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MARTIN MARIETTA

An Updated Global Grid Point Surface Air Temperature Anomaly Data Set: 1851–1990

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Environmental Sciences Division
Publication No. 3520

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MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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ABSTRACT

JONES, P. D., S. C. B. RAPER, B. S. G. CHERRY, C. M. GOODESS, T. M. L. WIGLEY, B. SANTER, P. M. KELLY, R. S. BRADLEY, and H. F. DIAZ. 1991. An updated global grid point surface air temperature anomaly data set: 1851–1990. ORNL/CDIAC-37, NDP-020/R1. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee. 422 pp.

This document presents land-based monthly surface air temperature anomalies (departures from a 1951–1970 reference period mean) on a 5° latitude by 10° longitude global grid. Monthly surface air temperature anomalies (departures from a 1957-1975 reference period mean) for the Antarctic (grid points from 65°S to 85°S) are presented in a similar way as a separate data set. The data were derived primarily from the *World Weather Records* and the archives of the United Kingdom Meteorological Office. This long-term record of temperature anomalies may be used in studies addressing possible greenhouse-gas-induced climate changes. To date, the data have been employed in generating regional, hemispheric, and global time series for determining whether recent (i.e., post-1900) warming trends have taken place.

This document also presents the monthly mean temperature records for the individual stations that were used to generate the set of gridded anomalies. The periods of record vary by station. Northern Hemisphere station data have been corrected for inhomogeneities, while Southern Hemisphere data are presented in uncorrected form.

All data have been assessed for quality (gross accuracy and consistency, temporal variability, and spatial and temporal completeness of record) and for long-term homogeneity. Although the period of record extends from 1851 to 1990, few grid point locations have contributed data for the entire period of record.

These data are available free of charge as a numeric data package (NDP) from the Carbon Dioxide Information Analysis Center. The NDP consists of this document and a magnetic tape containing machine-readable files (not available on floppy diskettes, due to size constraints). This document provides sample listings of temperature anomalies, station numbers, and mean inverse distance data, as well as a complete listing of the gridded surface air temperature anomalies on microfiche (Appendix B). This document also offers retrieval program listings (in FORTRAN and SAS* languages), furnishes graphical summaries and information on sampling methods and data selection, defines limitations and restrictions of the data, and provides reprints of pertinent literature.

*SAS is the registered trademark of SAS Institute, Inc., Cary, North Carolina 27511-8000.

PART 1

INFORMATION ABOUT THE NUMERIC DATA PACKAGE

1. NAME OF THE NUMERIC DATA PACKAGE

An Updated Global Grid Point Surface Air Temperature Anomaly Data Set: 1851–1990

2. CONTRIBUTORS

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3. KEYWORDS

Surface air temperatures, temperature anomalies, gridded temperature data, climatic trends, time series, data homogeneity

4. BACKGROUND INFORMATION

Because reliable thermometers were not developed until the mid-18th century, almost all long-term temperature records are shorter than 200 years. For the most part, the development of a large-scale temperature recording network did not begin until the early- to mid-19th century (Bradley et al. 1985). As additional stations began operating, global coverage improved. However, differences in instrumentation and calculation methods among stations and among countries have made it difficult to compile an accurate data set for global surface air temperatures. Furthermore, changes in location, in instrumentation, and in calculation methods at individual stations, as well as other factors, such as urbanization, have resulted in an inhomogeneous data set (i.e., showing jumps, discontinuities, or trends attributable to nonclimatic sources) (see, for example, Jones et al. 1986a). The data set contained and described in this package extends back to 1851 and is, to the extent possible, homogeneous. This package is an updated and expanded version of that contained in Jones et al. 1986b. These data sets are identical for the period 1851–1978; however, the updated version corrects erroneous data and adds new station data for the period 1979–1984. The updated package also extends the data set by adding data for the Northern (grid points from

85°N to 0°) and Southern (grid points from 5°S to 60°S) Hemispheres for the period 1985–1990, and, for the first time, presents Antarctic (grid points from 65°S to 85°S) data for the period 1957–1990. In addition, this package includes the monthly mean temperature records for the individual stations that were used to generate the gridded anomalies.

The gridded anomaly data were evaluated for homogeneity, by comparison with neighboring stations, and were classified as immediately usable, corrected, or uncorrectable. The results of this assessment (for data from grid points 85°N to 60°S and through 1984), including any corrections applied to the data, are presented in Jones et al. (1985, 1986c). The gridded data set was generated from the station anomalies by an interpolation procedure averaging station data that were weighted according to the inverse of the distance of the station to the nearest grid point. The gridded data are departures (anomalies) from the station means for each month over the 1951–1970 reference period, or, for the Antarctic data, the 1957–1975 reference period. It was necessary to reduce all the station data to anomalies because of different station elevations and, to a lesser extent, different observation times.

5. SOURCE AND SCOPE OF THE DATA

The basis of the data set is derived from the *World Weather Records* (WWR), published by the Smithsonian Institution (1927, 1935, and 1947) and the U.S. Weather Bureau (1959–1982). Additional data were added from material available in published and manuscript form in meteorological archives. For the Northern Hemisphere, much of the additional information came from the archives of the United Kingdom Meteorological Office. Areas where data coverage was considerably expanded include the Soviet Union, northern Europe, northern Africa, and the People's Republic of China. For the Southern Hemisphere, data were added for Argentina, Chile, Indonesia, Australia, Pacific Islands (particularly Tahiti), New Zealand, Peru, and (for 1957 onwards) some parts of Antarctica. Details of these additional sources can be found in Bradley et al. (1985) and Jones et al. (1985, 1986a) for the Northern Hemisphere and in Jones et al. (1986c, 1986d) for the Southern Hemisphere. Data for the Antarctic were assembled primarily from the *World Weather Records* and the *Monthly Climatic Data for the World.*

The present updated version of this data set is identical to the earlier version for all records from 1851 through 1978, except for the addition of a separate data set containing Antarctic (grid points from 65°S to 85°S) surface air temperature anomalies beginning in 1957. Beginning with 1979 data, this document differs from the earlier version (Jones et al. 1986b) in several ways. Erroneous data for some sites have been corrected after a review of the actual station temperature data, and inconsistencies in the representation of missing values have been removed. For some grid locations, data have been added from stations that had not contributed to the original set. Data from satellites have also been used to correct station records in cases in which large discrepancies were evident (Jones et al. 1988). The present package also extends the record by adding monthly surface air temperature anomalies for the Northern (grid points from 85°N to 0°) and Southern (grid points from 5°S to 60°S Hemispheres for the period 1985–1990.

This document also includes the monthly mean temperature records for the individua stations that were used to generate the set of gridded anomalies. The periods of record var by station, with data for 1988 being the most recent presented (although data for 1989 and 1990 were also used to generate the updated gridded anomalies). Northern Hemisphere

(stations from 87.5°N to 2.5°S) station data have been corrected for inhomogeneities, while Southern Hemisphere (stations from 2.5°S to 62.5°S) data are presented in uncorrected form and missing 5 stations (Masterton, New Zealand; Lincoln College, New Zealand; Cape Leeuwin, Australia; Cape Naturaliste, Australia; and Angururu, Australia). Further details concerning these station records, including station histories, are given in Jones et al. (1985; 1986c), copies of which are included in Appendix A. Individual station data for the Antarctic (stations south of 62.5°S) are not presented in this package but are given in Jones and Limbert (1989) and may be obtained free of charge from the Carbon Dioxide Information Analysis Center.

Analysis of these gridded surface air temperature anomaly data over the period 1881–1984 shows a linear warming trend of 0.52°C for the Northern Hemisphere (Jones et al. 1986a), and 0.51°C for the Southern Hemisphere, excluding the Antarctic (Jones et al. 1986d). A similar trends analysis incorporating the entire data set through 1990 has not yet been published.

6. APPLICATIONS OF THE DATA

A representative global data set of surface air temperatures is crucial for understanding past climatic trends and for comparing future measurements. For example, this baseline data set will be important in detecting any climate shift that may have been induced by increased concentrations of atmospheric greenhouse gases. The gridded data have been used in establishing hemispheric time series of surface air temperatures (e.g., Fig. 6, Jones et al. 1986c; Fig. 5, Jones et al. 1986a). The methods used to calculate spatial mean surface air temperatures differ among researchers, particularly in regard to averaging procedures and the extrapolation of extant data to data-poor areas (e.g., Wigley et al. 1985). When used in estimating global mean temperatures, these data are often combined with data for sea surface temperatures (SST) and, preferably, corrected for the effects of El Niño/Southern Oscillation (ENSO) events (see, for example, Jones 1988).

7. LIMITATIONS AND RESTRICTIONS

Although the data are calculated, stored, and presented in this data set to an accuracy of 0.01°C (0.1°C for Antarctic data), the individual monthly grid point anomalies are probably only accurate to at best ±0.2°C, given the accuracy of the original data (see Jones et al. 1985). The size of this error decreases, however, as averages for larger and larger regions are calculated.

Homogeneity of the data was checked by comparison with data from adjacent stations; not all station histories were examined. Thus, it is possible that some inhomogeneities could have escaped detection if a group of stations were affected similarly by a non-climatic factor.

Interstation comparisons were based on annual means, rather than on monthly means. It is possible, then, that an inhomogeneity due to urbanization could have remained undetected if a season-specific effect was not identified in the annual data. More detail on the measures taken to improve the homogeneity of the data set can be found in Appendix A. An assessment of the effect of urban warming on hemispheric average temperature anomalies derived from this data set is given in Jones et al. (1989).

The data set suffers from large discontinuities in both temporal and spatial coverage (Figs. 1–9). During the period 1900–1988, for example, nearly 60% of all contributing grid locations lack 10 or more years of data. Spatially, coverage is particularly poor before 1900. In 1851, for example, temperature anomaly data are available for only 48 grid loci, virtually all north of the equator; the entire Southern Hemisphere is represented by a single grid point, using data from a single station (Fig. 6). Jones et al. (1986d) considers the Southern Hemisphere data to be reliable only back to about 1890 for making annual hemispheric estimates and back to about 1860 for estimating overall trends. Even in 1990, however, large spatial gaps exist in the data set (Fig. 9). In the Southern Hemisphere, there is a complete lack of data from a number of grid locations in South America and central Africa. In the Northern Hemisphere, data for high-latitude locations are sparse, and there are a number of gaps in temperate regions, including two grid locations in the continental United States (resulting from the rejection of some station data during the 1980s due to urbanization effects). Considering the overall sparsity of polar data and the low weighting factor usually assigned to high-latitude data in generating area average temperature series (e.g., Jones et al. 1985), the result is likely to be an effective omission of high latitude data from such area average series. However, on the basis of the consistency of findings derived from satellite data and from surface data, Jones and Wigley (1990) have argued that incomplete coverage does not seriously affect the quality of surface temperature data.

Although each grid point temperature anomaly serves as an average value for all stations nearest to that grid point, many of the gridded anomalies use data from a single station. In 1990, for example, over half of all grid point temperature anomalies were based (as a monthly average) on data from one station. Even in 1960, the year in which the number of contributing stations was at a maximum, over 40% of all grid point anomalies were based on single station data.

In cases for the period 1979–84 in which the updated data contained in this document involve a change in the number of stations contributing to a grid point temperature anomaly, no corresponding changes were made to the associated mean inverse distance values. In these instances, therefore, the mean inverse distance data presented in this document must be assumed to be incorrect.

