figures. These data are current as of 1 December 1979, and will be updated each month as new data comes in from NOAA.

TABLE 1

California

Temperature Stations

station i.d.	place name	fault system	location
PRVT	Priest Valley	San Andreas	King City
BRKT	Berkeley	Hayward/Calavaras	
GILT	Gilroy	Calavaras	
PINT	Pinnacles Nat. Mon.	San Andreas	S. of Hollister
PAST	Pasadena	Sierra Madre	
RIVT	Riverside Fire Sta.	San Jacinto	
SBRT	San Bernardino County Hospital	San Jacinto/ San Andreas	
SBGT	Sanberg Weather Station Office	San Andreas	NW of Palmdale
UPLT	Upland	Cucamonga	
BORT	Borrego Desert Park	San Jacinto	
VALT	Valyermo Fire Sta.	San Andreas	

TABLE 2

California

Rainfall stations

station i.d.	place name	fault system	location
SLCR	Slack Canyon	San Andreas	Parkfield
HOLR	Hollister	Calavaras San Andreas	
PRVR	Priest Valley	San Andreas	King City
CARR	Cholame Alley Ranch	San Andreas	Parkfield
BRKR	Berkeley	Hayward/Calavaras	
GILR	Gilroy	Calavaras	
PAIR	Paicines	San Andreas	Hollister
PINR	Pinnacles Nat. Mon.	San Andreas	
PASR	Pasadena	Sierra Madre	
RIVR	Riverside Fire Sta.	San Jacinto	
SBRR	San Bernardino County Hospital	San Jacinto/ San Andreas	
SBGR	Sanberg Weather Station Office	San Andreas	NW of Palmdale
UPLR	Upland	Cucamonga	Pomona
BORR	Borrego Desert Park	San Jacinto	Anza-Borrego Des.
VALR	Valyermo Fire Sta.	San Andreas	SE of Palmdale

TABLE 3

Alaska

Rainfall Stations

station i.d.	place name	fault system	location
YAGR	Cape Yakataga	Chugach/StElias	SE Alaska
YAKR	Yakutat	Chugach/StElias	SE Alaska

Alaska

Temperature Stations

station i.d.	place name	fault system	location
YAGT	Cape Yakataga	Chugach/StElias	SE Alaska
YAKT*	Yakutat	Chugach/StElias	SE Alaska

*to be added Spring 1980

References

Herriot, J. W., and Ward, P. L., (in preparation) 1978. GEOLAB: A Computer Language for Processing Geophysical Data Interactively, U. S. Geological Survey Open-File Report.

Honeywell, Multics Programmers Manual Commands and Active Functions, Series 60, 1975, Honeywell Information Systems, Inc.

Johnston, M. J. S., Jones, A. C., Daul, W., and Mortensen, C. E., (1978). Tilt Near an Earthquake (Ml=4.3), Briones Hills, California, Bull. Seism. Soc. Am. 68, 169-173.

Miranda, S. L., First Look at TED, 1978. U. S. Geological Survey Computer Division Center

Mortensen, C. E., and Johnston, M. J. S., (1975). The Nature of Surface Tilt along 85 km of the San Andreas Fault--Preliminary Results from a 14-instrument Array. Pageoph, Vol. 113, Birkhauser Verlag, Basel.

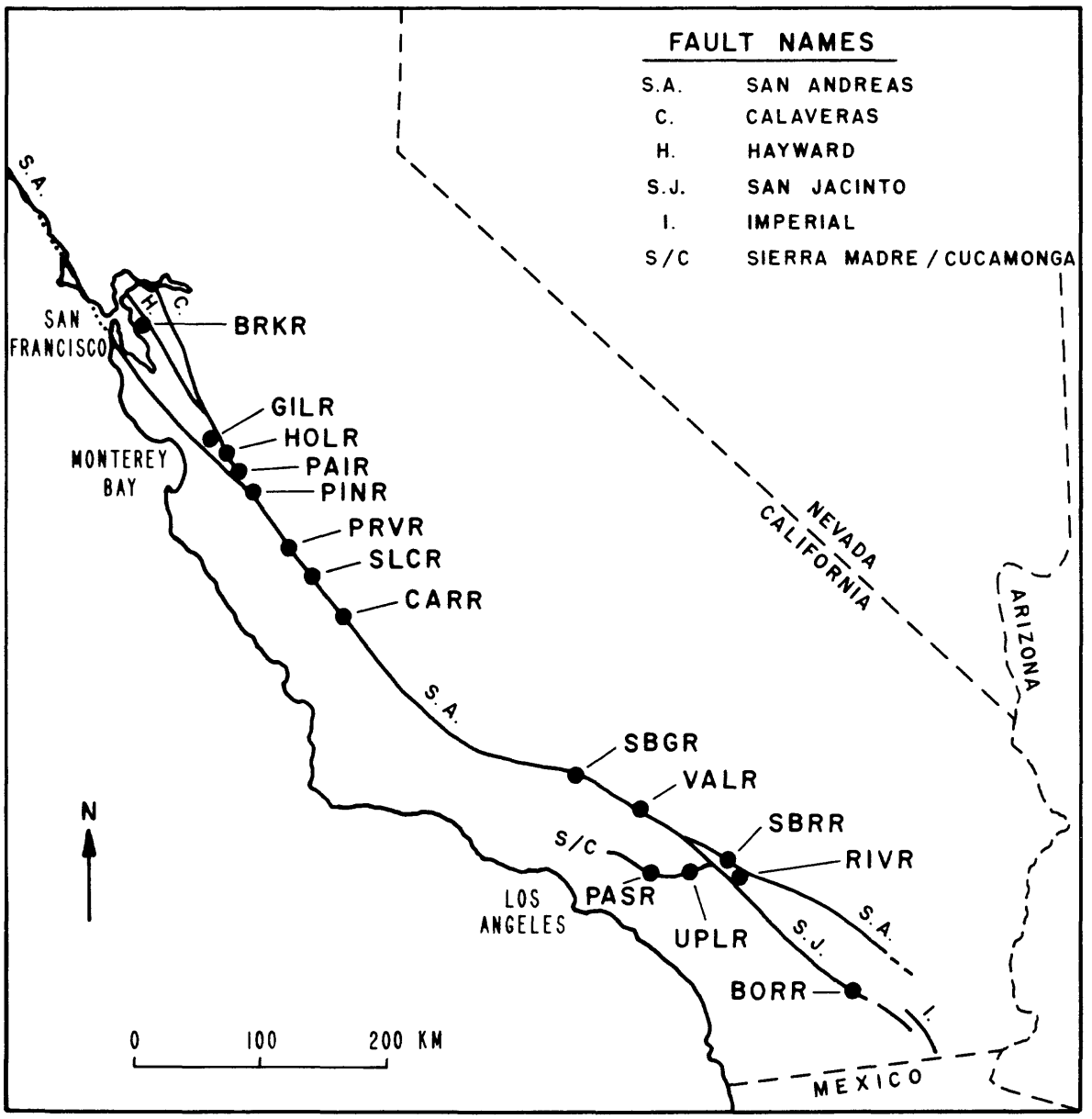


Figure 1. NOAA California Rainfall Station Locations for which Data is Available in U.S.G.S. Climatological Data Base

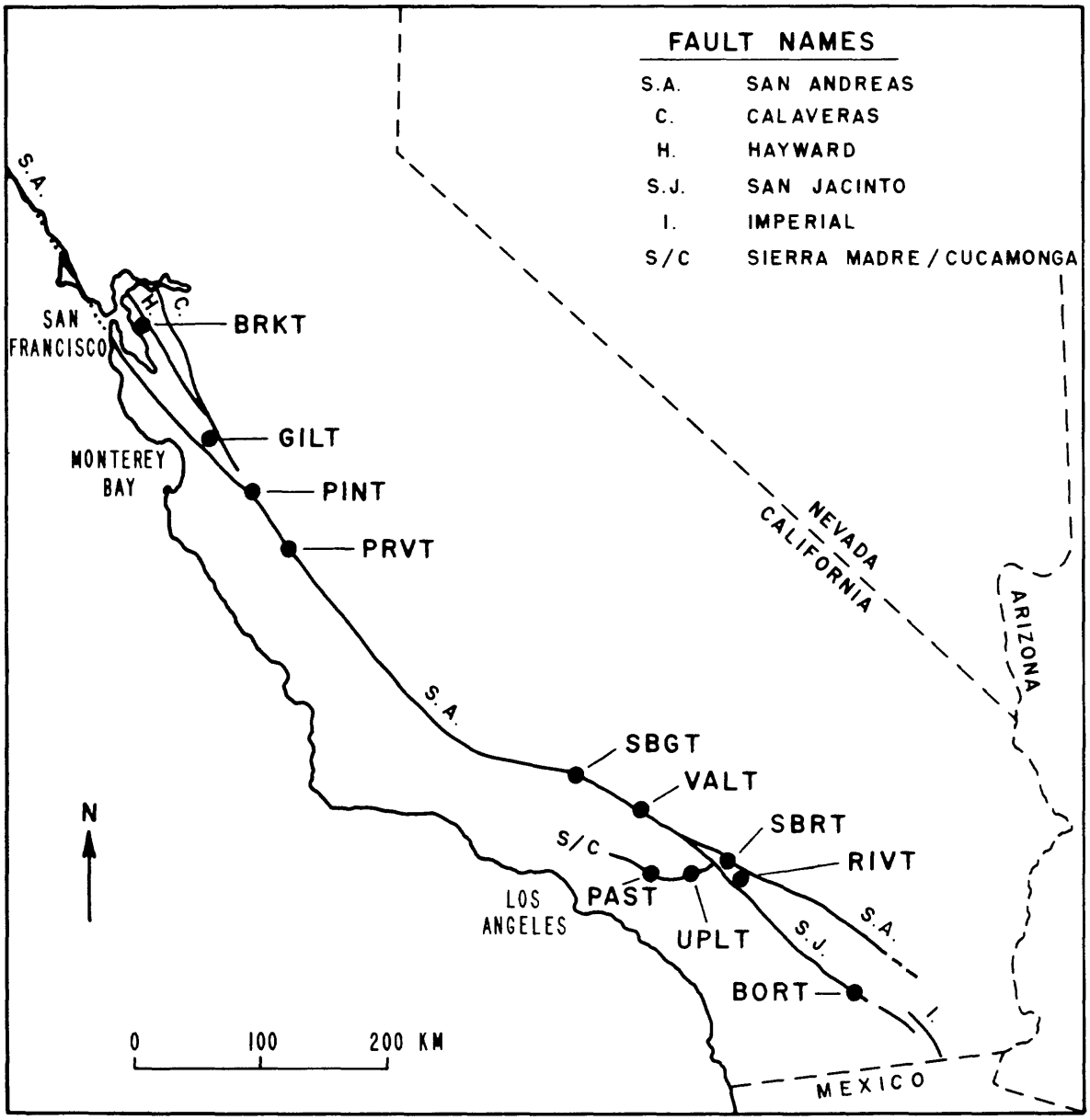


Figure 2. NOAA California Temperature Station Locations for which Data is Available in U.S.G.S. Climatological Data Base