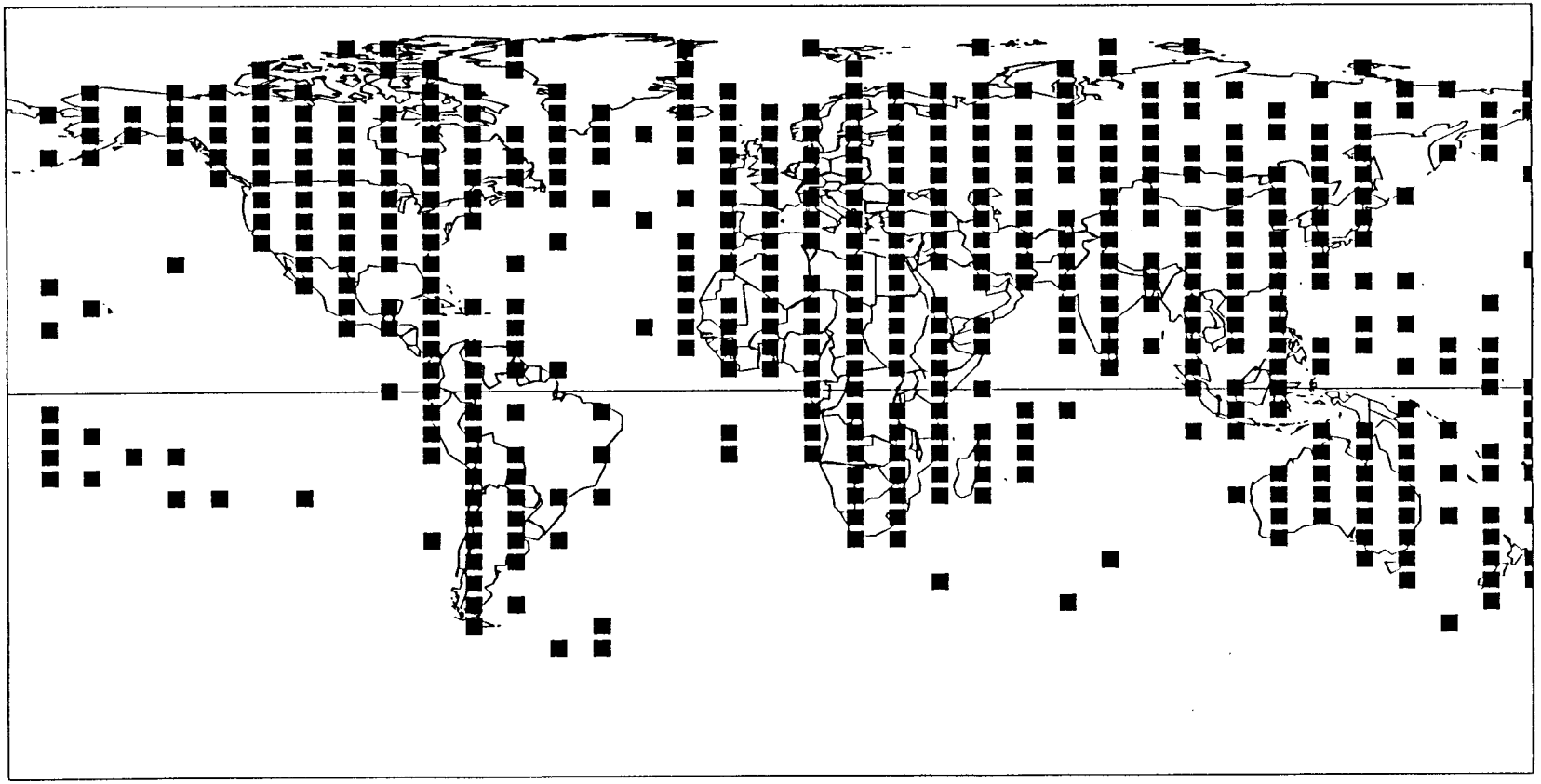

Fig. 1. Grid point locations for which any monthly surface air temperature anomaly data are available from the period 1851 to 1990.

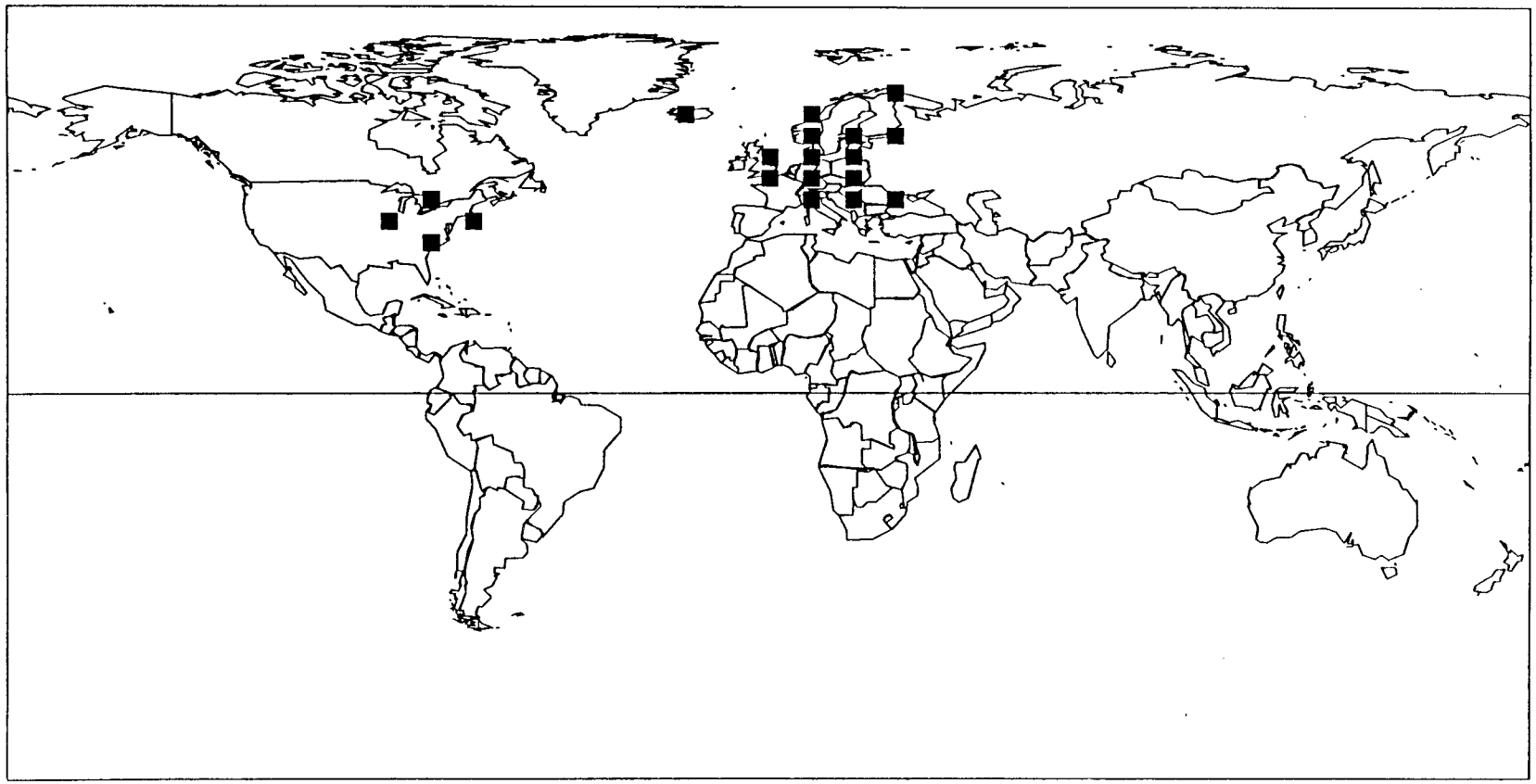

Fig. 2. Grid point locations for which continuous monthly surface air temperature anomaly data are available over the entire period of record, 1851 to 1990.

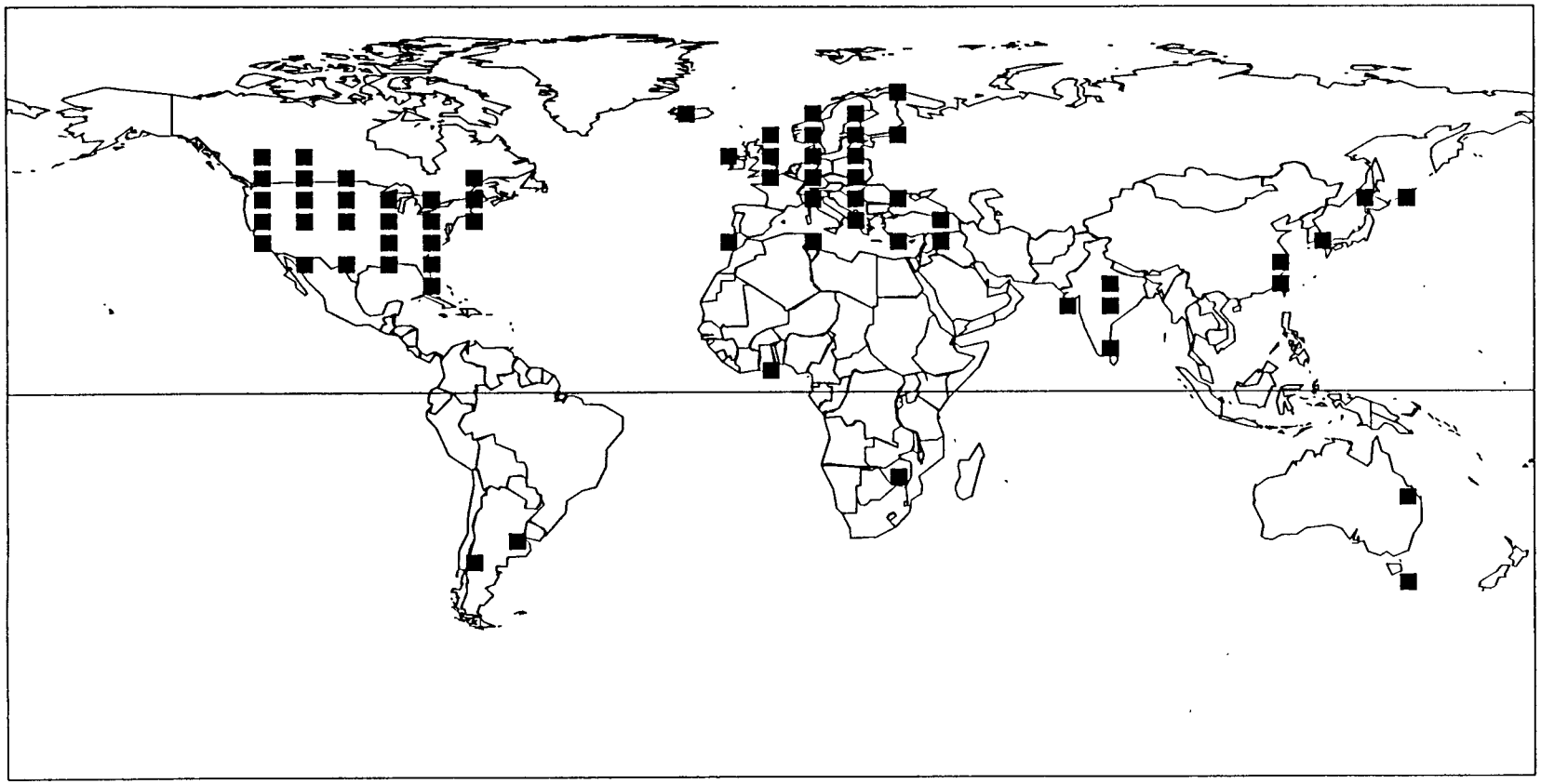

Fig. 3. Grid point locations for which continuous monthly surface air temperature anomaly data are available over the period 1900 to 1990.

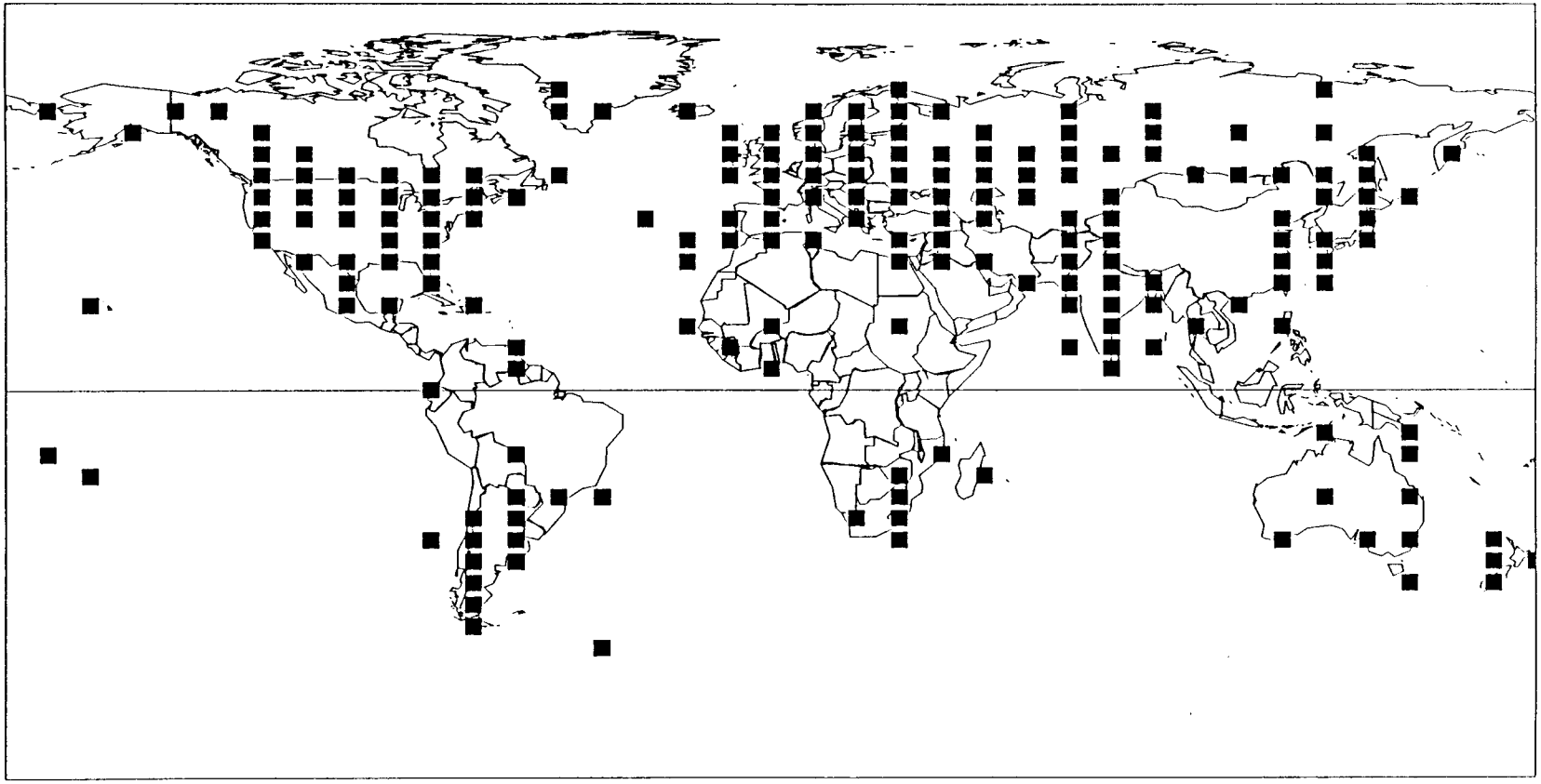

Fig. 4. Grid point locations for which surface air temperature anomaly data are available for at least 90% of all months over the period 1900 to 1990.