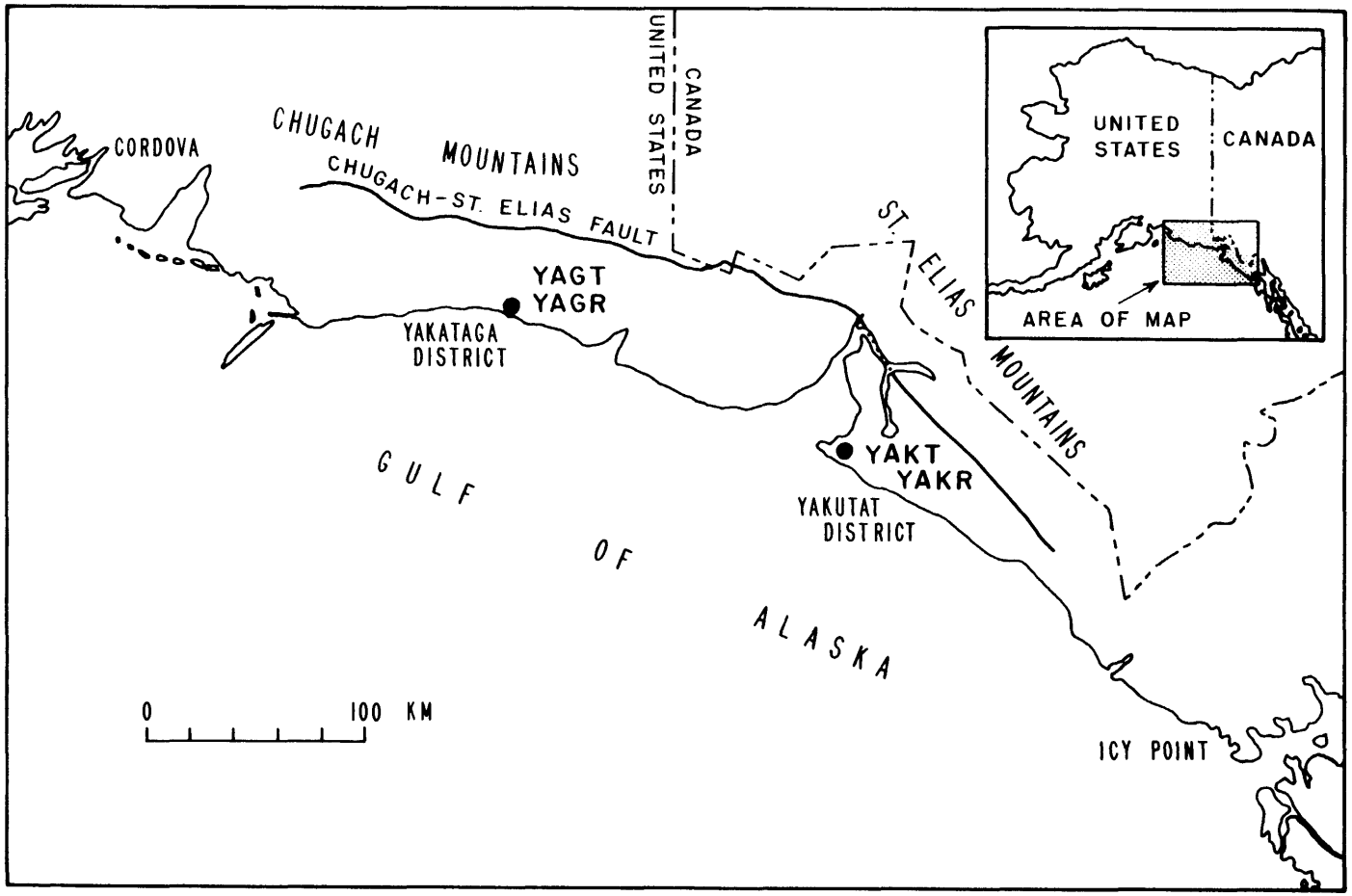


Figure 3. NOAA Alaska Rainfall and Temperature Locations for which Data is Available in U.S.G.S. Climatological Data Base

```
brkr 73 263 .01
73y 9m 20d 54 22d 20 24d 02 10m 6d 10 56 15 19d 01 21d 05 73 07 11m 5d 308 51
  9d 19 86 150 15 20 11 01 108 91 20d 21 22d 23 02 25d 16 30d 38 12m 1d 16
    11d 54 13d 29 17d 17 21d 86 26d 122 23 29d 23 31d 18  74y 1m 3d 115 09 46 30
    10 11d 15 14d 48 16d 76 05 29 10 31d 19 2m 1d 24 12d 46 03 16d 04 19d 98
    21d 24 04 26d 01 28d 36 3m 1d 127 102 34 7d 33 11d 32 05 25d 71 03 131 21 45
    36 07 4m 1d 233 5d 12 8d 01 42 18d 05 23d 48 60 26d 15 5m 1d 0 31d 0
6m 18d 09 7m 8d 140 10 10m 7d 01 28d 196 13 31d 51 11m 7d 47 17d 02 08 21d 44
  24d 03 12m 2d 49 62 10 14d 03 27d 128 22 75y 1m 4d 08 6d 53 03 40 04 04 27d 09
  31d 113 2m 1d 64 21 31 30 6d 09 40 56 18 10 12d 103 101 19d 28 3m 1d 10 02
  4d 05 08 03 90 99 47 13d 118 15d 64 21d 157 05 24d 20 36 4m 3d 15 69 29 7d 95
    15d 14 02 24d 29 6m 24d 05 7m 15d 21 8m 18d 01 10m 6d 05 9d 146 67 25d 33 93
    29d 67 11 11m 9d 26 15d 43 02 12m 11d 09 10 21d 43
76y 1m 9d 29 2m 4d 03 10 01 01 09 13d 28 17 16d 05 18d 04 09 29d 115
3m 1d 10 101 18d 13 31d 04
4m 3d 10 5d 01 03 42 14 10d 22 06 22d 01 5m 1d 0 31d 0 6m 9d 05 8m 14d 11 62
  17d 22 33 22d 05
9m 27d 11 36
10m 1d 43 01 11m 11d 49 13d 13 26 12m 29d 45 193
77y 1m 1d 12 104 13 12d 13 21d 02
2m 8d 36 20d 15 34 23d 19
3m 9d 12 12d 11 02 00 168 17 23d 04 23 25
4m 6d 22 25d 22 30d 01
5m 1d 32 7d 11 31 11d 14 18d 15 05 26d 03
6m 1d 0 30d 0
7m 1d 0 31d 0
8m 1d 0 31d 0
9m 16d 34 06 19d 102 28d 19 04
10m 28d 30 02 02
11m 4d 41 17 20d 04 341
12m 11d 22 14d 123 16d 05 134 21d 39 107 25d 03 14 12 06 17
78y 1m 1d 12 25 4d 63 155 8d 02 83 12d 37 123 129 69 115 02 81 32
2m 1d 02 4d 06 72 65 99 91 12d 81 30 15d 13 26d 12
3m 1d 33 121 19 82 67 8d 133 05 21d 86 23d 04 30d 01
4m 1d 17 3d 58 12 04 94 15d 134 32 19d 01 19 24d 24 27 04
5m 1d 0 31d 0
6m 1d 0 30d 1
7m 1d 0 31d 0
8m 1d 0 31d 0
9m 9d 70
10m 1d 0 31d 0
11m 12d 21 02 19d 61 30 21 18
12m 1d 13 17d 54 10
79y 1m 3d 11 01 7d 19 175 24 98 179 14d 171 70 17d 28 30d 45 01
2m 13d 214 07 05 49 18d 78 20d 97 49 83 25d 28 02 28d 68
3m 1d 04 15d 22 40 01 21d 01 26d 46 124 10
4m 6d 13 16d 03 02 22d 41 72 25d 02 30
5m 5d 10 12 02
6m 1d 0 30d 0
7m 21d 09
*finish
```

TABLE 4 Example of Rainfall Data Entry Format in >udd>isp>data>climate.cards>brkr

```
                                                                                                                                max
sbrt 79 001

79y 1m 1d 63 61 69 70 59 63 65 67 61 69 65 63 69 60 52 62 58 55 64 69 62
   58 66 65 56 56 59 50 53 48 49
2m 1d 52 49 56 62 65 71 71 80 78 81 79 80 75 63 61 55 72 70 60 59 54 61 59 71
   70 65 72 69
3m 1d 60 62 69 79 80 87 87 82 74 80 82 80 69 66 62 61 58 55 51 64 55 65 71 76
   74 68 62 59 59 60 75
4m 1d 75 73 78 85 87 76 69 64 63 68 69 81 85 86 85 73 70 68 79 83 84 79 75 78
   84 83 78 77 80 72
5m 1d 71 65 75 87 81 71 70 60 73 82 90 95 97 95 88 78 88 83 82 78 75 92 93 88
   87 88 82 77 77 78 83
6m 1d 83 76 85 84 85 80 72 92 99 103 108 110 105 100 94 86 77 78 93 91 91
   93 94 91 90 105 111 109 108 100
7m 1d 91 87 84 87 187 91 100 102 103 101 95 102 92 99 104 106 107 110 104 90 96
   97 101 101 102 100 102 104 104 103 106
*mean
                                                                                                                                min

79y 1m 1d 31 32 38 37 43 4348 43 48 38 41 43 40 43 44 45 45 42 34 39 41
   38 37 45 41 30 29 34 23 31 37
2m 1d 40 38 34 30 35 35 37 38 38 39 44 45 39 44 38 45 38 40 42 44 45 42 41 34
   45 39 39 40
3m 1d 43 33 35 41 36 53 48 47 48 47 47 48 51 52 45 46 41 45 41 41 43 48 39 41 46
   50 49 48 43 48 41
4m 1d 41 45 49 45 46 47 53 52 54 42 43 45 50 51 50 52 52 48 40 45 46 46 45 46
   48 55 52 51 50 55
5m 1d 54 50 54 50 53 49 51 48 41 41 49 51 55 57 51 55 53 54 52 56 58 52 60 57
   58 56 61 59 58 55 58
6m 1d 57 59 58 58 60 61 58 54 53 58 58 65 68 65 63 55 58 56 53 54 54 55 57 59
   57 60 63 62 64 63
7m 1d 58 59 55 57 57 57 62 62 63 60 62 62 63 62 60 63 72 69 74 70 65 62 66 67
   67 64 61 62 64 59 68
*finish
```

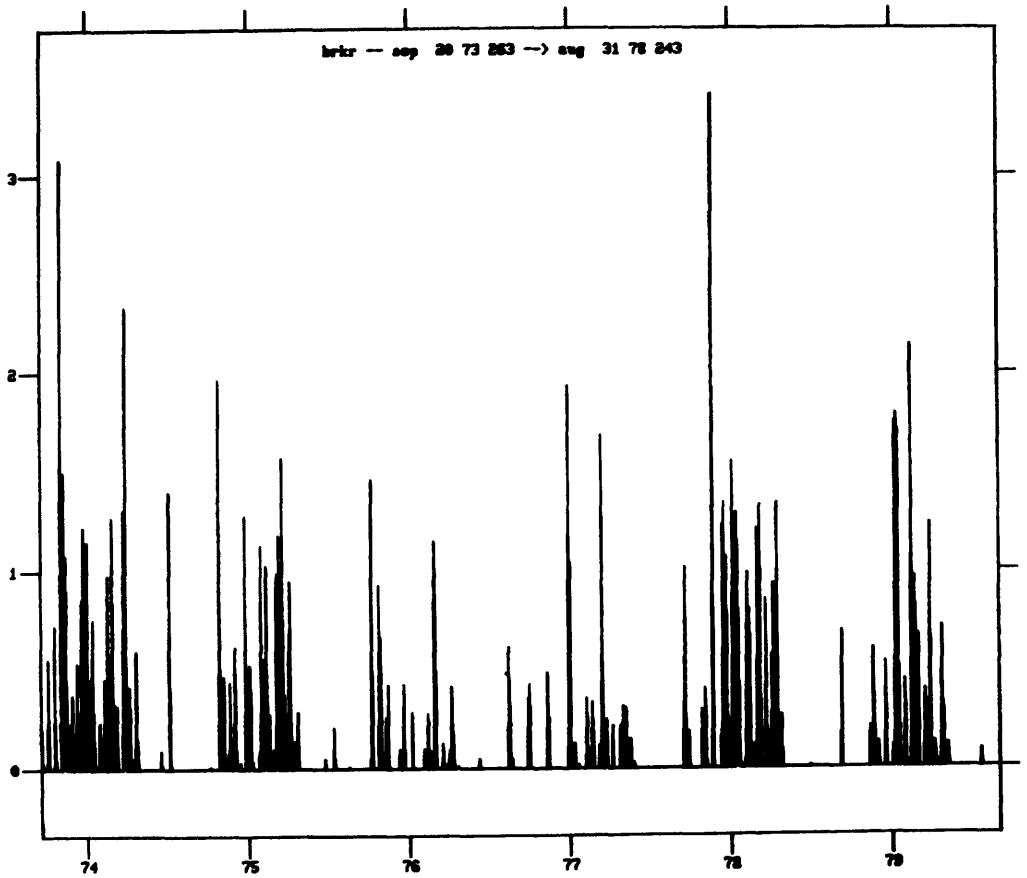
TABLE 5 Example of Temperature Data Entry Format in >udd>isp>data>climate.cards>sbrt

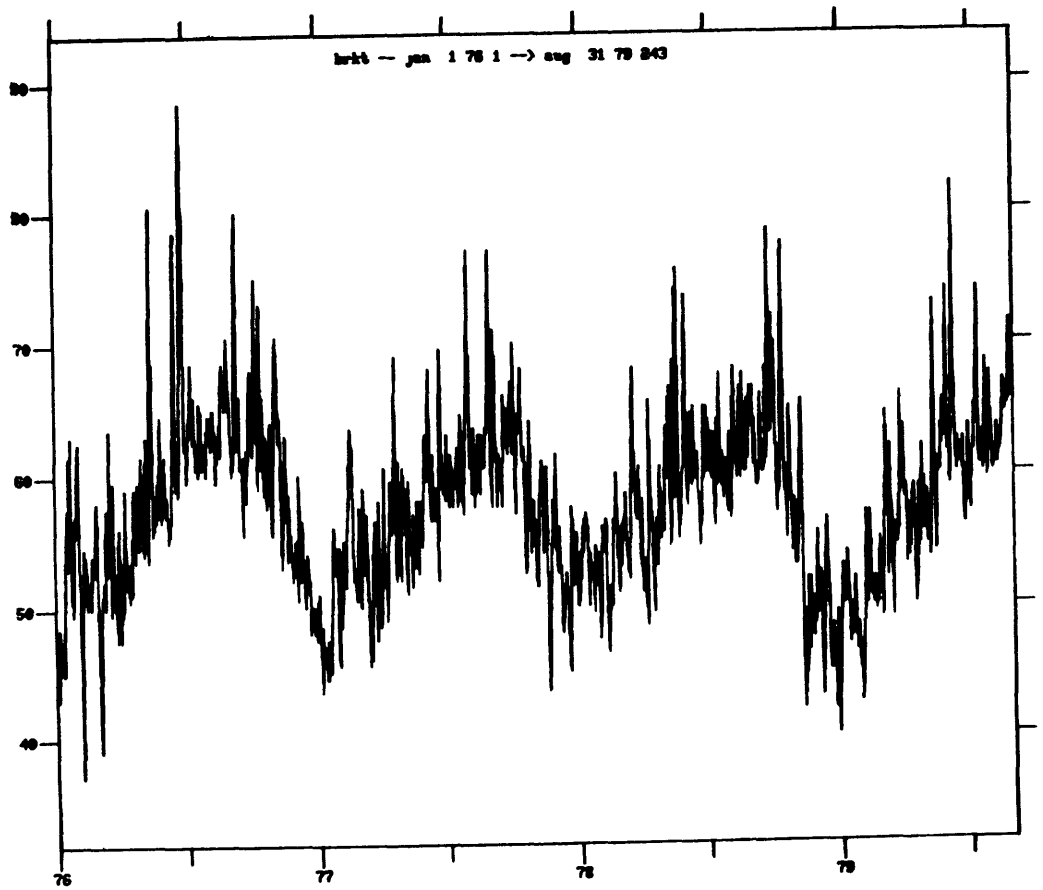
```
var yrx var jlx var ntime var otime var f1 var l1
str inputdir 80  '>udd>Isp>data>climate.cards' =inputdir
str inputsen 80  rarr clidata 10000
op setdir (dir '>udd>Isp>data>climate'  getsnam)
op reaclim(file (inputsen none|inputdir|'>'|^) getclim =clidata)
op movclim(reaclim ^  clidata wdat)
op pltclim(reaclim ^  tplot clidata  labsen)
op shoclim(inputsen is   rl)
op allclim(setdir   snum do(snam:i is  movclim snam:i  shoclim) 'finished' is,)
op gtime(^*365 +((^ - 1)/4+^))
op pltpart(reaclim ^ ^=yrx ^=jlx gtime yrx yrx jlx=ntime gtime yr yr jl=otime
ntime - otime=f1 eof - f1=l1 f1+1=f1 yrx=yr jlx=jl tplot(clidata part f1 l1)
labsen)
'climate ops being loaded...' is,
setdir 'operators are:  pltclim <sens>     movclim <sens>     allclim' is,
```

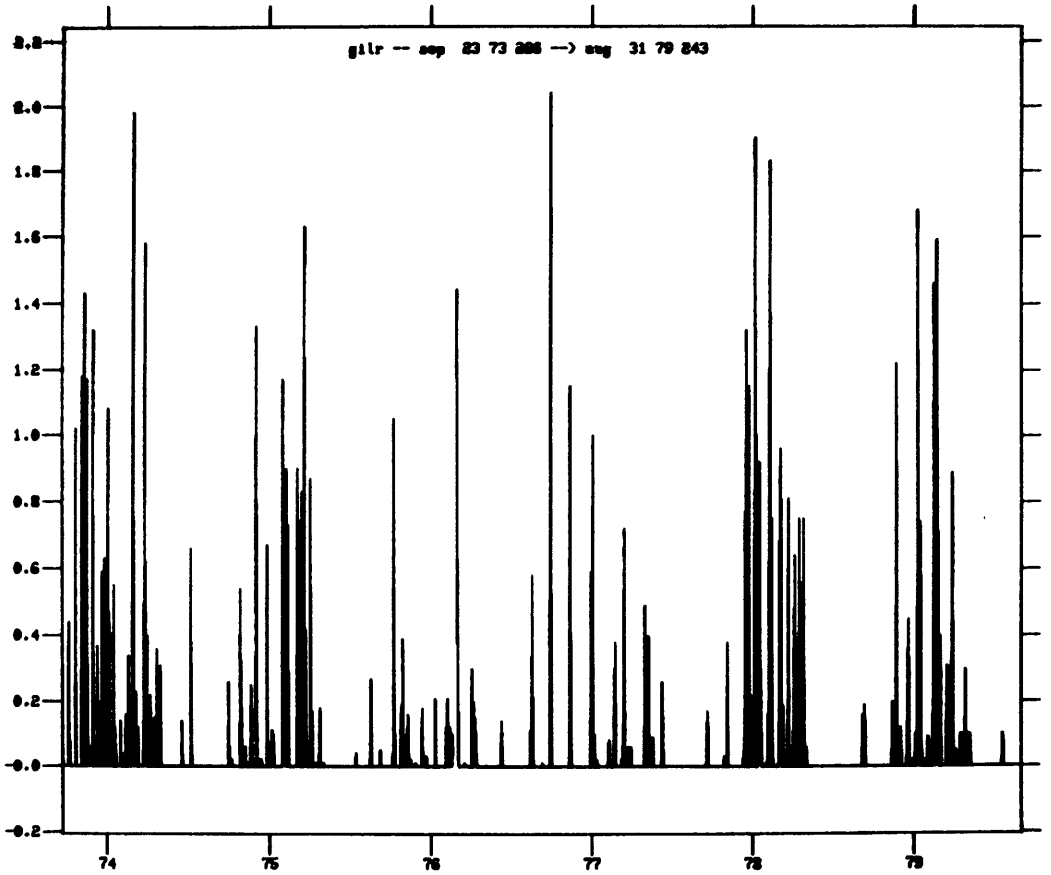
Appendix I Complete Listing of Geolab Oplib Climate Operators

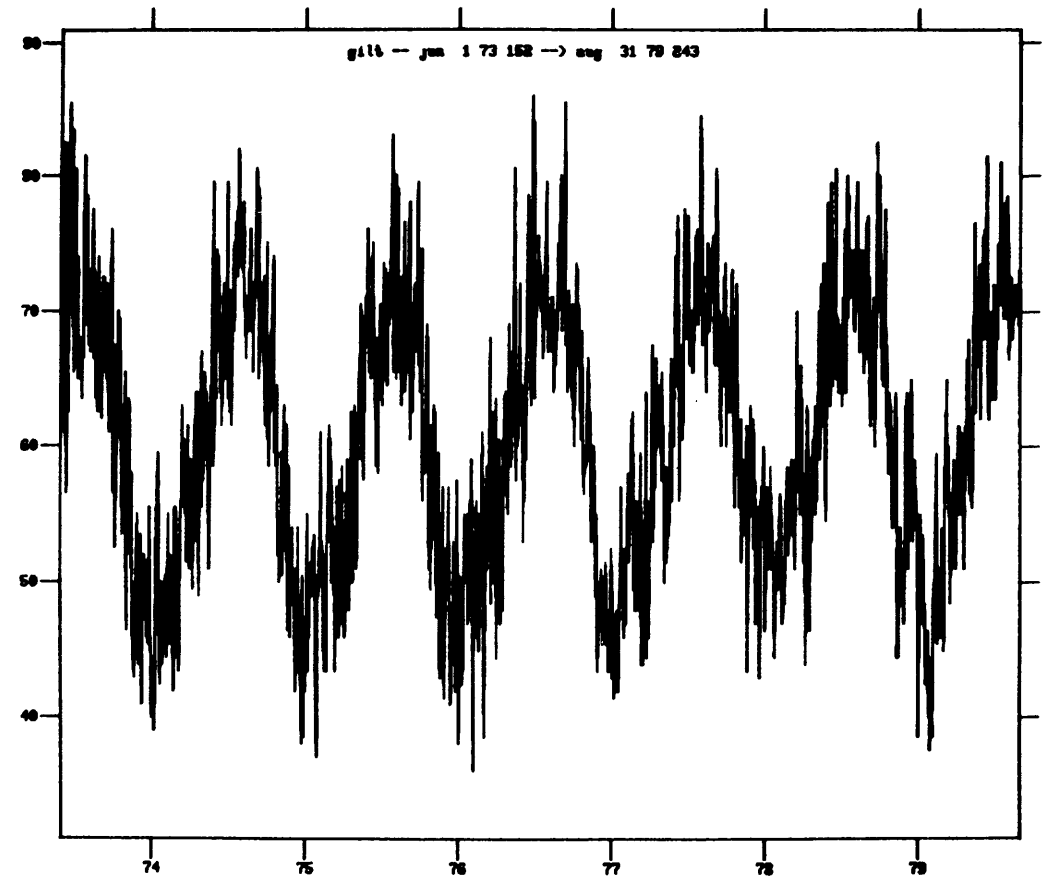
```
c-----getclim----------14 nov 78----------------------------
cread climat cards into array r -- fin=0 means more to come
      subroutine getclim(r,nptr,nm,y1,d1,y2,d2,fin,usym)
      integer l(81),y1,d1,y2,d2,jul(12),ptr,fin,yr,dy,xyrs,begfill
      real r(1)
      data jul/0,31,59,90,120,151,181,212,243,273,304,334/
      do 99 i=1,fin
   99    r(i)=0.
      l(81)=mean ; mean=fin ; ifin=fin ; fin=0 ; kar=0
  100 read(1,8)nm,y1,d1,coef ; yr=y1 ; mo=dy ; dy=1 ; nptr=0
      if(coef.eq.0)coef=1
    7 read(1,9,end=21)(l(i),i=1,80) ; i=0 ; kar=kar+1 ; if(l(1).eq.42)goto 20
    6 n=0 ; p=0 ; s=0 ; m=1 ; f=1
    5 i=i+1 ; if(i.gt.81)goto 7 ; d=l(i) ; k=4
      if(d.eq.45)k=2 ; if(d.ge.48.and.d.le.57)k=1
      if(d.eq.46)k=3 ; k=k+s ; goto(1,2,3,5,1,4,3,4)k
    1 n=n*10+d-48              ; s=4        ; goto 5
    2 m=-1                     ; s=4        ; goto 5
    3 p=i                      ; s=4        ; goto 5
    4 nt=0
      if(d.ne.89.and.d.ne.121)goto 200 ; nt=n ; yr=n ; dy=1 ; mo=1
  200 if(d.ne.77.and.d.ne.109)goto 201 ; nt=n ; mo=n ; dy=1
  201 if(d.ne.68.and.d.ne.100)goto 202 ; nt=n ; dy=n
  202 if(nt.eq.0)goto 14
              leap=0 ; if(yr/4*4.eq.yr.and.mo.ge.3)leap=1
          julis=jul(mo)+leap+dy ; begfill=nptr+1
          nptr=(yr-y1)*365 + (yr-1-(y1-1)/4*4)/4 + julis-d1
          if(nptr.lt.1)goto 6
          if(nptr+1.lt.begfill)print 92,yr,mo,dy,julis,begfill,nptr,kar
          if(nptr.lt.begfill.or.m.ne.-1)goto 6
          do 13 ptr=begfill,nptr
   13        r(ptr)=usym
          goto 6
   14 if(nptr.lt.ifin)goto 114 ; print, "getclim: input array too small"
      goto 21
  114 nptr=nptr+1
      if(p.ne.0)f=10.**(i-p-1) ; rnptr=n/f*m*coef
      if(mean.eq.1)rnptr=(rnptr+r(nptr))/2
      r(nptr)=rnptr ; goto 6
   21 l(2)=101
   20 iii1=1 ; iii2=1 ; iii3=1
      call dait(y1,d1,nptr,y2,d2,iii1,iii2,iii3)
      nptr=nptr+1
      if(l(2).eq.101)fin=1 ; if(l(2).ne.109)goto 90 ; mean=1 ; goto 100
   90 nptr=nptr-1 ; return
    8 format(a4,i3,i4,f8.0)
    9 format(80r1)
   91 format(9x,2i3,i4,i7,"=beg",i7,"=fin",i7,"=len",f7.0,"=fill")
   92 format(9x,2i3,2i4,i7,"=beg",i7,"=fin  ---error--- line number:",i6)
      end
```

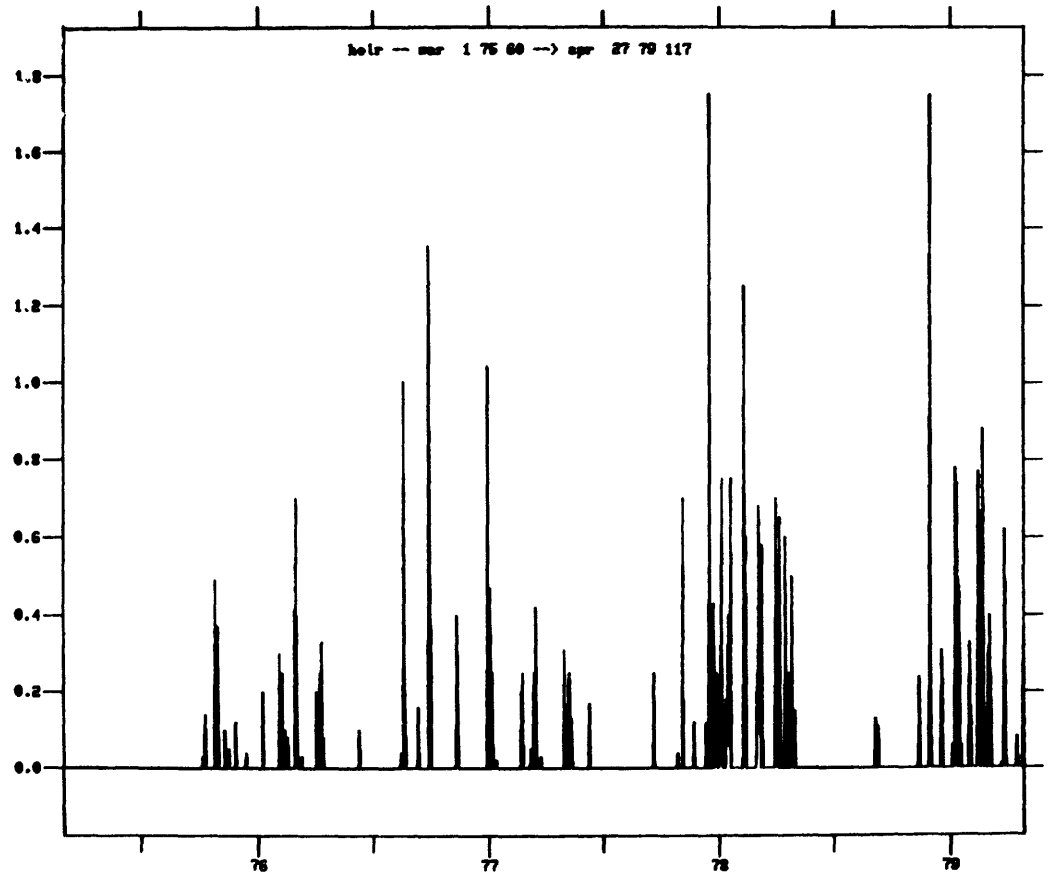
Appendix II Geolab Operator 'Getclim' Fortran Source Code