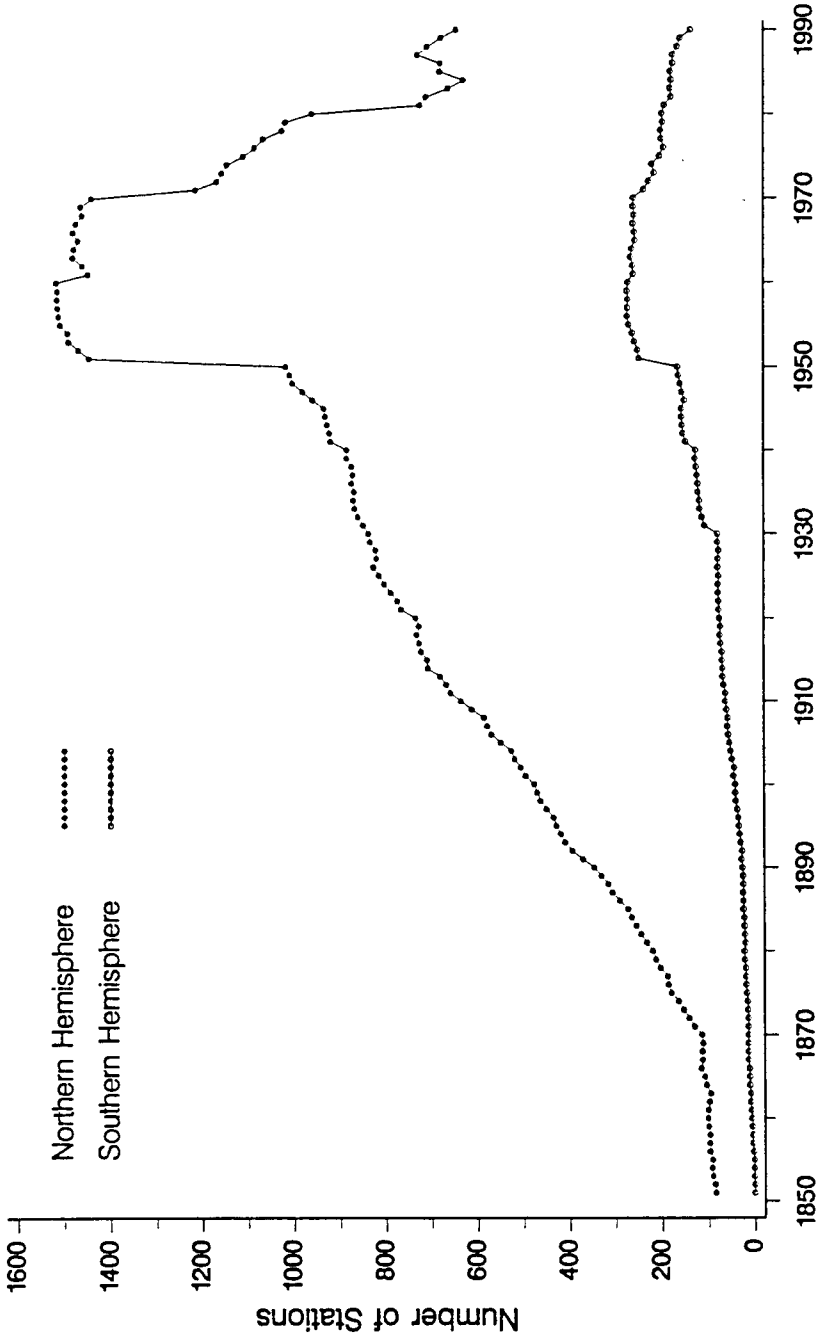

Fig. 5. Average number of stations contributing monthly temperature data from 1851 to 1990.

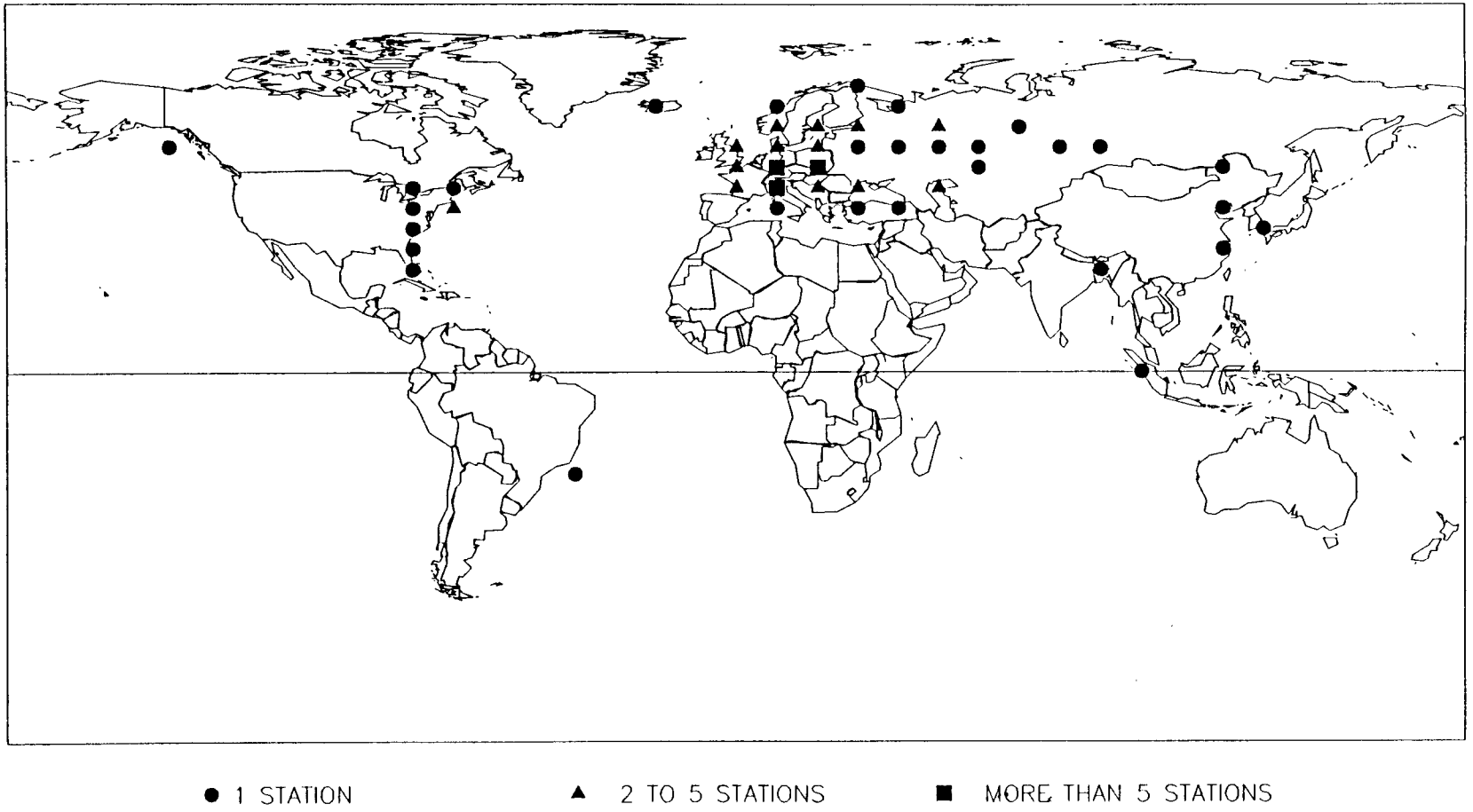

Fig. 6. Year 1851: Average number of stations contributing monthly temperature data for each grid point location.

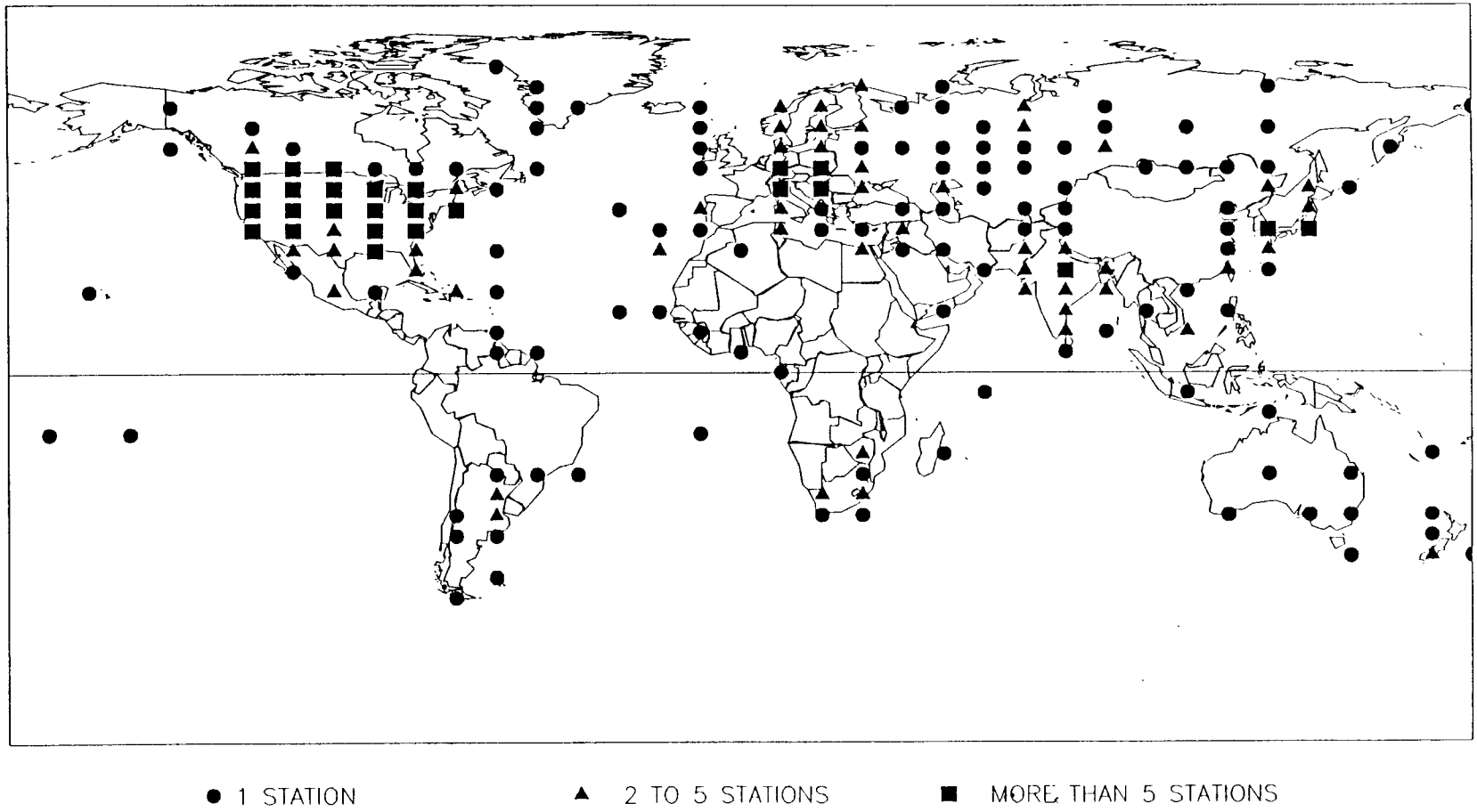

Fig. 7. Year 1900: Average number of stations contributing monthly temperature data for each grid point location.

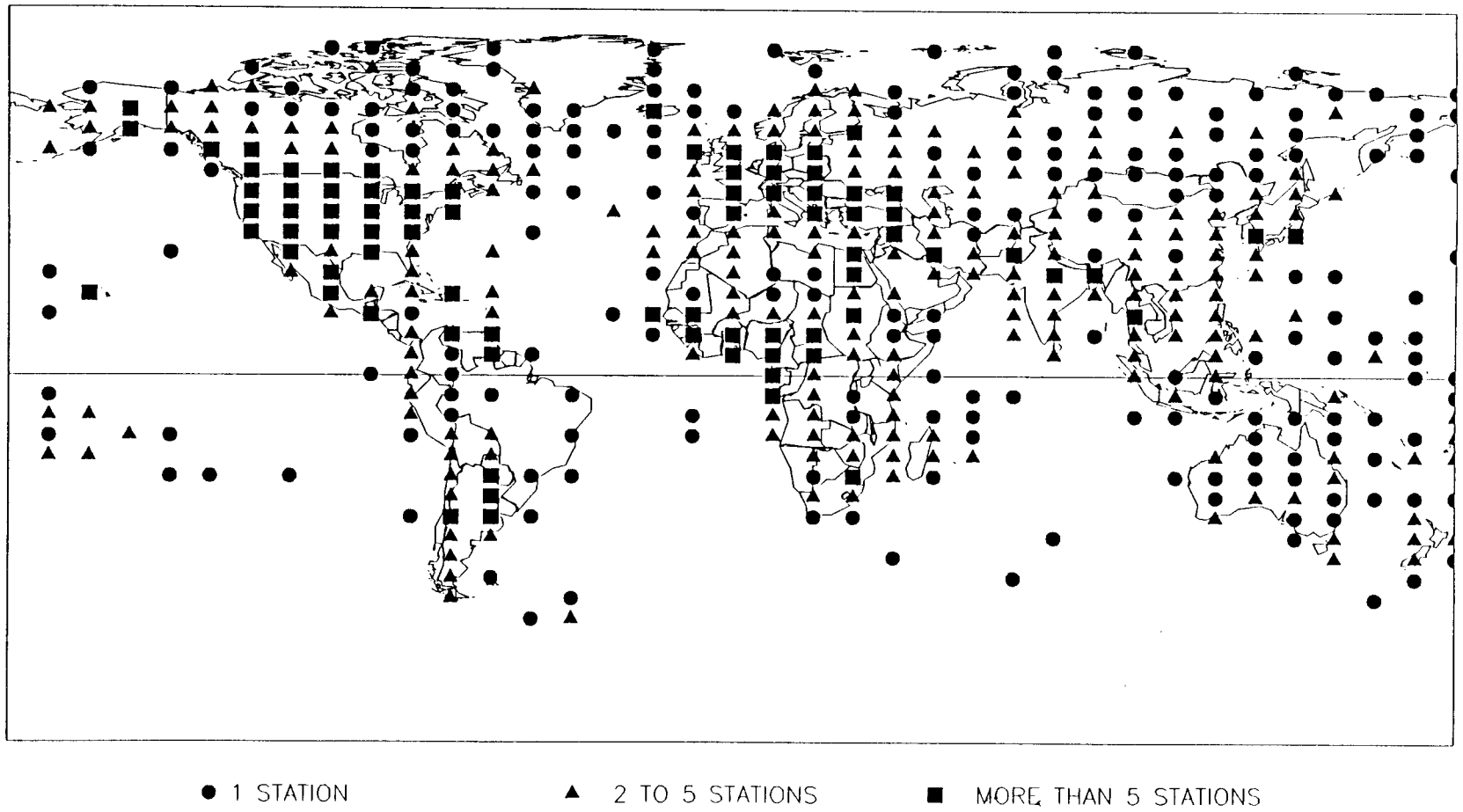

Fig. 8. Year 1960: Average number of stations contributing monthly temperature data for each grid point location.

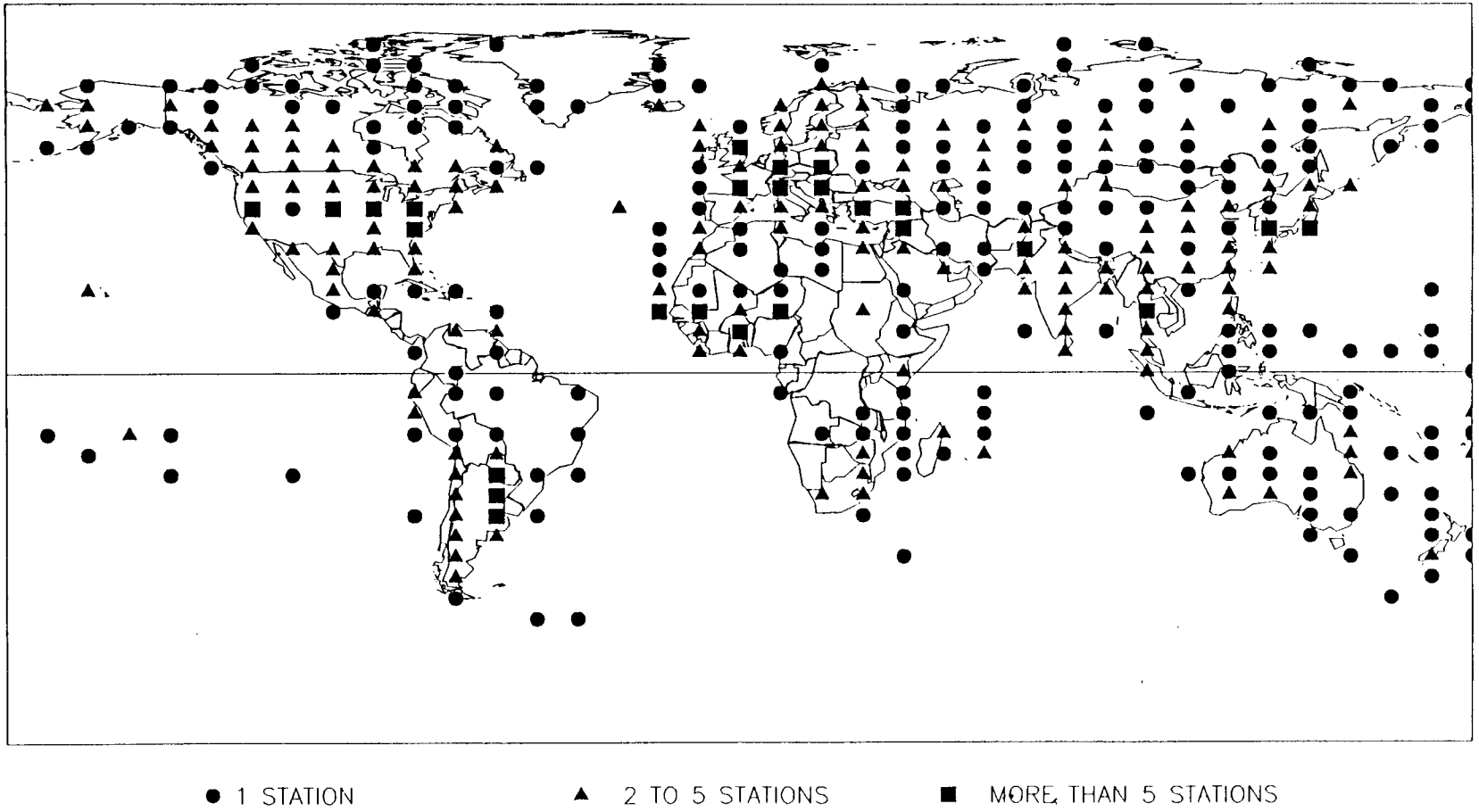

Fig. 9. Year 1990: Average number of stations contributing monthly temperature data for each grid point location.

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Jones, P. D., S. C. B. Raper, B. S. G. Cherry, C. M. Goodess, T. M. L. Wigley, B. Santer, P. M. Kelly, R. S. Bradley, and H. F. Diaz. 1986b. *A global grid point surface air temperature data set: 1851–1984.* NDP-020. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Jones, P. D., S. C. B. Raper, C. M. Goodess, B. S. G. Cherry, and T. M. L. Wigley. 1986c. *A grid point surface air temperature data set for the Southern Hemisphere.* DOE Technical Report No. TR027. U.S. Department of Energy, Carbon Dioxide Research Division, Washington, D.C.

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Smithsonian Institution. 1927, 1935, 1947. *World Weather Records.* Miscellaneous Collections, Vols. 79, 90, 104. Washington, D.C.

U.S. Weather Bureau. 1959–1982. *World Weather Records.* 1941–1950 (1361 pp.), 1951–1960 (Vols. 1–6), 1961–1970 (Vols. 1–6). U.S. Department of Commerce, Washington, D.C.

Wigley, T. M. L., J. K. Angell, and P. D. Jones. 1985. Analysis of the temperature record. pp. 55–90. in M. C. MacCracken and F. M. Luther (eds.), *Detecting the Climatic Effects of Increasing Carbon Dioxide.* DOE/ER-0235. U.S. Department of Energy, Washington, D.C.

This data package includes reprints of Jones et al. 1985, Jones et al. 1986c, and Jones et al. 1988 (see Appendix A).

9. DATA CHECKS PERFORMED BY CDIAC

The Carbon Dioxide Information Analysis Center (CDIAC) endeavors to provide quality assurance (QA) of all data before their distribution. To ensure the highest possible quality in the data, CDIAC conducts extensive reviews for reasonableness, accuracy, completeness, and consistency of form. While having common objectives, the specific form of these reviews must be tailored to each data set; the process may involve considerable programming efforts. The entire QA process is an important part of CDIAC's effort to ensure that accurate, usable CO_2-related data are available to researchers.

The following summarizes the QA checks performed on the gridded surface air temperature data by CDIAC.

1. The format of all information, including header items, was checked to ensure consistency throughout each data file. Inconsistencies discovered either within the data set or between the original version and the present updated version include: (1) the presence of an extraneous line length record, not present in the earlier version of the data set, at the beginning of each line; and (2) inconsistencies in the form in which the year of record was presented within the data set.

2. All records were compared with the corresponding records (where available) in the original version to cite changes made to the updated version. These changes are summarized in Fig. 10.

3. The spatial and temporal continuity of the gridded temperature data set was reviewed, along with the corresponding data on the number of contributing stations. These results are summarized in Figs. 1–9.

4. Range and variability checks were performed on the temperature anomaly data to ensure reasonableness. The variability of the temperature data for years 1851–1990, is shown in Fig. 11.