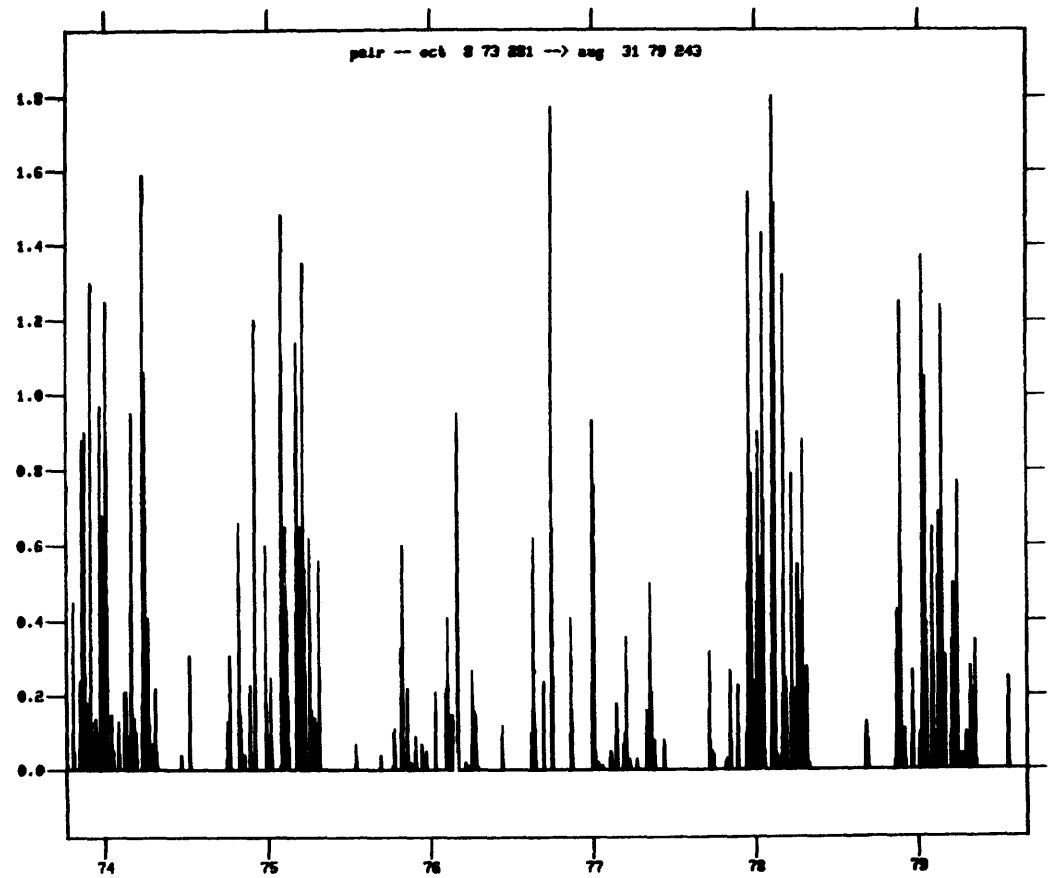

brkr — sep 28 73 263 —> aug 31 78 243
3
2
1
0
74
75
76
77
78
79

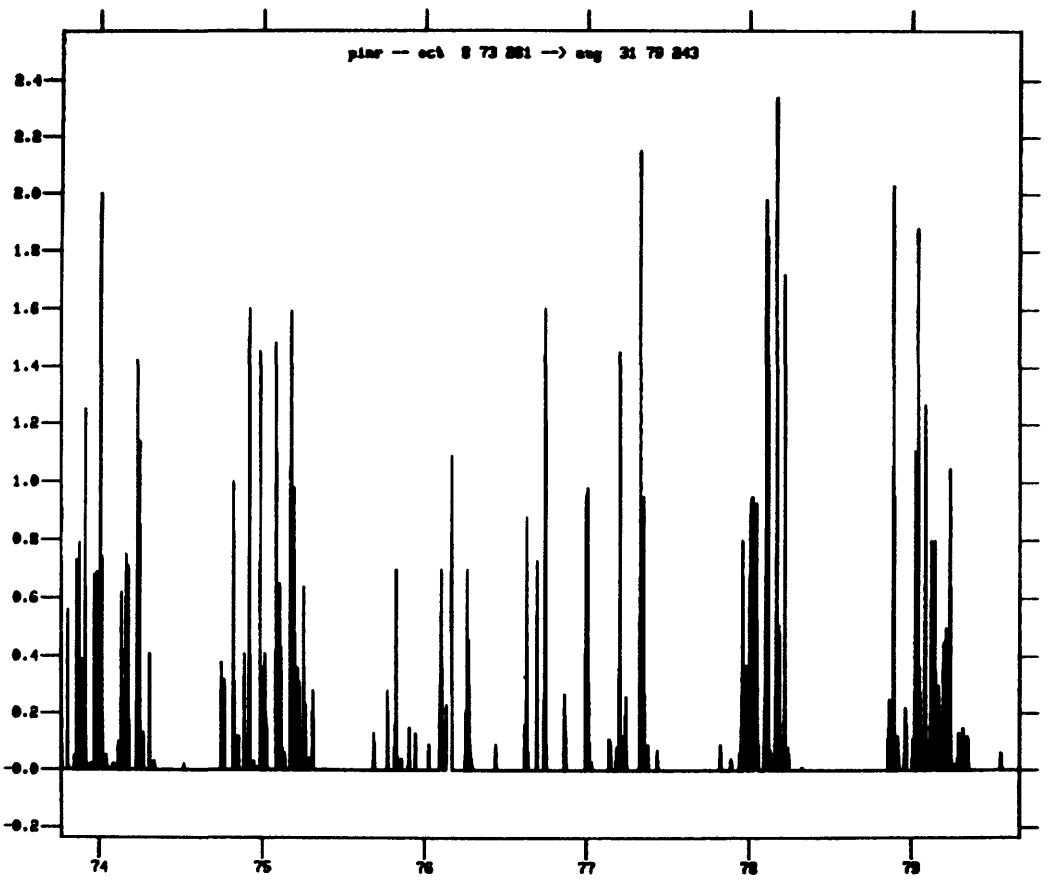

brkt — jan 1 76 1 —> aug 31 79 243
80
70
60
50
40
76
77
78
79

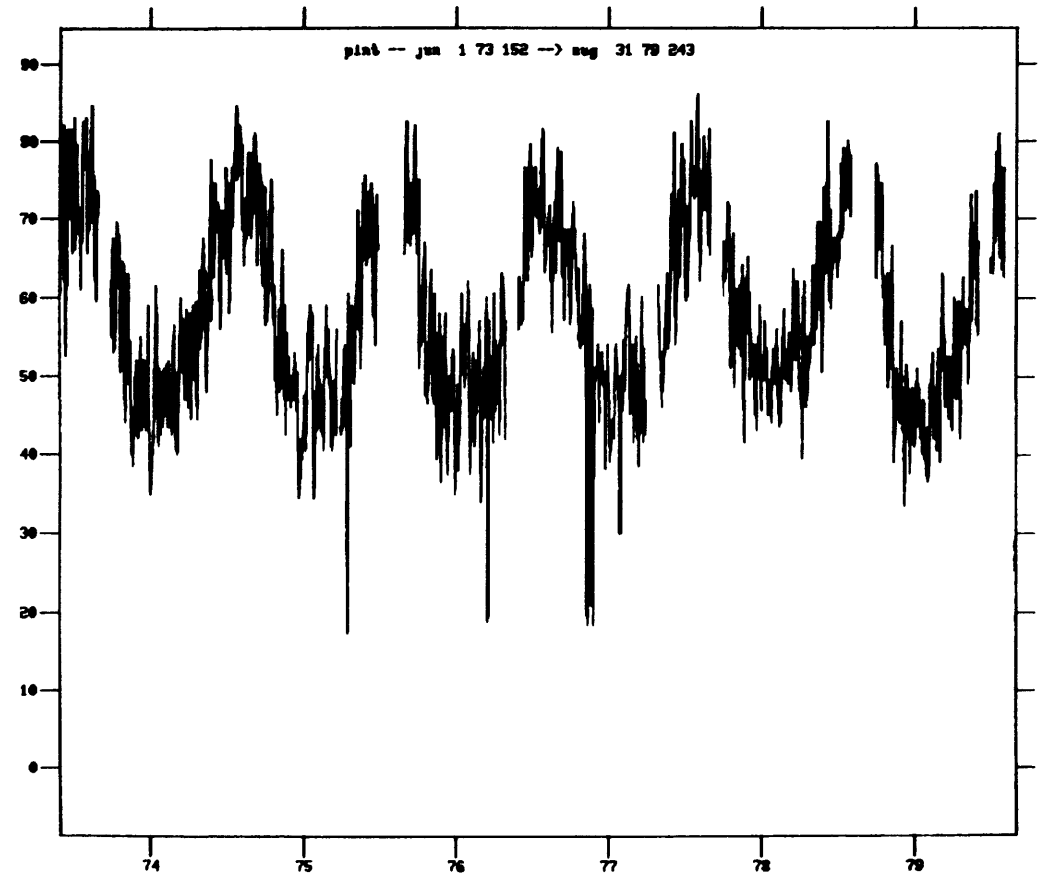

gilr -- sep 23 73 266 --> aug 31 79 243
2.8
2.6
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
-0.0
-0.2
74
75
76
77
78
79

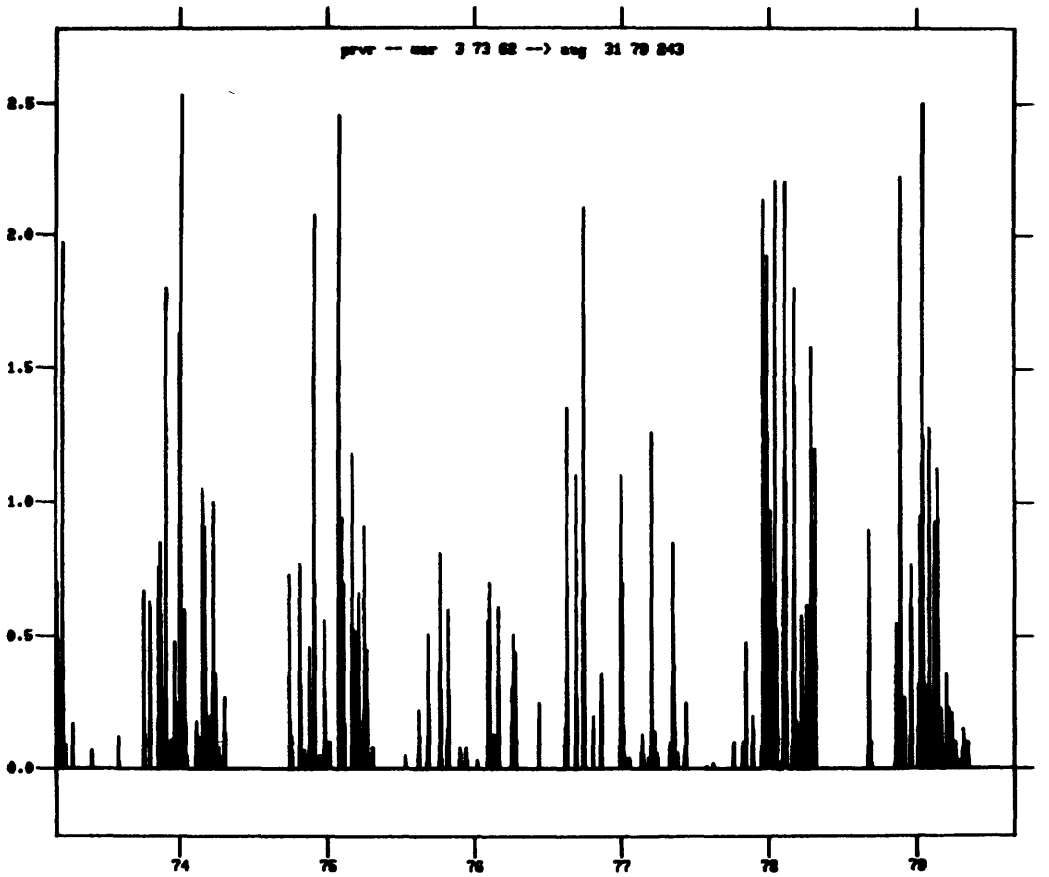

gilt -- jan 1 73 152 --> aug 31 79 243
90
80
70
60
50
40
74
75
76
77
78
79

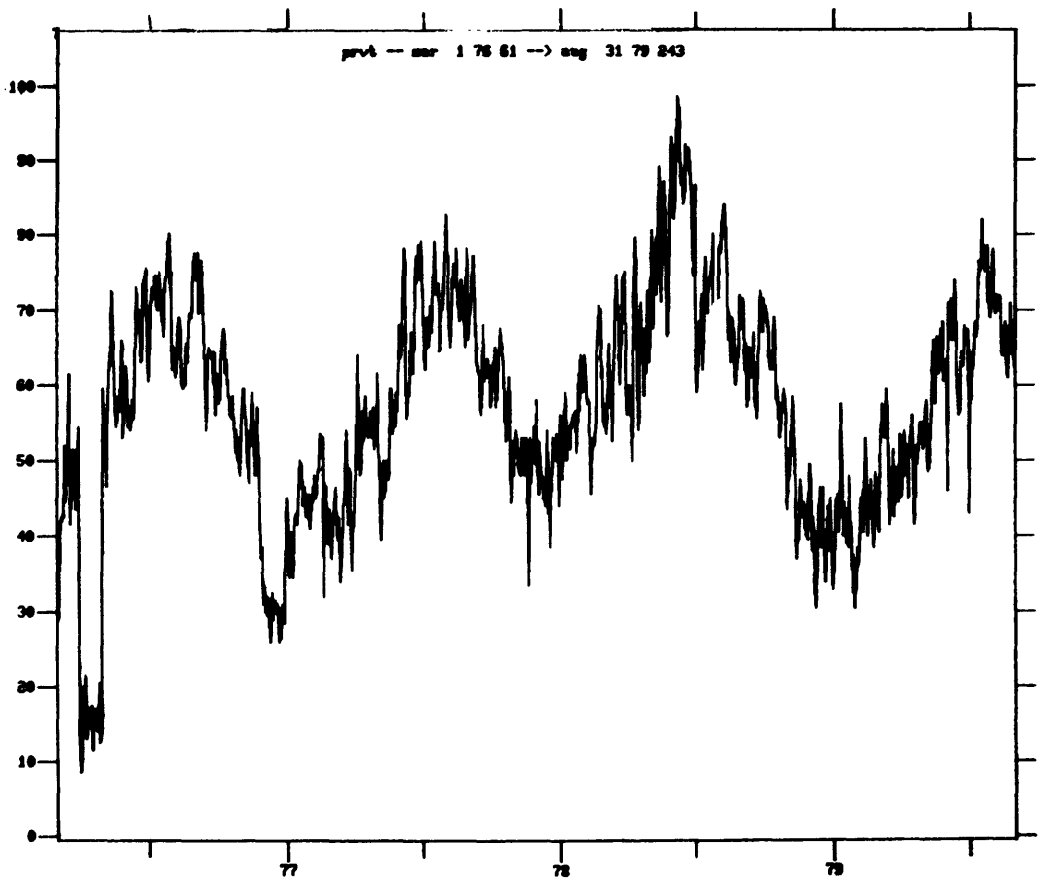

hoir -- mar 1 75 60 --> apr 27 79 117
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
76
77
78
79

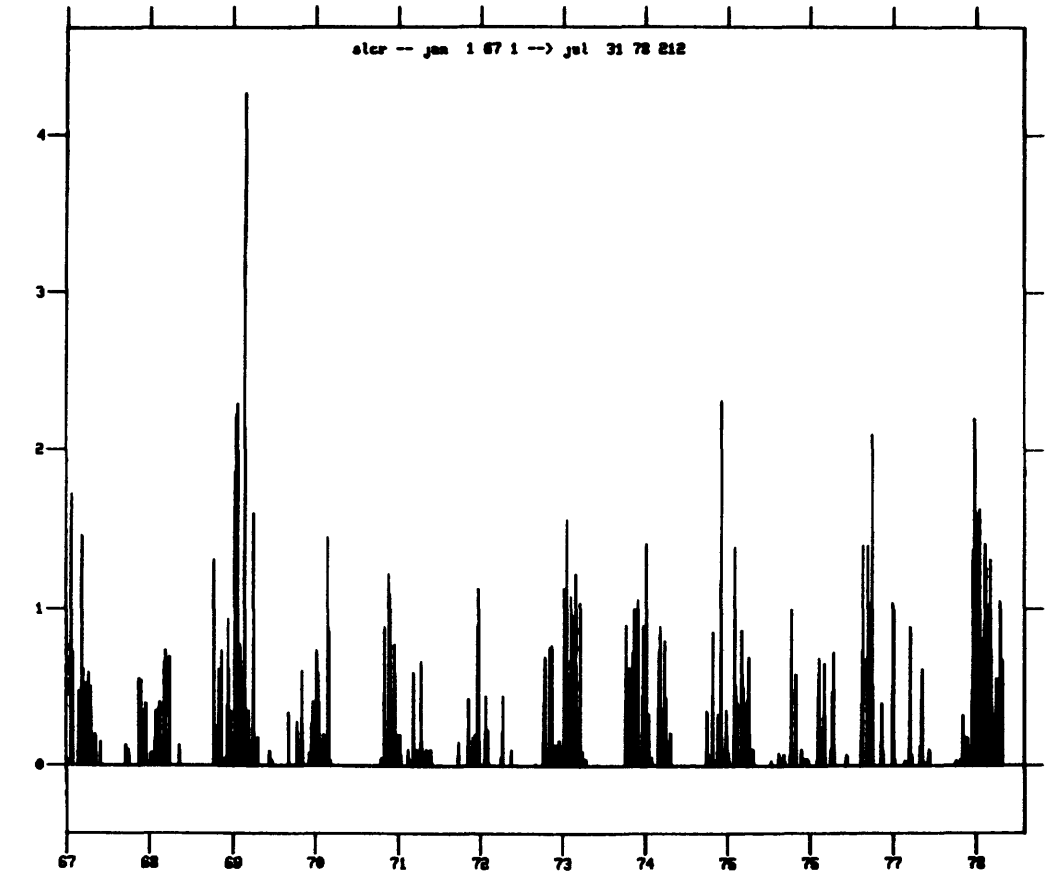

pair -- oct 8 73 881 --> aug 31 79 843
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
74
75
76
77
78
79

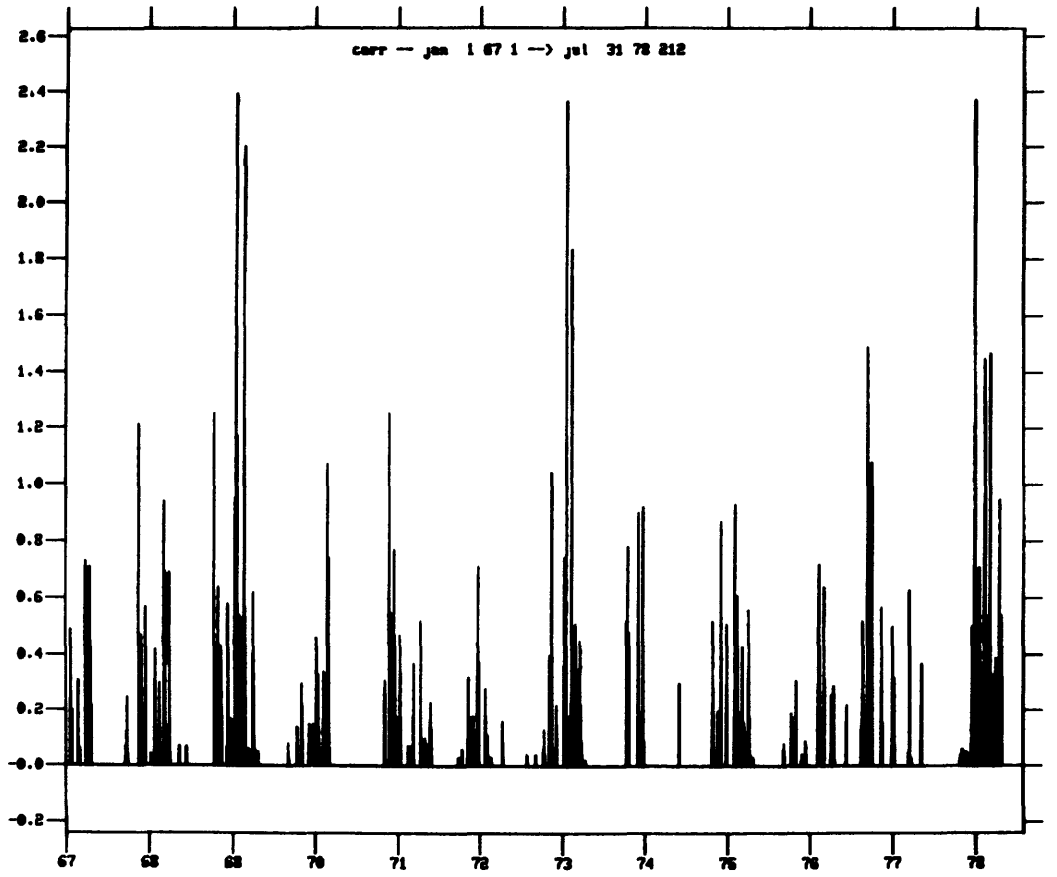

pinr -- oct 8 73 281 --> aug 31 79 243
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
-0.0
-0.2
74
75
76
77
78
79

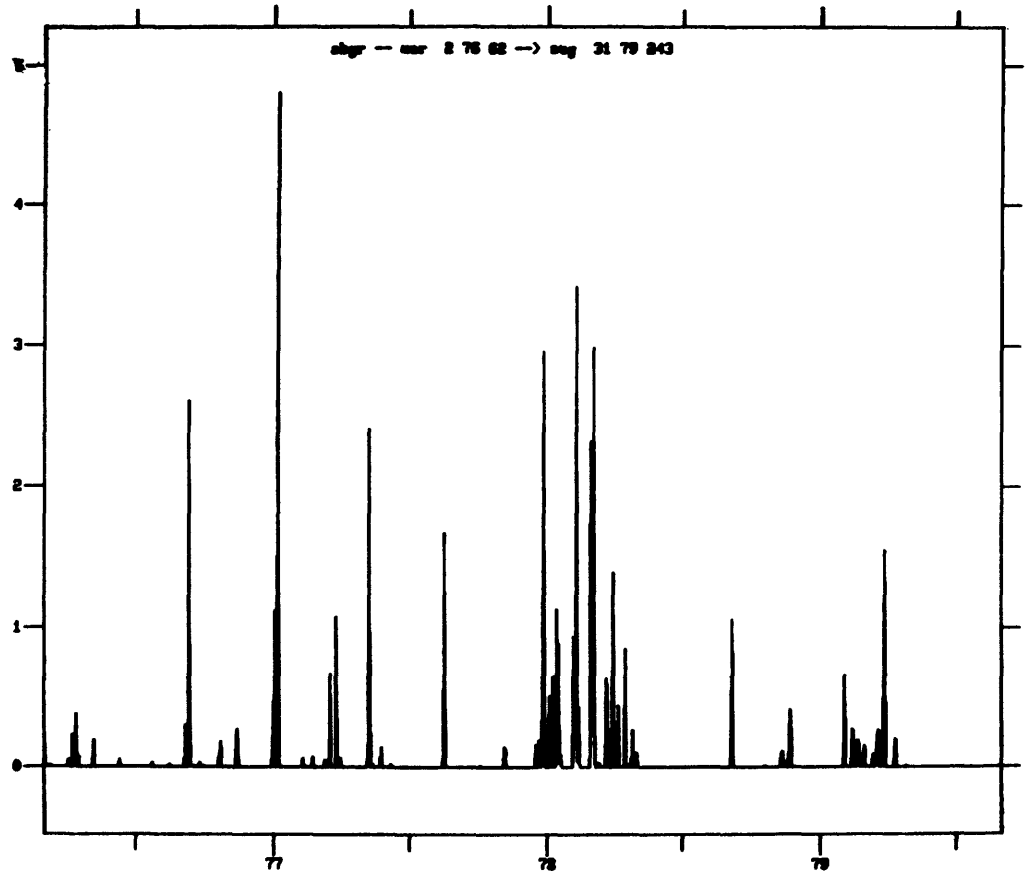

pinb -- jun 1 73 152 --> aug 31 79 243
80
90
70
60
50
40
30
20
10
0
74
75
76
77
78
79