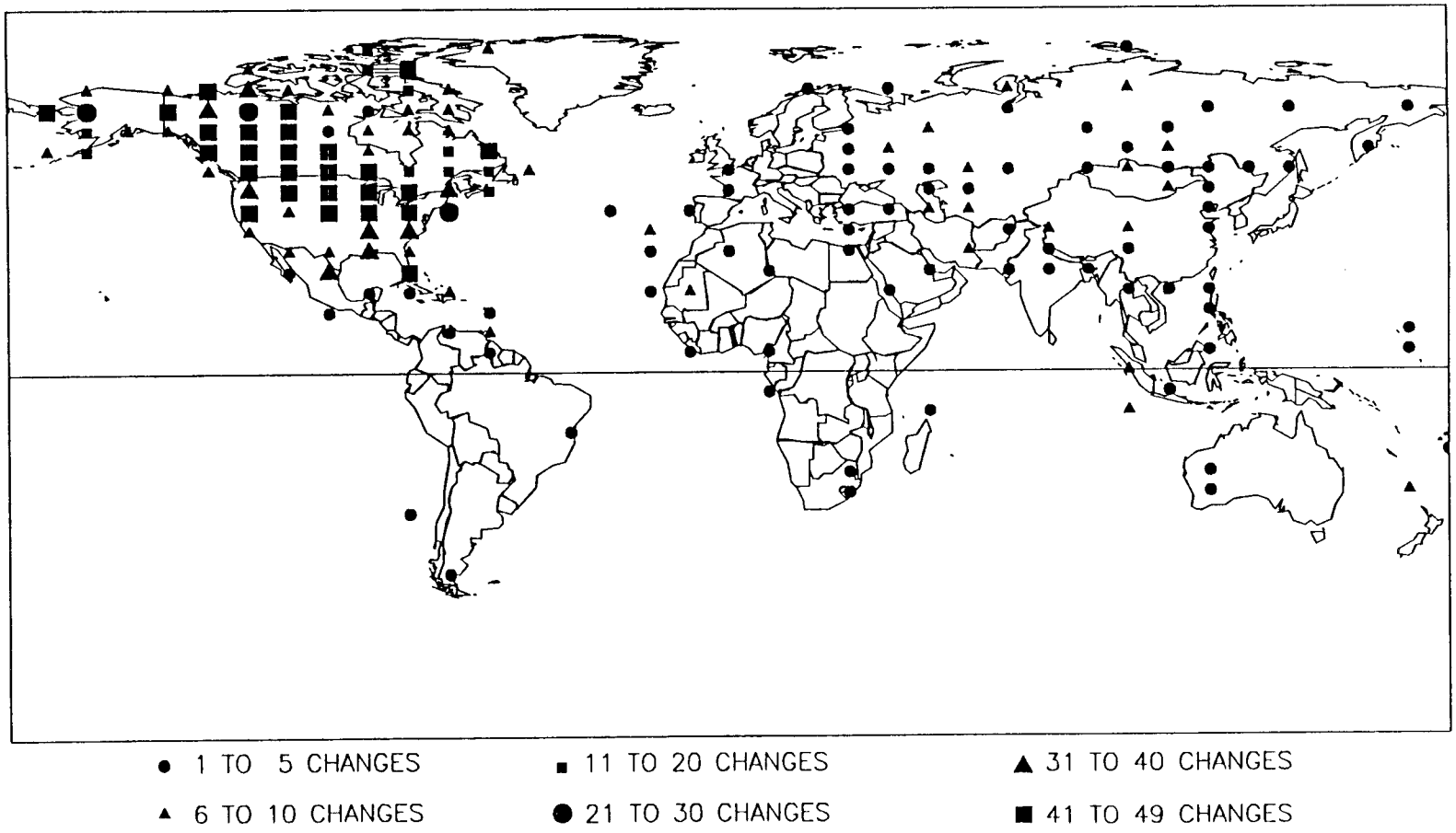

Fig. 10. Number of months per grid point location for which changes were made in the updated data set for the period 1979 to 1984.

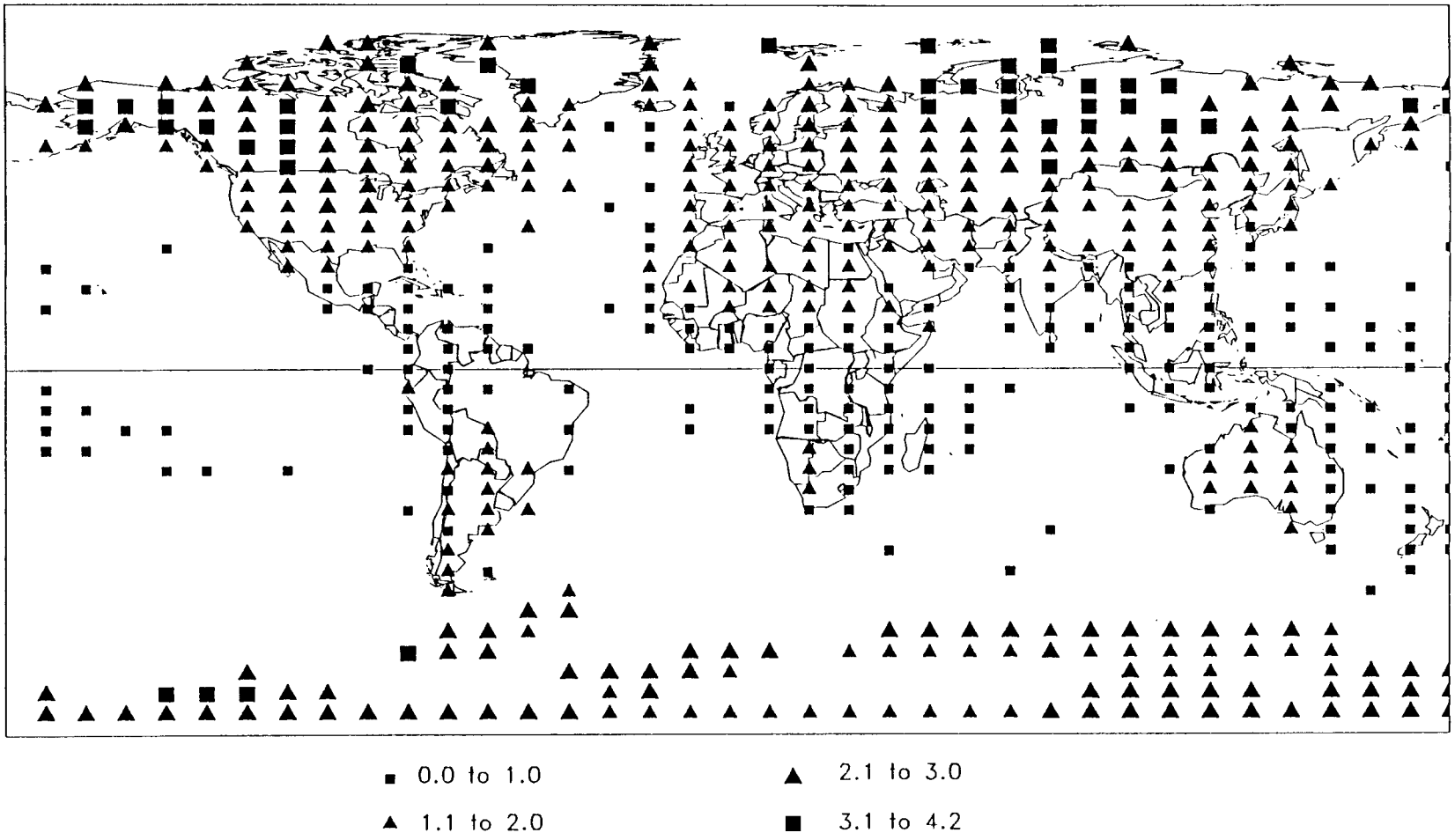

Fig. 11. Variability in monthly temperature anomaly data for each grid point location over the period 1851 to 1990. Numbers represent standard deviations (in degrees Celsius).

It is not the task of CDIAC to make alterations or deletions to the values of data it receives. Therefore, aside from the elimination of inconsistencies and redundancies in header items described in item 1 above, the surface air temperature anomaly files distributed by CDIAC in this package are identical to the original files sent to CDIAC.

Packaging of the monthly mean temperature records for individual stations required the merging of a number of separate files and the correction of incomplete or inconsistent header information. In addition, each data record, containing the 12 monthly mean temperatures for a given year, was appended with a summary value representing the mean of the 12 monthly values. No alterations have otherwise been made to any of the monthly data values contained in these files. Therefore, any limitations present in these data (e.g., the lack of corrections for inhomogeneities and the absence of data for 5 stations in the Southern Hemisphere) reflect those present in the original files obtained by CDIAC.

10. HOW TO OBTAIN THE PACKAGE

This document describes a data set consisting of the departures of 1851–1990 surface air temperatures from the mean of the 1951–1970 reference period, expressed on a global 10° longitude grid by 5° latitude grid, covering latitudes from 85°N to 60°S. Antarctic (65°S to 85°S) data are similarly presented as a separate data set consisting of the departures of 1957–1990 surface air temperatures from the mean of the 1957–1975 reference period. These data are provided on microfiche (inside back cover) in the package and are available upon request on nine-track magnetic tapes from CDIAC. Also described is a data set consisting of the actual monthly mean temperature records for individual stations from which the set of gridded departures (anomalies) were derived. Requests for magnetic tapes should include any specific instructions for transmitting the data required by the user to access the data. Requests not accompanied by specific instructions will be filled on nine-track, 6250 BPI, standard-labeled tapes with characters written in EBCDIC (Extended Binary Codes Decimal Interchange Code) and files formatted as noted in Section 11. Because of the size of the data files (12–20 MB), it is not feasible to distribute these data on floppy diskettes, even as compressed files. Requests should be addressed to the following:

Carbon Dioxide Information Analysis Center
Oak Ridge National Laboratory
Post Office Box 2008
Oak Ridge, Tennessee 37831-6335
U.S.A.

The tapes and documentation can be ordered by telephone, fax machine, or electronic mail.

Telephone:	(615)	574-0390
	FTS	624-0390
Fax:	(615)	574-2232
	FTS	624-2232
Electronic Mail:		BITNET: CDP@ORNLSTC
		INTERNET: CDP@STC10.CTD.ORNL.GOV
		OMNET: CDIAC

PART 2

INFORMATION ABOUT THE MAGNETIC TAPE

11. CONTENTS OF THE MAGNETIC TAPE

The following is a list of files distributed on magnetic tape by CDIAC along with this documentation.

File number and description	Number of logical records	Record format[a]	Block size	Record length
1. General descriptive information file	361	FB	8000	80
2. FORTRAN IV data retrieval code to read and print the gridded surface air temperature anomaly data file for the Northern Hemisphere (File 10)	56	FB	8000	80
3. FORTRAN IV data retrieval code to read and print the gridded surface air temperature anomaly data file for the Southern Hemisphere (File 11)	56	FB	8000	80
4. FORTRAN IV data retrieval code to read and print the gridded surface air temperature anomaly data file for the Antarctic (File 12)	42	FB	8000	80
5. FORTRAN IV data retrieval code to read and print the monthly mean temperature records for individual stations (Files 13 and 14)	27	FB	8000	80

File number and description	Number of logical records	Record format[a]	Block size	Record length
6. SAS[b] input/output routine to read and print the gridded surface air temperature anomaly data file for the Northern Hemisphere (File 10)	102	FB	8000	80
7. SAS[b] input/output routine to read and print the gridded surface air temperature anomaly data file for the Southern Hemisphere (File 11)	82	FB	8000	80
8. SAS[b] input/output routine to read and print the gridded surface air temperature anomaly data file for the Antarctic (File 12)	35	FB	8000	80
9. SAS[b] input/output routine to read and print the monthly mean temperature records for individual stations (Files 13 and 14)	24	FB	8000	80
10. Gridded surface air temperature anomalies for the Northern Hemisphere, 1851–1990	186,480	FB	5400	108
11. Gridded surface air temperature anomalies for the Southern Hemisphere, 1851–1990	186,480	FB	8000	80
12. Gridded surface air temperature anomalies for the Antarctic, 1957-1990	15,096	FB	8000	80

File number and description	Number of logical records	Record format[a]	Block size	Record length
13. Monthly mean temperature records for individual stations in the Northern Hemisphere (corrected)	116,931	FB	8000	80
14. Monthly mean temperature records for individual stations in the Southern Hemisphere (uncorrected and 5 stations[c] missing)	16,738	FB	8000	80
Total records	522,510			

[a]FB = fixed block.
[b]SAS is the registered trademark of SAS Institute, Inc., Cary, North Carolina 27511-8000.
[c]Masterton, New Zealand
Lincoln College, New Zealand
Cape Leeuwin, Australia
Cape Naturaliste, Australia
Angururu, Australia

12. DESCRIPTIVE FILE ON THE TAPE

The following is a listing of File 1 on the magnetic tape distributed by CDIAC. This file is intended to complement the documentation and provide details (i.e., variable descriptions, formats, and units) about each data file on the magnetic tape.

TITLE OF THE DATA SET

An Updated Global Grid Point Surface Air Temperature Anomaly Data Set: 1851–1990

DATA CONTRIBUTORS

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SOURCE AND SCOPE OF THE DATA

The data files included on this magnetic tape provide gridded surface air temperature anomaly data for a total of 486 grid cells in the Northern and Southern Hemispheres (latitudes from 85°N to 60°S), and an additional 100 grid cells in the Antarctic (latitudes from 65°S to 85°S). Each grid cell represents an area of 5° latitude by 10° longitude. These data are derived from temperature records of land-based stations for the period 1851–1990, except for the Antarctic data, where the period is 1957–1990. The gridded data are departures (anomalies) from the station means for each month over the 1951–1970 reference period, or, for the Antarctic data, the 1957–1975 reference period. It was necessary to reduce all the station data to anomalies because of different station elevations and, to a lesser extent, different observation times.