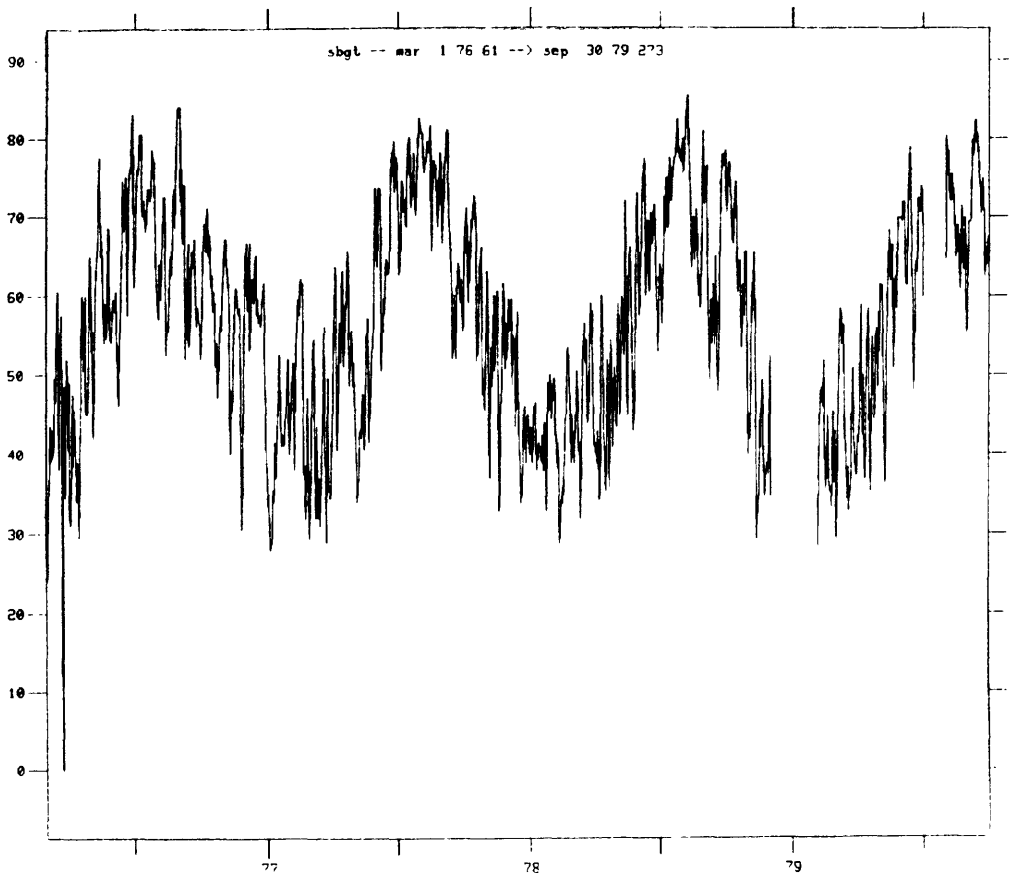

prvr — mar 3 73 62 —> aug 31 79 843
8.5
2.0
1.5
1.0
0.5
0.0
74
75
76
77
78
79

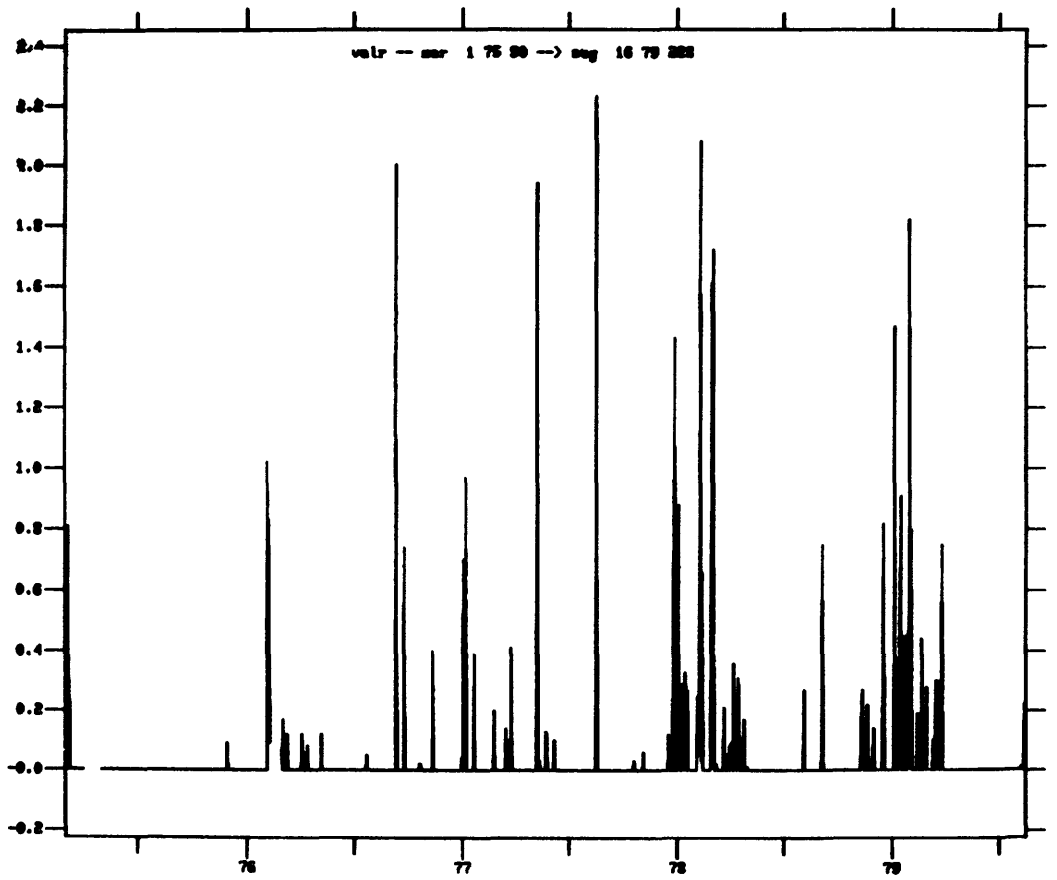

prvA — mar 1 76 61 —> aug 31 79 843
100
90
80
70
60
50
40
30
20
10
0
77
78
79

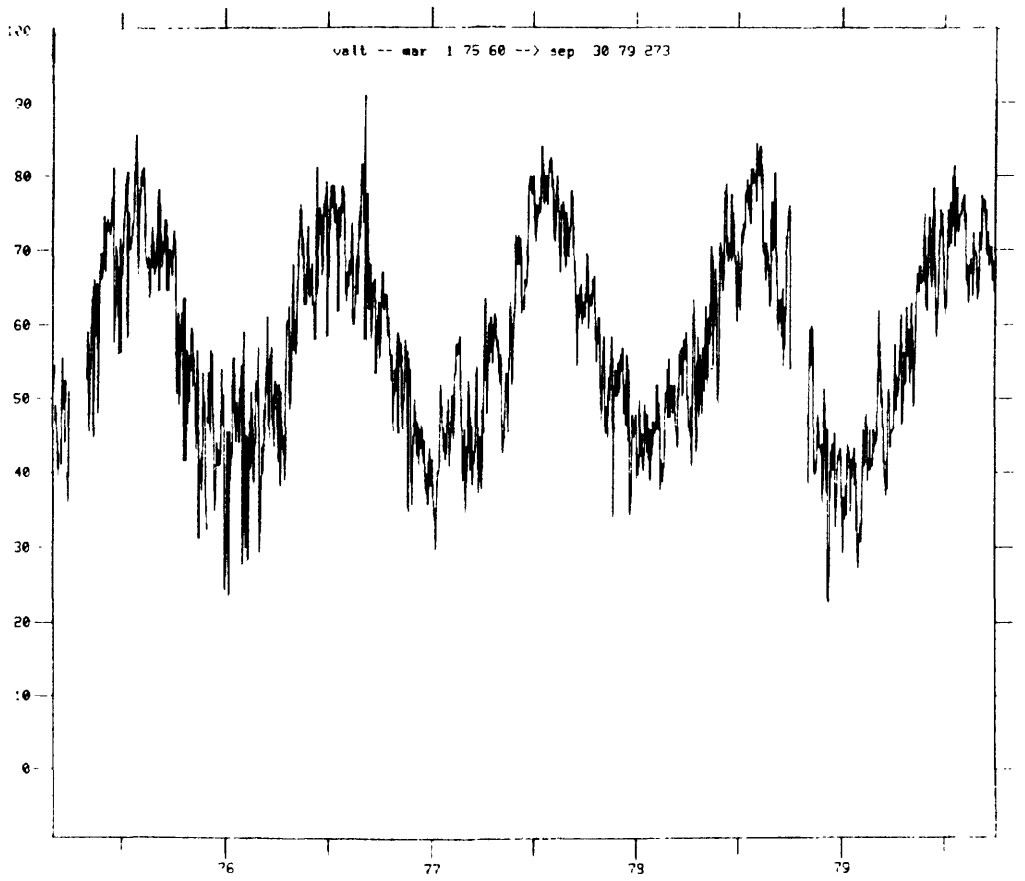

alcr -- jan 1 67 1 --> jul 31 78 212
4
3
2
1
0
67
68
69
70
71
72
73
74
75
76
77
78

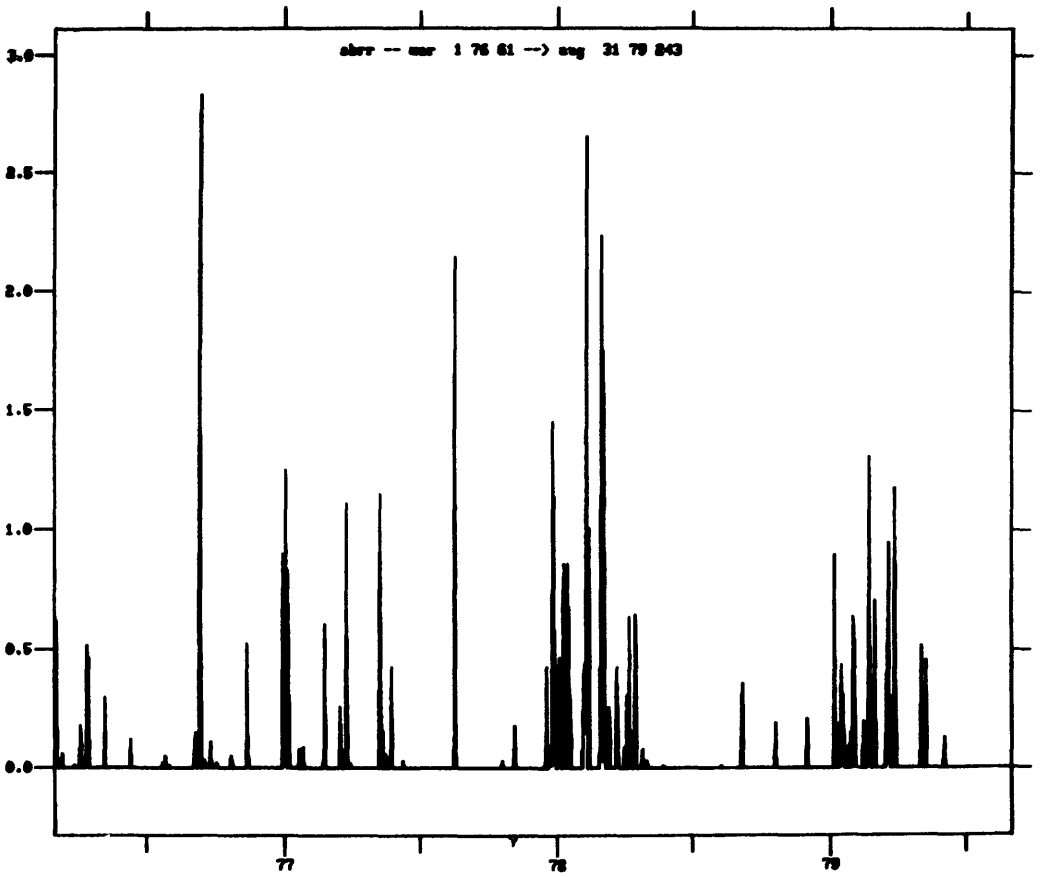

corr -- jan 1 67 1 --> jul 31 78 212
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
-0.0
-0.2
67
68
69
70
71
72
73
74
75
76
77
78

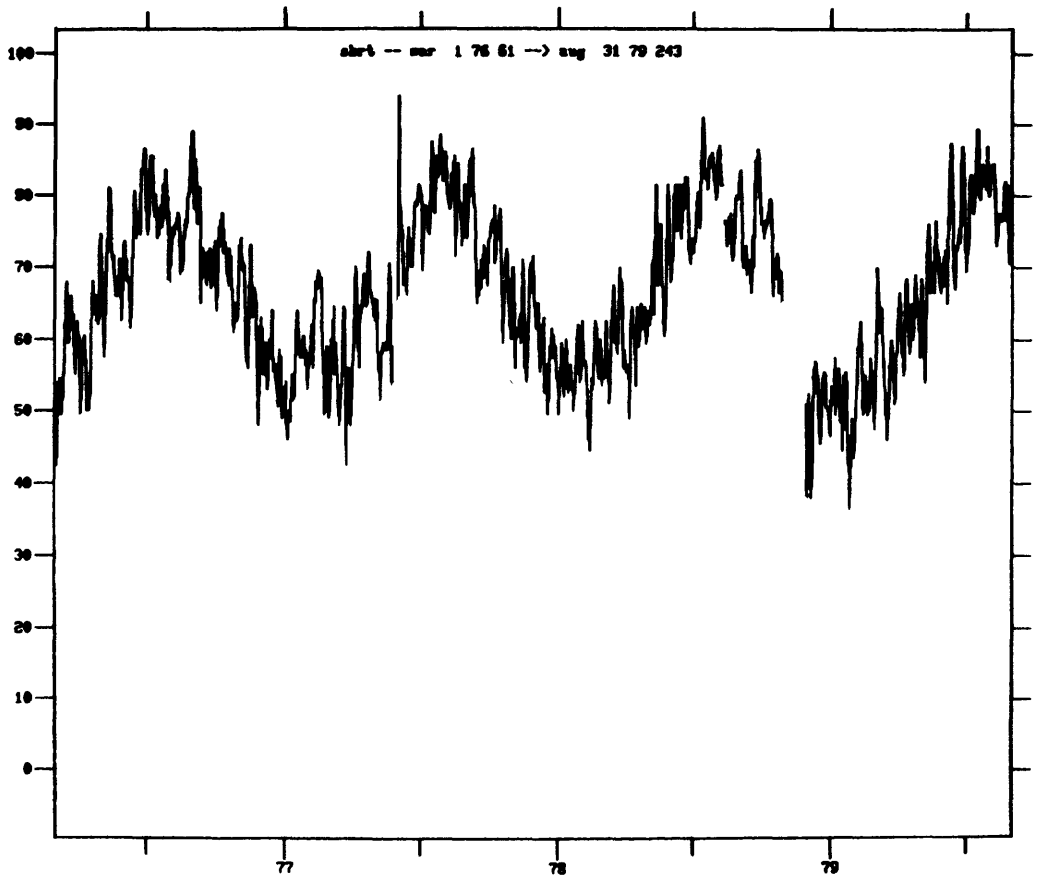

5
4
3
2
1
0
77
78
79

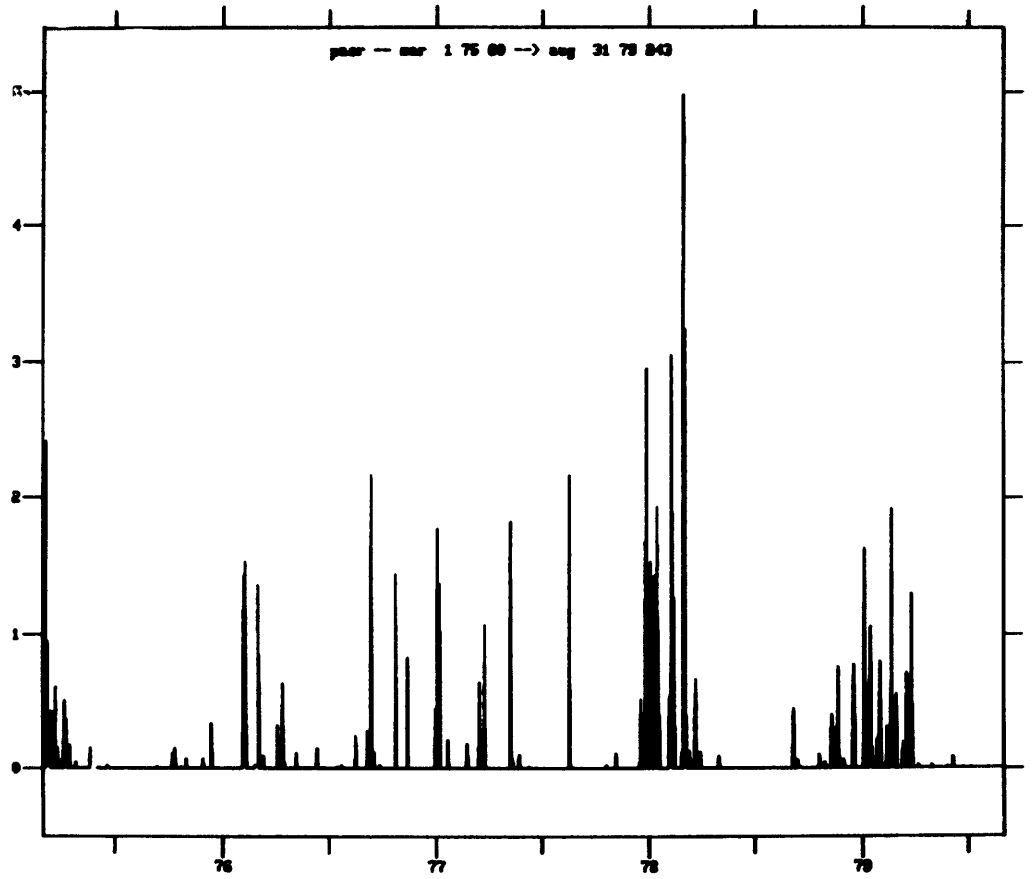

sbgt -- mar 1 76 61 --> sep 30 79 273
90
80
70
60
50
40
30
20
10
0
77
78
79

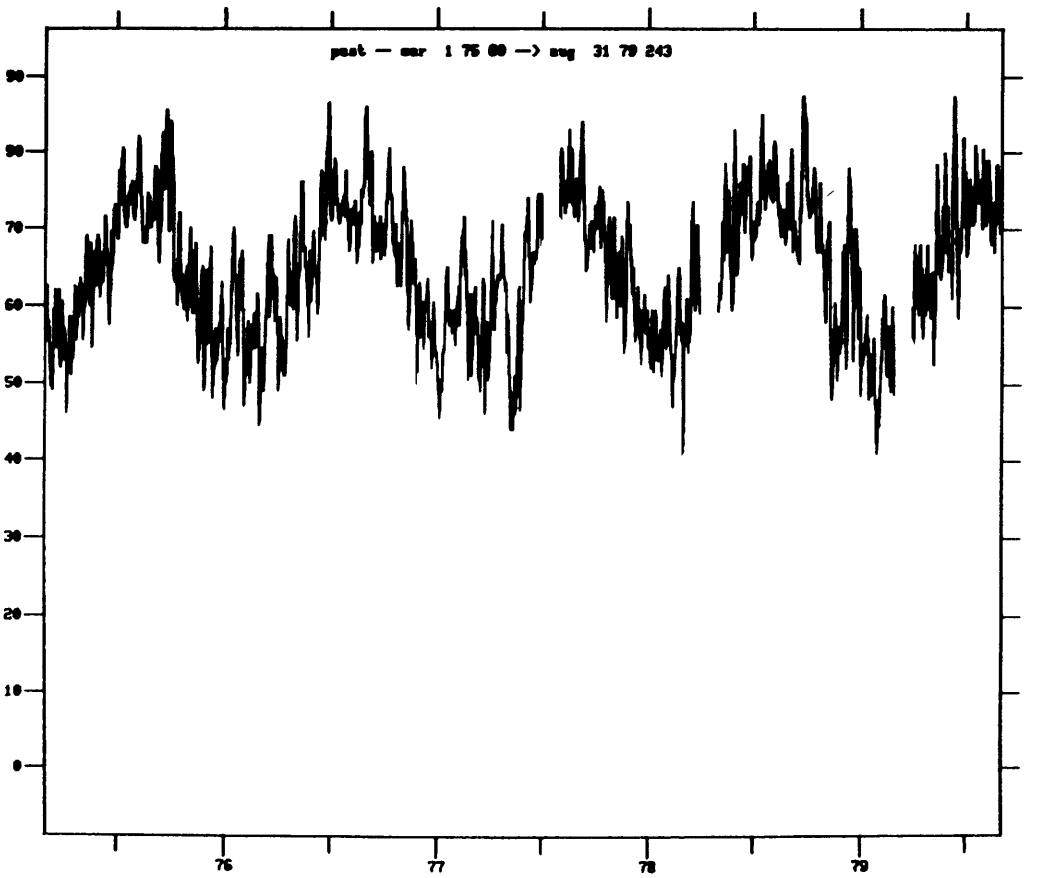

2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
-0.0
-0.2
76
77
78
79

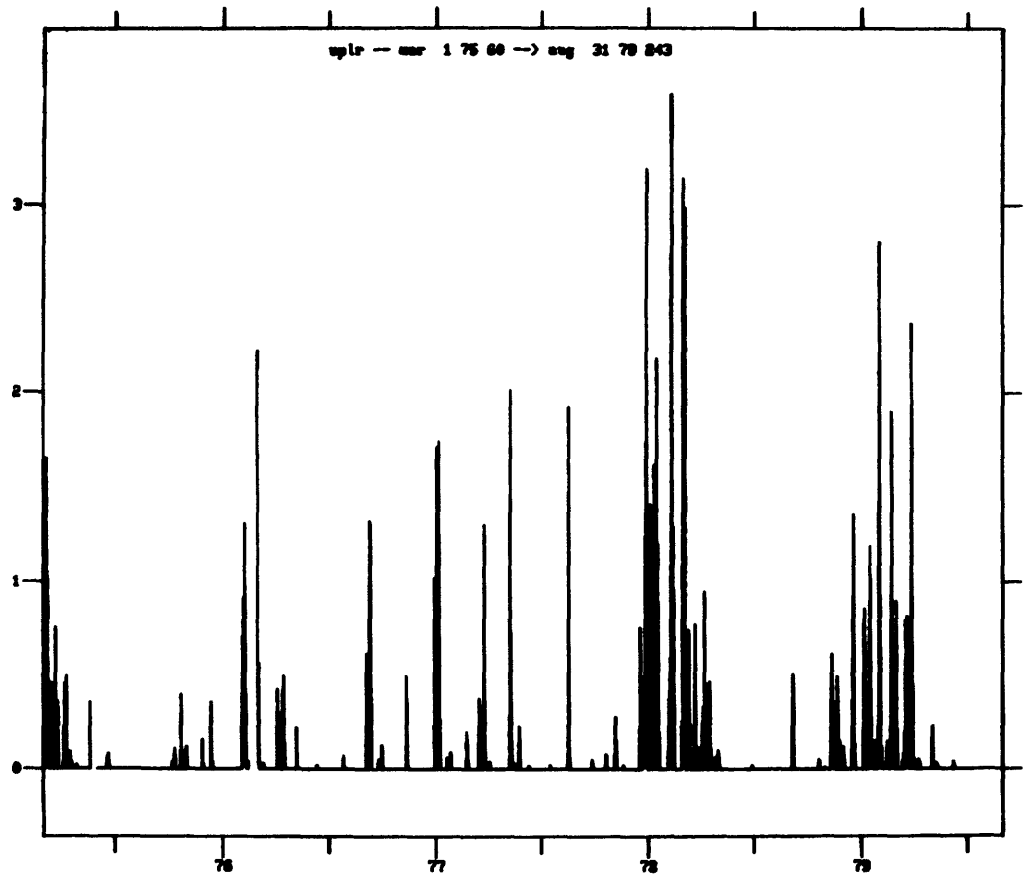

valt -- mar 1 75 60 --> sep 30 79 273
90
80
70
60
50
40
30
20
10
0
76
77
79
79

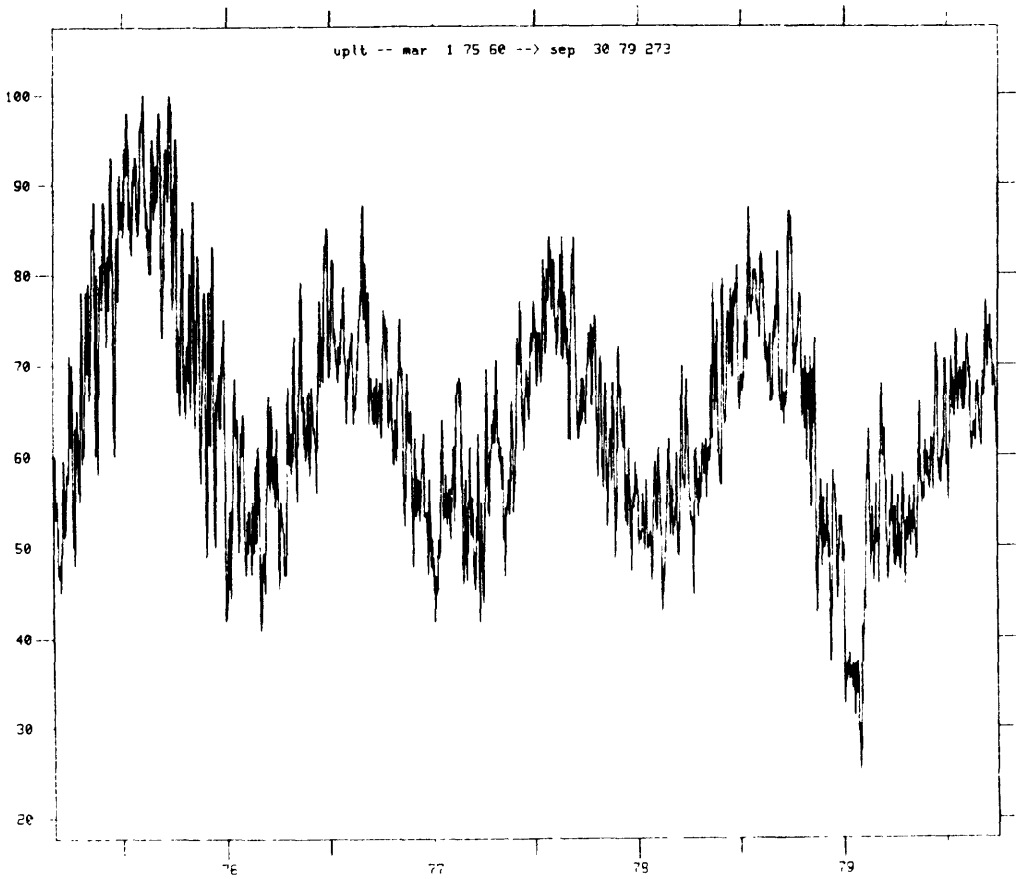

abrr -- mar 1 76 61 --> aug 31 79 243
3.0
2.5
2.0
1.5
1.0
0.5
0.0
77
78
79

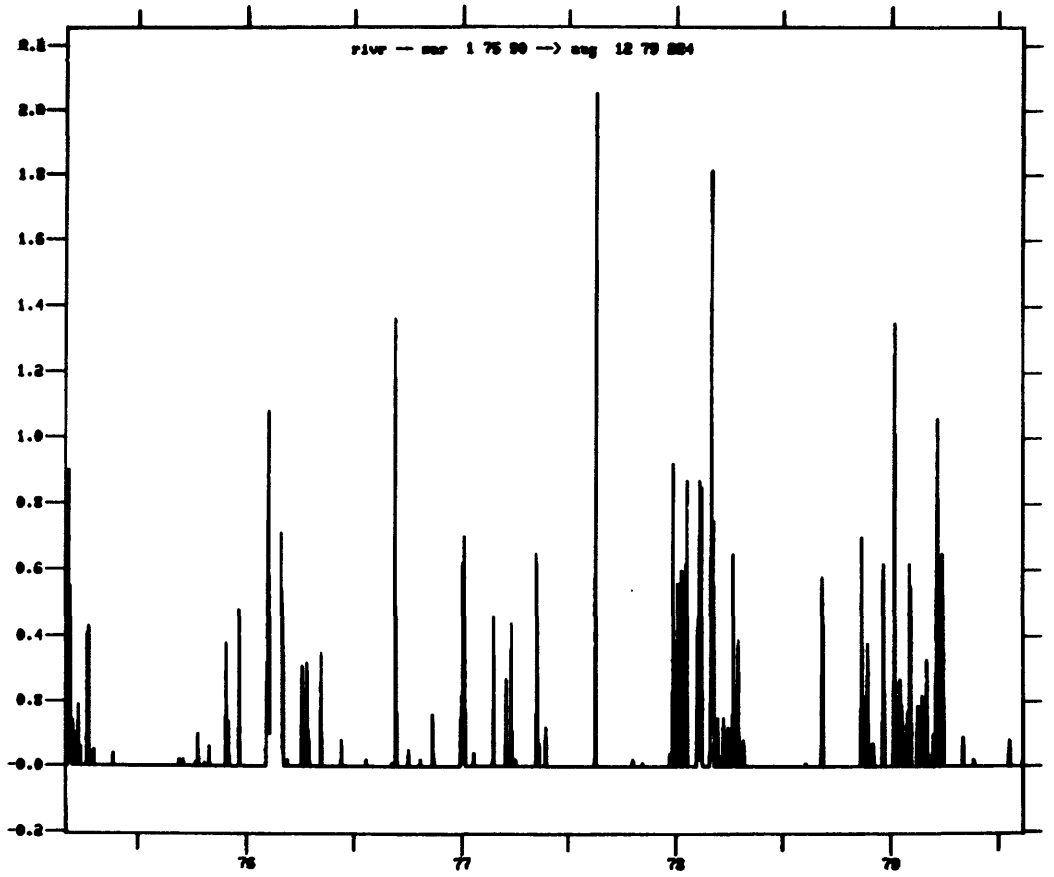

abrt -- mar 1 76 61 --> aug 31 79 243
100
90
80
70
60
50
40
30
20
10
0
77
78
79

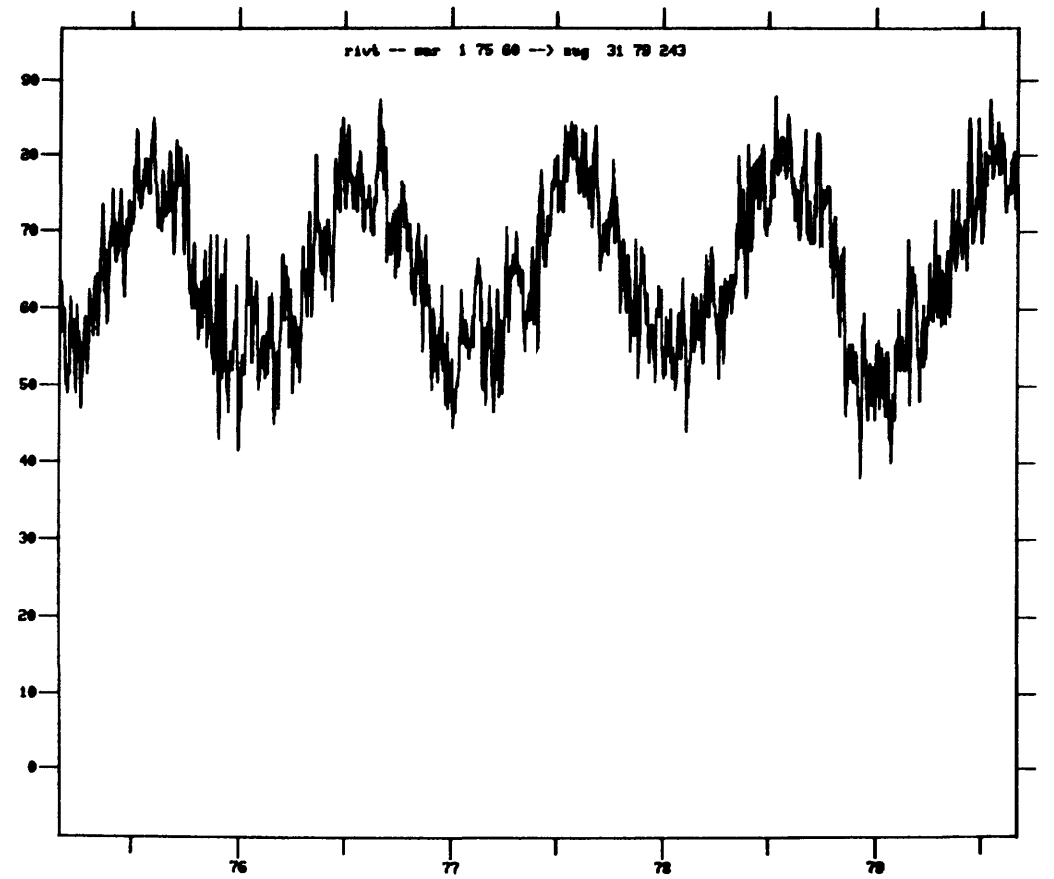

pmar — mar 1 75 00 —> aug 31 79 243
5
4
3
2
1
0
76
77
78
79

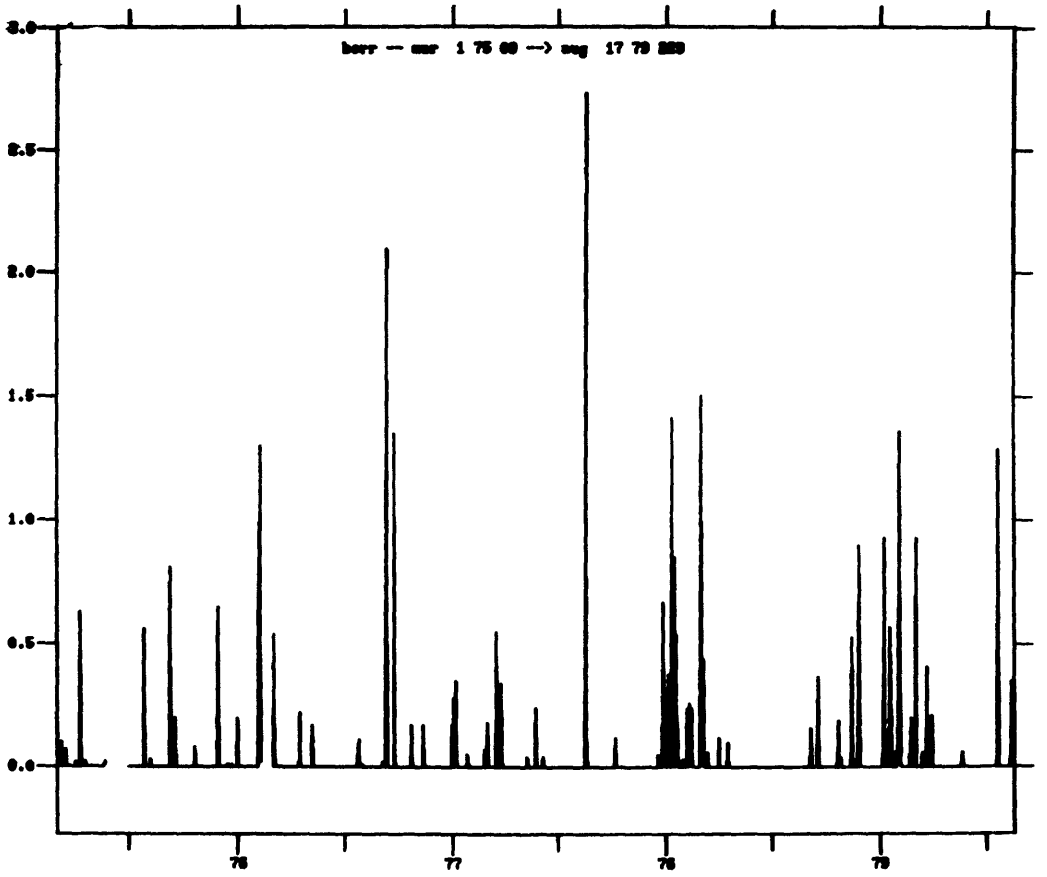

pmat — mar 1 75 00 —> aug 31 79 243
90
80
70
60
50
40
30
20
10
0
76
77
78
79

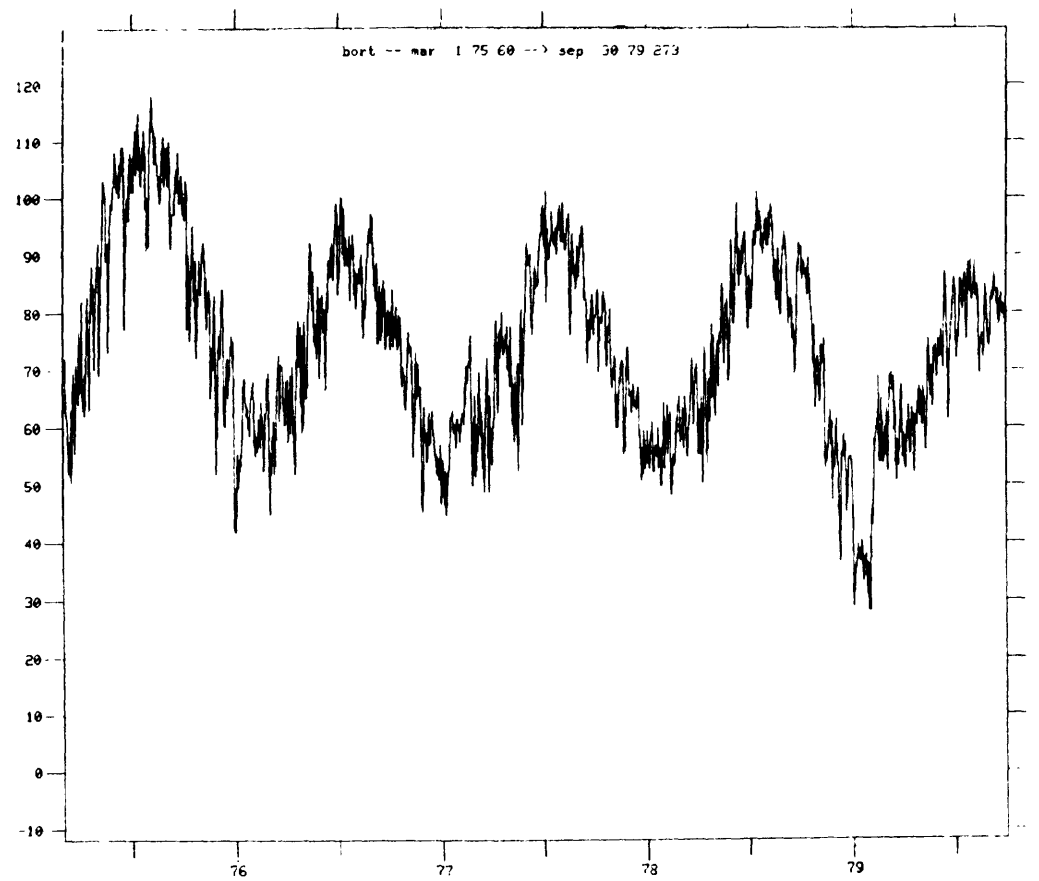

uplr — mar 1 75 60 —> aug 31 79 243