The primary sources of these data are the *World Weather Records* (WWR), published by the Smithsonian Institution and the U.S. Weather Bureau, the archives of the United Kingdom Meteorological Office, and the *Monthly Climatic Data for the World*, published by the National Climatic Data Center (Asheville, North Carolina). Additional sources are

described in Bradley et al. (1985) and in Jones et al. (1985, 1986a, 1986c, 1986d). The present updated version of this data set is identical to the earlier version (Jones et al. 1986b) for all records from 1851 through 1978. For the period 1979–1984, the present data set corrects erroneous data using satellite data for some sites and appends data for other sites by adding previously unavailable station data (Jones et al. 1988). The present package also adds monthly surface air temperature anomalies for the period 1985–1990, Antarctic monthly surface air temperature anomalies for the period 1957–1990, as well as the monthly mean temperature records for individual stations (Antarctic stations excluded) that were used to generate the set of gridded anomalies. Individual station data for the Antarctic (stations south of 62.5° S) are not presented in this package but are given in Jones and Limbert (1989) and may be obtained free of charge from the Carbon Dioxide Information Analysis Center.

DATA FORMAT

Fourteen files are provided on this magnetic tape, including this descriptive file, four FORTRAN IV and four SAS data retrieval programs, three data files containing gridded surface air temperature anomaly data, and two files containing the monthly mean temperature records for individual stations.

Gridded Anomaly Data, Northern Hemisphere

The data file containing the gridded surface air temperature anomaly data for the Northern Hemisphere (File 10) is formatted in the following way:

```
      INTEGER I, J, YEAR, MONTH, ANOM(18), NSTA(18), IDIST(18)
   10 READ (5,100,END=999) YEAR, MONTH
      DO 20 I=1,36
        READ (5,200) (ANOM(J), J=1,18)
   20 CONTINUE
      READ (5,100) YEAR, MONTH
      DO 30 I=1,36
        READ (5,200) (NSTA(J), J=1,18)
   30 CONTINUE
      READ (5,100) YEAR, MONTH
      DO 40 I=1,36
        READ (5,200) (IDIST(J), J=1,18)
   40 CONTINUE
      GOTO 10
  100 FORMAT (20X,I4,4X,I2)
  200 FORMAT (18(1X,I5))
```

where

YEAR is the year of the data record being read;

MONTH is the month of the data record being read;

ANOM is the gridded surface air temperature anomaly in degrees Celsius, multiplied by 100;

NSTA is the number of stations used to calculate the gridded anomaly;

IDIST is 10,000 times the mean value (for all contributing stations) of the inverse of the great circle distance between the station and the grid point;

I represents the data line being read (each of the 36 lines of data represents a 10° longitude band, centered on 0°, 10°E, 20°E, ..., 170°E, 180°, 170°W, ..., 10°W);

J represents the data column being read (each of the 18 columns of data represents a 5° latitude band, centered on 85°N, 80°N, ..., 5°N, 0°);

Missing values for the temperature anomalies are represented by -9999. Missing values for the number of stations and mean inverse distances are represented by 0.

Gridded Anomaly Data, Southern Hemisphere

The data file containing the gridded surface air temperature anomaly data for the Southern Hemisphere (File 11) is formatted in the following way:

```
      INTEGER I, J, YEAR, MONTH, ANOM(12), NSTA(12), IDIST(12)
   10 READ (5,100,END=999) YEAR, MONTH
      DO 20 I=1,36
        READ (5,200) (ANOM(J), J=1,12)
   20 CONTINUE
      READ (5,100) YEAR, MONTH
      DO 30 I=1,36
        READ (5,200) (NSTA(J), J=1,12)
   30 CONTINUE
      READ (5,100) YEAR, MONTH
      DO 40 I=1,36
        READ (5,200) (IDIST(J), J=1,12)
   40 CONTINUE
      GOTO 10
  100 FORMAT (20X,I4,4X,I2)
  200 FORMAT (12(1X,I5))
```

where

YEAR is the year of the data record being read;

MONTH is the month of the data record being read;

ANOM is the gridded surface air temperature anomaly in degrees Celsius, multiplied by 100;

NSTA is the number of stations used to calculate the gridded anomaly;

IDIST is 10,000 times the mean value (for all contributing stations) of the inverse of the great circle distance between the station and the grid point;

I represents the data line being read (each of the 36 lines of data represents a 10° longitude band, centered on 0°, 10°E, 20°E, ..., 170°E, 180°, 170°W, ..., 10°W);

J represents the data column being read (each of the 12 columns of data represents a 5° latitude band, centered on 5°S, 10°S, ..., 60°S);

Missing values for the temperature anomalies are represented by -9999. Missing values for the number of stations and mean inverse distances are represented by 0.

Gridded Anomaly Data, Antarctic

The data file containing the gridded surface air temperature anomaly data (anomalies only — no information concerning the number of stations and the mean inverse distances) for the Antarctic (File 12) is formatted in the following way:

```
      INTEGER I, J, YEAR, MONTH, ANOM(5)
   10 READ (5,100,END=999) YEAR, MONTH
      DO 20 I=1,36
        READ (5,200) (ANOM(J), J=1,5)
   20 CONTINUE
      GOTO 10
  100 FORMAT (20X,I4,4X,I2)
  200 FORMAT (5(1X,I5))
```

where

YEAR is the year of the data record being read;

MONTH is the month of the data record being read;

ANOM is the gridded surface air temperature anomaly in degrees Celsius, multiplied by 100;

I represents the data line being read (each of the 36 lines of data represents a 10° longitude band, centered on 0°, 10°E, 20°E, ..., 170°E, 180°, 170°W, ..., 10°W);

J represents the data column being read (each of the 5 columns of data represents a 5° latitude band, centered on 65°S, 70°S, 75°S, 80°S, 85°S);

Missing values for the temperature anomalies are represented by -9999.

Monthly Mean Temperature Data for Individual Stations

The data files containing the monthly mean temperature records for individual stations (Files 13 and 14) are each formatted as

```
      INTEGER ID, LAT, LONG, ALT, TYPE, STYEAR, ENDYEAR,
     1    QCCODE, FRYEAR, J
      CHARACTER STATION*19, NATION*12, YEAR*4, TEMP(12)*4,
     1    TMEAN*4
   10 READ (5,500,END=100) ID, LAT, LONG, ALT, STATION, NATION,
     1          TYPE, STYEAR, ENDYEAR, QCCODE, FRYEAR
      YEAR='INIT'
   20 IF (YEAR.EQ.'    ') THEN
        GOTO 10
      ELSE
        READ (5,600) YEAR, (TEMP(J),J=1,12), TMEAN
        GOTO 20
      END IF
  500 FORMAT (1X,I6,1X,I4,1X,I5,1X,I5,1X,A19,1X,A12,1X,I1,1X,I4,
     1    1X,I4,1X,I2,1X,I4)
  600 FORMAT (1X,A4,12(1X,A4),2X,A4)
```

where

ID is the station identification number given by the World Meteorological Organization (WMO);

LAT is the latitude of the station (north is positive), multiplied by 10;

LONG is the longitude of the station (west is positive), multiplied by 10;

ALT is the altitude of the station in meters above sea level;

STATION is the station name;

NATION is the country in which the station is located;

TYPE is an integer code whose value indicates whether data entries are temperature ('1') or precipitation ('2');

STYEAR is the first year for which temperature records are given;

ENDYEAR is the most recent year for which temperature records are given;

QCCODE is the quality control code (see Jones et al. 1985);

FRYEAR is the first year for which reliable data is available (see Jones et al. 1985);

YEAR is the year of the data record being read;

TEMP is the monthly temperature value in degrees Celsius, multiplied by 10. Temperature values for Northern Hemisphere stations (File 13) have been corrected for inhomogeneities, while those for Southern Hemisphere stations (File 14) are uncorrected;

J represents the data column being read. Each of the 12 columns of data represents the average temperature for one month (January - December);

TMEAN is the mean of the 12 monthly temperatures in degrees Celsius, multiplied by 10;

Missing values for the monthly temperatures are represented by -999. In cases where one or more monthly temperatures are missing, values for the mean of the 12 monthly temperatures are given as -999. Missing values for latitude and altitude are represented by -999. Missing values for longitude are represented by -1999.

File 13 contains the monthly temperature data (corrected for inhomogeneities) for stations in the Northern Hemisphere (87.5°N to 2.5°S). File 14 contains the monthly temperature data (uncorrected) for stations in the Southern Hemisphere (2.5°S to 62.5°S), with the following 5 stations missing: Masterton, New Zealand; Lincoln College, New Zealand; Cape Leeuwin, Australia; Cape Naturaliste, Australia; and Angururu, Australia.

REFERENCES

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Jones, P. D., and D. W. S. Limbert. 1989. *Antarctic surface temperature and pressure data.* ORNL/CDIAC-27, NDP-032. Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Jones, P. D., S. C. B. Raper, B. Santer, B. S. G. Cherry, C. M. Goodess, P. M. Kelly, T. M. L. Wigley, R. S. Bradley, and H. F. Diaz. 1985. *A grid point surface air temperature data set for the Northern Hemisphere.* DOE Technical Report No. TR022. U.S. Department of Energy, Carbon Dioxide Research Division, Washington, D.C.

Jones, P. D., S. C. B. Raper, R. S. Bradley, H. F. Diaz, P. M. Kelly, and T. M. L. Wigley. 1986a. Northern Hemisphere surface air temperature variations: 1851–1984. *Journal of Climate and Applied Meteorology* 25:161–79.

Jones, P. D., S. C. B. Raper, B. S. G. Cherry, C. M. Goodess, T. M. L. Wigley, B. Santer, P. M. Kelly, R. S. Bradley, and H. F. Diaz. 1986b. *A global grid point surface air temperature data set: 1851–1984.* NDP-020. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Jones, P. D., S. C. B. Raper, C. M. Goodess, B. S. G. Cherry, and T. M. L. Wigley. 1986c. *A grid point surface air temperature data set for the Southern Hemisphere.* DOE Technical Report No. TR027. U.S. Department of Energy, Carbon Dioxide Research Division, Washington, D.C.

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Smithsonian Institution. 1927, 1935, 1947. *World Weather Records.* Miscellaneous Collections, Vols. 79, 90, 104. Washington, D.C.

U.S. Weather Bureau. 1959–1982. *World Weather Records.* 1941–1950 (1361 pp.), 1951–1960 (Vols. 1–6), 1961–1970 (Vols. 1–6). U.S. Department of Commerce, Washington, D.C.

13. LISTINGS OF THE FORTRAN IV DATA RETRIEVAL PROGRAMS

The following is a listing of the FORTRAN IV data retrieval program provided on magnetic tape (File 2) by CDIAC to read and print the gridded surface air temperature anomaly file for the Northern Hemisphere (File 10—see Table 1 for a partial listing of this file). The job control language (JCL) statements shown below are not provided in the file on the magnetic tape. The JCL statements required will vary for each individual requesting these data. The JCL statements shown below are provided to illustrate the statements that would be required by an individual at ORNL who has requested these data on a nine-track, 6250 BPI, standard-labeled tape with characters written in EBCDIC and is attempting to read the tape on an IBM mainframe (e.g., IBM 3090).

```
//UIDNHM JOB (12345),'USER ADDRESS'
//PRT OUTPUT DEFAULT=YES,JESDS=ALL,DEST=LOCAL
// EXEC FORTVCLG
//FORT.SYSIN DD *

C
C*************************************************************
C FORTRAN PROGRAM TO READ AND PRINT THE GRIDDED SURFACE AIR
C TEMPERATURE ANOMALY FILE FOR THE NORTHERN HEMISPHERE
C*************************************************************
C

      INTEGER I, J, K, DATA(18), LONG(36), LAT(18), YEAR, MONTH
      LONG(1)=0
      DO 20 I=2,19
           LONG(I)=LONG(I-1)+10
   20 CONTINUE
      LONG(20)=170
      DO 30 I=21,36
           LONG(I)=LONG(I-1)-10
   30 CONTINUE
      LAT(1)=85
      DO 40 I=2,18
           LAT(I)=LAT(I-1)-5
   40 CONTINUE
   45 DO 70 I=1,3
           READ (5,400,END=800) YEAR, MONTH
           IF (I.EQ.1) THEN
                WRITE (6,450) YEAR, MONTH
           END IF
           IF (I.EQ.2) THEN
                WRITE (6,460) YEAR, MONTH
           END IF
           IF (I.EQ.3) THEN
                WRITE (6,470) YEAR, MONTH
           END IF
           WRITE (6,500) (LAT(K), K=1,18)
           DO 50 J=1,19
                READ (5,550) (DATA(K), K=1,18)
```

```
                WRITE (6,600) LONG(J), (DATA(K), K=1,18)
 50         CONTINUE
            DO 60 J=20,36
                READ (5,550) (DATA(K), K=1,18)
                WRITE (6,650) LONG(J), (DATA(K), K=1,18)
 60         CONTINUE
            WRITE (6,700)
 70   CONTINUE
      GOTO 45
400   FORMAT (20X,I4,4X,I2)
450   FORMAT (1X,'TEMPERATURE ANOMALY DATA',4X,'YEAR = ',I4,
     1     2X,'MONTH = ',I2/)
460   FORMAT (1X,'NUMBER OF CONTRIBUTING STATIONS',4X,
     1     'YEAR = ',I4,2X,'MONTH = ',I2/)
470   FORMAT (1X,'MEAN INVERSE DISTANCE OF STATIONS',4X,
     1     'YEAR = ',I4,2X,'MONTH = ',I2/)
500   FORMAT (9X,18(3X,I2,'N')/)
550   FORMAT (18(1X,I5))
600   FORMAT (1X,I3,'E',4X,18(1X,I5))
650   FORMAT (1X,I3,'W',4X,18(1X,I5))
700   FORMAT (2(/))
800   STOP
      END

//GO.FT05F001 DD UNIT=TAPE62,VOL=SER=TAPEVOL,DISP=(,PASS),
// DSN=TAB.NDP020R1.NHEM90.ANOM,LABEL=(10,SL),
// DCB=(RECFM=FB,LRECL=108,BLKSIZE=5400)
//GO.FT06F001 DD *
```