3
2
1
0
76
77
78
79

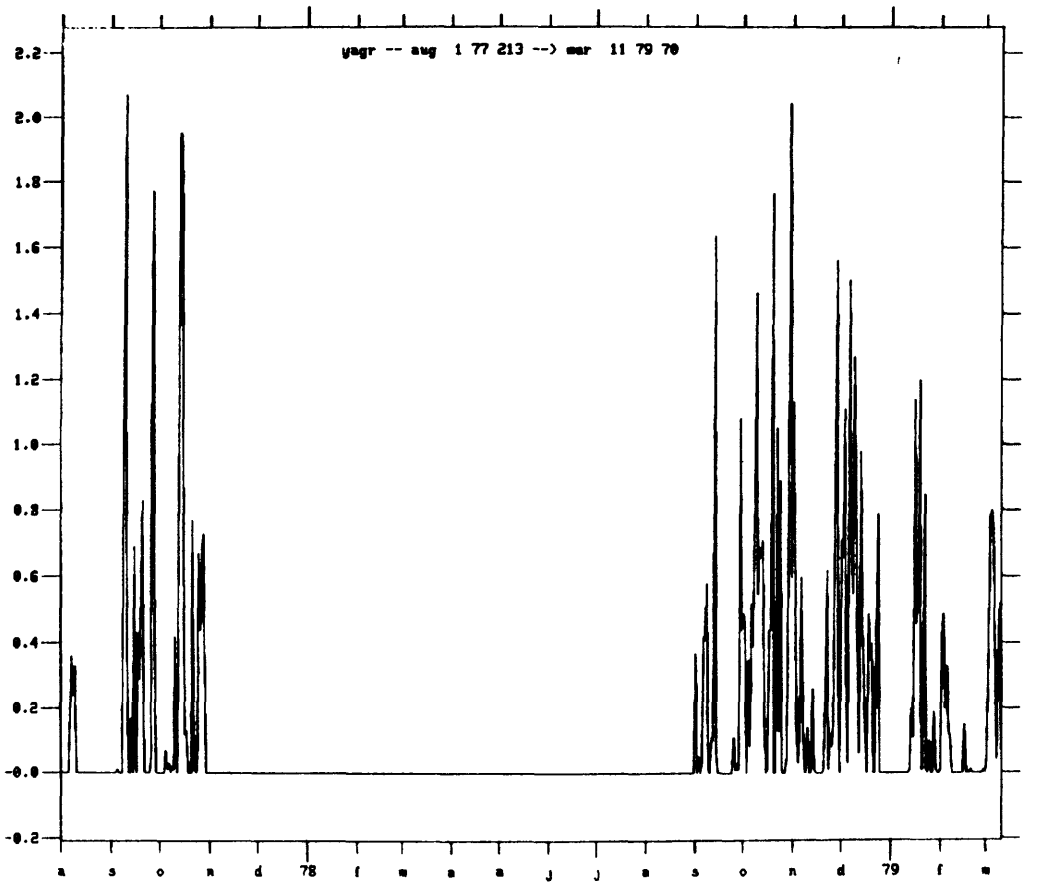

uplt -- mar 1 75 60 --> sep 30 79 273
100
90
80
70
60
50
40
30
20
76
77
78
79

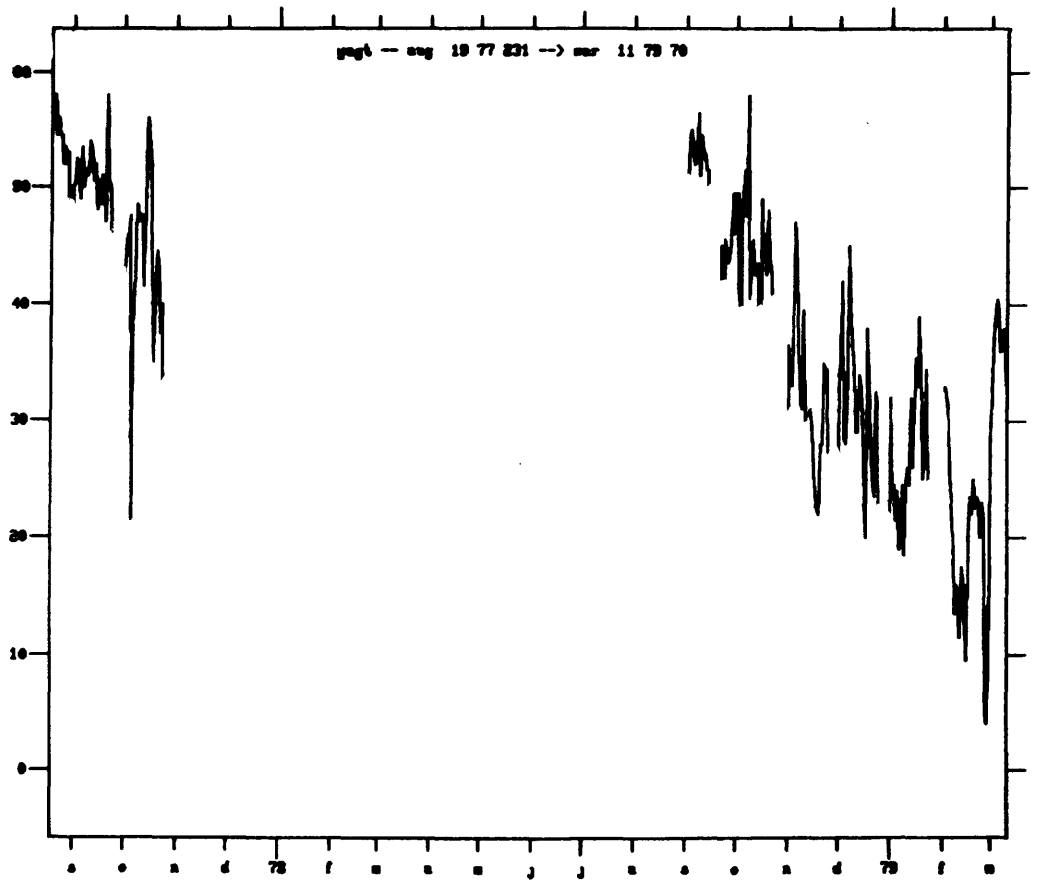

riv — mar 1 75 00 —> aug 12 79 884
2.8
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
-0.0
-0.2
76
77
78
79

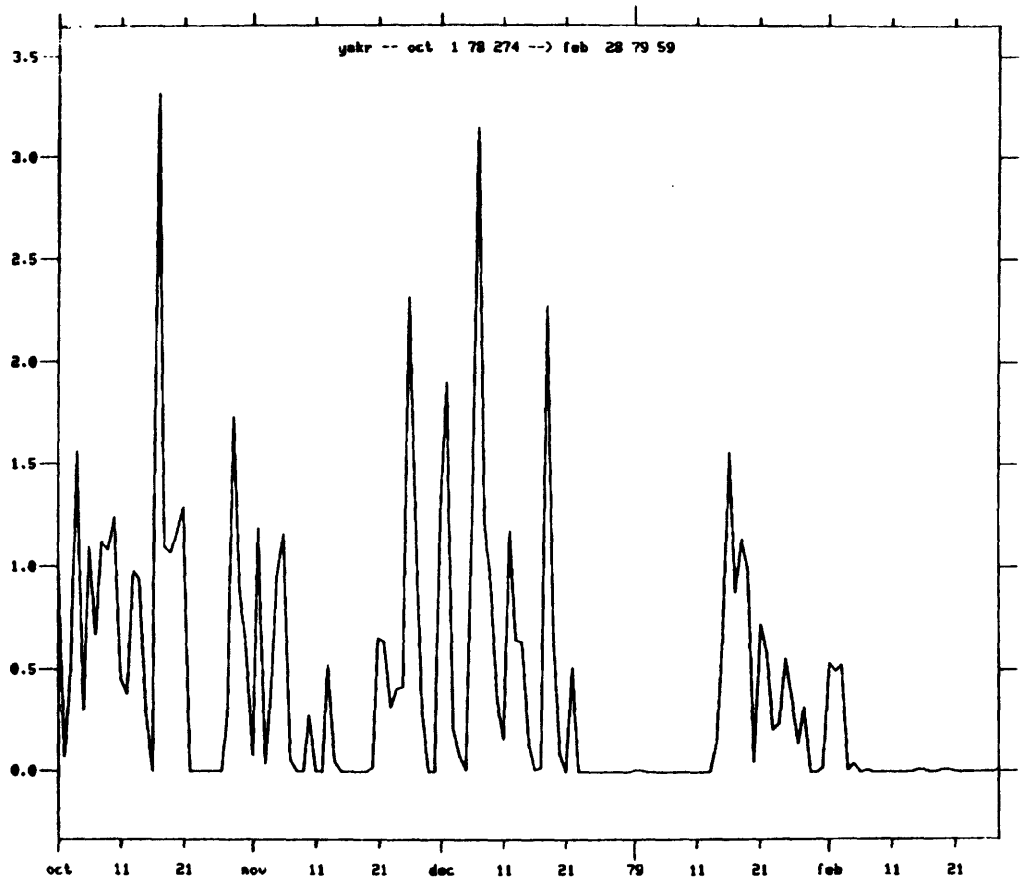

rivt — mar 1 75 00 —> aug 31 79 243
90
80
70
60
50
40
30
20
10
0
76
77
78
79


3.0
2.5
2.0
1.5
1.0
0.5
0.0
76
77
78
79


bort -- mar 1 75 60 --> sep 30 79 273
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
76
77
78
79


ygr -- aug 1 77 213 --> mar 11 79 70
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
-0.0
-0.2
a s o n d 78 f m a m j j a s o n d 79 f m


ygt -- aug 19 77 231 --> mar 11 79 70
60
50
40
30
20
10
0
a s o n d 78 f m a m j j a s o n d 79 f m


yakr -- oct 1 78 274 --> feb 28 79 59
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
oct
11
21
nov
11
21
dec
11
21
79
11
21
feb
11
21