The following is a listing of the FORTRAN IV data retrieval program provided on magnetic tape (File 3) by CDIAC to read and print the gridded surface air temperature anomaly file for the Southern Hemisphere (File 11—see Table 2 for a partial listing of this file.). The JCL statements shown below are not provided in the file on the magnetic tape. The JCL statements required will vary for each individual requesting these data. The JCL statements shown below are provided to illustrate the statements that would be required by an individual at ORNL who has requested these data on a nine-track, 6250 BPI, standard-labeled tape with characters written in EBCDIC and is attempting to read the tape on an IBM mainframe (e.g., IBM 3090).

```
//UIDSHM JOB (12345),'USER ADDRESS'
//PRT OUTPUT DEFAULT=YES,JESDS=ALL,DEST=LOCAL
// EXEC FORTVCLG
//FORT.SYSIN DD *

C
C*************************************************************
C FORTRAN PROGRAM TO READ AND PRINT THE GRIDDED SURFACE AIR
C TEMPERATURE ANOMALY FILE FOR THE SOUTHERN HEMISPHERE
C*************************************************************
C
      INTEGER I, J, K, DATA(12), LONG(36), LAT(12), YEAR, MONTH
      LONG(1)=0
      DO 20 I=2,19
      LONG(I)=LONG(I-1)+10
  20  CONTINUE
      LONG(20)=170
      DO 30 I=21,36
           LONG(I)=LONG(I-1)-10
  30  CONTINUE
      LAT(1)=5
      DO 40 I=2,12
           LAT(I)=LAT(I-1)+5
  40 CONTINUE
  45 DO 70 I=1,3
          READ (5,400,END=800) YEAR, MONTH
          IF (I.EQ.1) THEN
               WRITE (6,450) YEAR, MONTH
          END IF
          IF (I.EQ.2) THEN
               WRITE (6,460) YEAR, MONTH
          END IF
          IF (I.EQ.3) THEN
               WRITE (6,470) YEAR, MONTH
          END IF
          WRITE (6,500) (LAT(K), K=1,12)
          DO 50 J=1,19
               READ (5,550) (DATA(K), K=1,12)
               WRITE (6,600) LONG(J), (DATA(K), K=1,12)
  50      CONTINUE
          DO 60 J=20,36
```

```
                READ (5,550) (DATA(K), K=1,12)
                WRITE (6,650) LONG(J), (DATA(K), K=1,12)
 60         CONTINUE
            WRITE (6,700)
 70   CONTINUE
      GOTO 45
400   FORMAT (20X,I4,4X,I2)
450   FORMAT (1X,'TEMPERATURE ANOMALY DATA',4X,'YEAR = ',I4,
     1     2X,'MONTH = ',I2/)
460   FORMAT (1X,'NUMBER OF CONTRIBUTING STATIONS',4X,
     1     'YEAR = ',I4,2X,'MONTH = ',I2/)
470   FORMAT (1X,'MEAN INVERSE DISTANCE OF STATIONS',4X,
     1     'YEAR = ',I4,2X,'MONTH = ',I2/)
500   FORMAT (9X,12(3X,I2,'S')/)
550   FORMAT (12(1X,I5))
600   FORMAT (1X,I3,'E',4X,12(1X,I5))
650   FORMAT (1X,I3,'W',4X,12(1X,I5))
700   FORMAT (2(/))
800   STOP
      END

//GO.FT05F001 DD UNIT=TAPE62,VOL=SER=TAPEVOL,DISP=(,PASS),
// DSN=TAB.NDP020R1.SHEM90.ANOM,LABEL=(11,SL),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
//GO.FT06F001 DD *
```

The following is a listing of the FORTRAN IV data retrieval program provided on magnetic tape (File 4) by CDIAC to read and print the gridded surface air temperature anomaly file for the Antarctic (File 12—see Table 3 for a partial listing of this file.). The JCL statements shown below are not provided in the file on the magnetic tape. The JCL statements required will vary for each individual requesting these data. The JCL statements shown below are provided to illustrate the statements that would be required by an individual at ORNL who has requested these data on a nine-track, 6250 BPI, standard-labeled tape with characters written in EBCDIC and is attempting to read the tape on an IBM mainframe (e.g., IBM 3090).

```
//UIDSHM JOB (12345),'USER ADDRESS'
//PRT OUTPUT DEFAULT=YES,JESDS=ALL,DEST=LOCAL
// EXEC FORTVCLG
//FORT.SYSIN DD *

C
C*************************************************************
C FORTRAN PROGRAM TO READ AND PRINT THE GRIDDED SURFACE
C TEMPERATURE ANOMALY FILE FOR THE ANTARCTIC
C*************************************************************
C
      INTEGER I, J, K, DATA(5), LONG(36), LAT(5),  YEAR, MONTH
      LONG(1)=0
      DO 20 I=2,19
        LONG(I)=LONG(I-1)+10
   20 CONTINUE
      LONG(20)=170
      DO 30 I=21,36
        LONG(I)=LONG(I-1)-10
   30 CONTINUE
      LAT(1)=65
      DO 40 I=2,5
        LAT(I)=LAT(I-1)+5
   40 CONTINUE
   45 READ (5,400,END=800) YEAR, MONTH
      WRITE (6,450) YEAR, MONTH
      WRITE (6,500) (LAT(K), K=1,5)
      DO 50 J=1,19
        READ (5,550) (DATA(K), K=1,5)
        WRITE (6,600) LONG(J), (DATA(K), K=1,5)
   50 CONTINUE
      DO 60 J=20,36
        READ (5,550) (DATA(K), K=1,5)
        WRITE (6,650) LONG(J), (DATA(K), K=1,5)
   60 CONTINUE
      WRITE (6,700)
      GOTO 45
  400 FORMAT (20X,I4,4X,I2)
  450 FORMAT (1X,'TEMPERATURE ANOMALY DATA',4X,'YEAR = ',I4,
     1     2X,'MONTH = ',I2/)
  500 FORMAT (9X,5(3X,I2,'S')/)
```

```
  550 FORMAT (5(1X,I5))
  600 FORMAT (1X,I3,'E',4X,5(1X,I5))
  650 FORMAT (1X,I3,'W',4X,5(1X,I5))
  700 FORMAT (2(/))
  800 STOP
      END

//GO.FT05F001 DD UNIT=TAPE62,VOL=SER=TAPEVOL,DISP=(,PASS),
// DSN=TAB.NDP020R1.ANTARC.ANOM,LABEL=(12,SL),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
//GO.FT06F001 DD *
```

The following is a listing of the FORTRAN IV data retrieval program provided on magnetic tape (File 5) by CDIAC to read and print either of the monthly mean temperature records for individual stations (Files 13 and 14—see Tables 4 and 5 for partial listings of these files). The JCL statements shown below are not provided in the file on the magnetic tape. The JCL statements required will vary for each individual requesting these data. The JCL statements shown below are provided to illustrate the statements that would be required by an individual at ORNL who has requested these data on a nine-track, 6250 BPI, standard-labeled tape with characters written in EBCDIC and is attempting to read the tape on an IBM mainframe (e.g., IBM 3090).

```
//UIDSHM JOB (12345),'USER ADDRESS'
//PRT OUTPUT DEFAULT=YES,JESDS=ALL,DEST=LOCAL
// EXEC FORTVCLG
//FORT.SYSIN DD *

C
C*************************************************************
C FORTRAN PROGRAM TO READ AND PRINT THE MONTHLY MEAN TEMPERA-
C TURE RECORDS FOR INDIVIDUAL STATIONS
C*************************************************************
C
     INTEGER ID, LAT, LONG, ALT, TYPE, STYEAR, ENDYEAR,
    1    QCCODE, FRYEAR, J
     CHARACTER STATION*19, NATION*12, YEAR*4, TEMP(12)*4,
    1   TMEAN*4
  10 READ (5,500,END=100) ID, LAT, LONG, ALT, STATION, NATION,
    1    TYPE, STYEAR, ENDYEAR, QCCODE, FRYEAR
     WRITE (6,500) ID, LAT, LONG, ALT, STATION, NATION, TYPE,
    1    STYEAR, ENDYEAR, QCCODE, FRYEAR
     YEAR='INIT'
  20 IF (YEAR.EQ.'    ') THEN
          GOTO 10
     ELSE
         READ (5,600) YEAR, (TEMP(J),J=1,12), TMEAN
         WRITE (6,600) YEAR, (TEMP(J),J=1,12), TMEAN
         GOTO 20
     END IF
 500 FORMAT (1X,I6,1X,I4,1X,I5,1X,I5,1X,A19,1X,A12,1X,I1,1X,I4,
    1     1X,I4,1X,I2,1X,I4)
 600 FORMAT (1X,A4,12(1X,A4),2X,A4)
 100 STOP
     END

//GO.FT05F001 DD UNIT=TAPE62,VOL=SER=TAPEVOL,DISP=(,PASS),
// DSN=TAB.NDP020R1.NHEMST.DATA,LABEL=(13,SL),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
//GO.FT06F001 DD *
```

14. LISTING OF THE SAS INPUT/OUTPUT RETRIEVAL PROGRAM

The following is a listing of the SAS data retrieval program provided on magnetic tape (File 6) by CDIAC to read and print the gridded surface air temperature anomaly file for the Northern Hemisphere (File 10). The JCL statements shown below are not provided in the file on the magnetic tape. The JCL statements required will vary for each individual requesting these data. The JCL statements shown below are provided to illustrate the statements that would be required by an individual at ORNL who has requested these data on a nine-track, 6250 BPI, standard-labeled tape with characters written in EBCDIC and is attempting to read the tape on an IBM mainframe (e.g., IBM 3090).

```
//UIDNHM JOB (12345),'USER ADDRESS'
//PRT OUTPUT DEFAULT=YES,JESDS=ALL,DEST=LOCAL
//STEP1 EXEC SAS,SASRGN=4096K,WORK=16000,SORT=50
//IN DD UNIT=TAPE62,VOL=SER=TAPEVOL,DISP=(,PASS),
// DSN=TAB.NDP020R1.NHEM90.ANOM,LABEL=(10,SL),
// DCB=(RECFM=FB,LRECL=108,BLKSIZE=5400)
//FT06F001 DD SYSOUT=A
//SYSIN DD *

OPTIONS LINESIZE=135;
DATA ANOMALY;
     INFILE IN;
     INPUT YEAR 21-24 MONTH 29-30 #2 @2 (T1-T648)(:5.) #39 @2
     (S1-S648)(:5.) #76 @2 (D1-D648)(:5.);
DATA PRINT;
     SET ANOMALY;
     FILE PRINT;
     ARRAY TEMP(36,18) T1-T648;
     ARRAY STA(36,18) S1-S648;
     ARRAY DIST(36,18) D1-D648;
     ARRAY LONG(36) X1-X36;
     ARRAY LAT(18) Y1-Y18;
     LONG(1)=0;
     DO I=2 TO 19;
          LONG(I)=LONG(I-1)+10;
     END;
     LONG(20)=170;
     DO I=21 TO 36;
          LONG(I)=LONG(I-1)-10;
     END;
     LAT(1)=85;
     DO I=2 TO 18;
          LAT(I)=LAT(I-1)-5;
     END;
     PUT  '     TEMPERATURE ANOMALY DATA' @35 YEAR= @50 MONTH= /;
     PUT   @2 'LONG' @72 'LAT (N)';
     PUT   LAT(1) 15-16 LAT(2) 22-23 LAT(3) 29-30 LAT(4) 36-37
           LAT(5) 43-44 LAT(6) 50-51 LAT(7) 57-58 LAT(8) 64-65
           LAT(9) 71-72 LAT(10) 78-79 LAT(11) 85-86 LAT(12) 92-93
           LAT(13) 99-100 LAT(14) 106-107 LAT(15) 113-114 LAT(16)
```

```
      120-121 LAT(17) 127-128 LAT(18) 134-135 /;
DO I=1 TO 19;
      PUT  LONG(I) 2-4 @5 'E' TEMP(I,1) 12-16 TEMP(I,2)
           19-23 TEMP(I,3) 26-30 TEMP(I,4) 33-37 TEMP(I,5)
           40-44 TEMP(I,6) 47-51 TEMP(I,7) 54-58 TEMP(I,8)
           61-65 TEMP(I,9) 68-72 TEMP(I,10) 75-79 TEMP(I,11)
           82-86 TEMP(I,12) 89-93 TEMP(I,13) 96-100
           TEMP(I,14) 103-107 TEMP(I,15) 110-114 TEMP(I,16)
           117-121 TEMP(I,17) 124-128 TEMP(I,18) 131-135;
END;
DO I=20 TO 36;
      PUT  LONG(I) 2-4 @5 'W' TEMP(I,1) 12-16 TEMP(I,2)
           19-23 TEMP(I,3) 26-30 TEMP(I,4) 33-37 TEMP(I,5)
           40-44 TEMP(I,6) 47-51 TEMP(I,7) 54-58 TEMP(I,8)
           61-65 TEMP(I,9) 68-72 TEMP(I,10) 75-79 TEMP(I,11)
           82-86 TEMP(I,12) 89-93 TEMP(I,13) 96-100
           TEMP(I,14) 103-107 TEMP(I,15) 110-114 TEMP(I,16)
           117-121 TEMP(I,17) 124-128 TEMP(I,18) 131-135;
END;
PUT   // '     NUMBER OF CONTRIBUTING STATIONS' @40 YEAR=
      @55 MONTH= /;
PUT   LAT(1) 15-16 LAT(2) 22-23 LAT(3) 29-30 LAT(4) 36-37
      LAT(5) 43-44 LAT(6) 50-51 LAT(7) 57-58 LAT(8) 64-65
      LAT(9) 71-72 LAT(10) 78-79 LAT(11) 85-86 LAT(12) 92-93
      LAT(13) 99-100 LAT(14) 106-107 LAT(15) 113-114 LAT(16)
      120-121 LAT(17) 127-128 LAT(18) 134-135 /;
DO I=1 TO 19;
      PUT  LONG(I) 2-4 @5 'E' STA(I,1) 15-16 STA(I,2) 22-23
           STA(I,3) 29-30 STA(I,4) 36-37 STA(I,5) 43-44
           STA(I,6) 50-51 STA(I,7) 57-58 STA(I,8) 64-65
           STA(I,9) 71-72 STA(I,10) 78-79 STA(I,11) 85-86
           STA(I,12) 92-93 STA(I,13) 99-100 STA(I,14)
           106-107 STA(I,15) 113-114 STA(I,16) 120-121
           STA(I,17) 127-128 STA(I,18) 134-135;
END;
DO I=20 TO 36;
      PUT  LONG(I) 2-4 @5 'W' STA(I,1) 15-16 STA(I,2) 22-23
           STA(I,3) 29-30 STA(I,4) 36-37 STA(I,5) 43-44
           STA(I,6) 50-51 STA(I,7) 57-58 STA(I,8) 64-65
           STA(I,9) 71-72 STA(I,10) 78-79 STA(I,11) 85-86
           STA(I,12) 92-93 STA(I,13) 99-100 STA(I,14)
           106-107 STA(I,15) 113-114 STA(I,16) 120-121
           STA(I,17) 127-128 STA(I,18) 134-135;
END;
PUT   // '     MEAN INVERSE DISTANCE OF STATIONS' @42 YEAR=
      @57 MONTH= /;
PUT   LAT(1) 15-16 LAT(2) 22-23 LAT(3) 29-30 LAT(4) 36-37
      LAT(5) 43-44 LAT(6) 50-51 LAT(7) 57-58 LAT(8) 64-65
      LAT(9) 71-72 LAT(10) 78-79 LAT(11) 85-86 LAT(12) 92-93
      LAT(13) 99-100 LAT(14) 106-107 LAT(15) 113-114 LAT(16)
      120-121 LAT(17) 127-128 LAT(18) 134-135 /;
DO I=1 TO 19;
```

```
            PUT  LONG(I) 2-4 @5 'E' DIST(I,1) 14-16 DIST(I,2)
                 21-23 DIST(I,3) 28-30 DIST(I,4) 35-37 DIST(I,5)
                 42-44 DIST(I,6) 49-51 DIST(I,7) 56-58 DIST(I,8)
                 63-65 DIST(I,9) 70-72 DIST(I,10) 77-79 DIST(I,11)
                 84-86 DIST(I,12) 91-93 DIST(I,13) 98-100
                 DIST(I,14) 105-107 DIST(I,15) 112-114 DIST(I,16)
                 119-121 DIST(I,17) 126-128 DIST(I,18) 133-135;
      END;
      DO I=20 TO 36;
            PUT  LONG(I) 2-4 @5 'W' DIST(I,1) 14-16 DIST(I,2)
                 21-23 DIST(I,3) 28-30 DIST(I,4) 35-37 DIST(I,5)
                 42-44 DIST(I,6) 49-51 DIST(I,7) 56-58 DIST(I,8)
                 63-65 DIST(I,9) 70-72 DIST(I,10) 77-79 DIST(I,11)
                 84-86 DIST(I,12) 91-93 DIST(I,13) 98-100
                 DIST(I,14) 105-107 DIST(I,15) 112-114 DIST(I,16)
                 119-121 DIST(I,17) 126-128 DIST(I,18) 133-135;
      END;
      PUT //;
RUN;
```

The following is a listing of the SAS data retrieval program provided on magnetic tape (File 7) by CDIAC to read and print the gridded surface air temperature anomaly file for the Southern Hemisphere (File 11). The JCL statements shown below are not provided in the file on the magnetic tape. The JCL statements required will vary for each individual requesting these data. The JCL statements shown below are provided to illustrate the statements that would be required by an individual at ORNL who has requested these data on a nine-track, 6250 BPI, standard-labeled tape with characters written in EBCDIC and is attempting to read the tape on an IBM mainframe (e.g., IBM 3090).

```
//UIDSHM JOB (12345),'USER ADDRESS'
//PRT OUTPUT DEFAULT=YES,JESDS=ALL,DEST=LOCAL
//STEP1 EXEC SAS,SASRGN=4096K,WORK=16000,SORT=50
//IN DD UNIT=TAPE62,VOL=SER=TAPEVOL,DISP=(,PASS),
// DSN=TAB.NDP020R1.SHEM90.ANOM,LABEL=(11,SL),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
//FT06F001 DD SYSOUT=A
//SYSIN DD *

OPTIONS LINESIZE=95;
DATA ANOMALY;
     INFILE IN;
     INPUT YEAR 21-24 MONTH 29-30 #2 @2 (T1-T432)(:5.) #39 @2
     (S1-S432)(:5.) #76 @2 (D1-D432)(:5.);
DATA PRINT;
     SET ANOMALY;
     FILE PRINT;
     ARRAY TEMP(36,12) T1-T432;
     ARRAY STA(36,12) S1-S432;
     ARRAY DIST(36,12) D1-D432;
     ARRAY LONG(36) X1-X36;
     ARRAY LAT(12) Y1-Y12;
     LONG(1)=0;
     DO I=2 TO 19;
          LONG(I)=LONG(I-1)+10;
     END;
     LONG(20)=170;
     DO I=21 TO 36;
          LONG(I)=LONG(I-1)-10;
     END;
     LAT(1)=5;
     DO I=2 TO 12;
          LAT(I)=LAT(I-1)+5;
     END;
     PUT  '     TEMPERATURE ANOMALY DATA' @35 YEAR= @50 MONTH= /;
     PUT   @2 'LONG' @51 'LAT (S)';
     PUT   LAT(1) 15-16 LAT(2) 22-23 LAT(3) 29-30 LAT(4) 36-37
           LAT(5) 43-44 LAT(6) 50-51 LAT(7) 57-58 LAT(8) 64-65
           LAT(9) 71-72 LAT(10) 78-79 LAT(11) 85-86 LAT(12) 92-93
           /;
     DO I=1 TO 19;
          PUT  LONG(I) 2-4 @5 'E' TEMP(I,1) 12-16 TEMP(I,2)
            19-23 TEMP(I,3) 26-30 TEMP(I,4) 33-37 TEMP(I,5)
```

```
                40-44 TEMP(I,6) 47-51 TEMP(I,7) 54-58 TEMP(I,8)
                61-65 TEMP(I,9) 68-72 TEMP(I,10) 75-79 TEMP(I,11)
                82-86 TEMP(I,12) 89-93;
      END;
      DO I=20 TO 36;
            PUT  LONG(I) 2-4 @5 'W' TEMP(I,1) 12-16 TEMP(I,2)
                 19-23 TEMP(I,3) 26-30 TEMP(I,4) 33-37 TEMP(I,5)
                 40-44 TEMP(I,6) 47-51 TEMP(I,7) 54-58 TEMP(I,8)
                 61-65 TEMP(I,9) 68-72 TEMP(I,10) 75-79 TEMP(I,11)
                 82-86 TEMP(I,12) 89-93;
      END;
      PUT   // '     NUMBER OF CONTRIBUTING STATIONS' @40 YEAR=
            @55 MONTH= /;
      PUT   LAT(1) 15-16 LAT(2) 22-23 LAT(3) 29-30 LAT(4) 36-37
            LAT(5) 43-44 LAT(6) 50-51 LAT(7) 57-58 LAT(8) 64-65
            LAT(9) 71-72 LAT(10) 78-79 LAT(11) 85-86 LAT(12) 92-93
            /;
      DO I=1 TO 19;
            PUT  LONG(I) 2-4 @5 'E' STA(I,1) 15-16 STA(I,2) 22-23
                 STA(I,3) 29-30 STA(I,4) 36-37 STA(I,5) 43-44
                 STA(I,6) 50-51 STA(I,7) 57-58 STA(I,8) 64-65
                 STA(I,9) 71-72 STA(I,10) 78-79 STA(I,11) 85-86
                 STA(I,12) 92-93;
      END;
      DO I=20 TO 36;
            PUT  LONG(I) 2-4 @5 'W' STA(I,1) 15-16 STA(I,2) 22-23
                 STA(I,3) 29-30 STA(I,4) 36-37 STA(I,5) 43-44
                 STA(I,6) 50-51 STA(I,7) 57-58 STA(I,8) 64-65
                 STA(I,9) 71-72 STA(I,10) 78-79 STA(I,11) 85-86
                 STA(I,12) 92-93;
      END;
      PUT   // '     MEAN INVERSE DISTANCE OF STATIONS' @42 YEAR=
            @57 MONTH= /;
      PUT   LAT(1) 15-16 LAT(2) 22-23 LAT(3) 29-30 LAT(4) 36-37
            LAT(5) 43-44 LAT(6) 50-51 LAT(7) 57-58 LAT(8) 64-65
            LAT(9) 71-72 LAT(10) 78-79 LAT(11) 85-86 LAT(12) 92-93
            /;
      DO I=1 TO 19;
            PUT  LONG(I) 2-4 @5 'E' DIST(I,1) 14-16 DIST(I,2)
                 21-23 DIST(I,3) 28-30 DIST(I,4) 35-37 DIST(I,5)
                 42-44 DIST(I,6) 49-51 DIST(I,7) 56-58 DIST(I,8)
                 63-65 DIST(I,9) 70-72 DIST(I,10) 77-79 DIST(I,11)
                 84-86 DIST(I,12) 91-93;
      END;
      DO I=20 TO 36;
            PUT  LONG(I) 2-4 @5 'W' DIST(I,1) 14-16 DIST(I,2)
                 21-23 DIST(I,3) 28-30 DIST(I,4) 35-37 DIST(I,5)
                 42-44 DIST(I,6) 49-51 DIST(I,7) 56-58 DIST(I,8)
                 63-65 DIST(I,9) 70-72 DIST(I,10) 77-79 DIST(I,11)
                 84-86 DIST(I,12) 91-93;
      END;
      PUT //;
RUN;
```

The following is a listing of the SAS data retrieval program provided on magnetic tape (File 8) by CDIAC to read and print the gridded surface air temperature anomaly file for the Antarctic (File 12). The JCL statements shown below are not provided in the file on the magnetic tape. The JCL statements required will vary for each individual requesting these data. The JCL statements shown below are provided to illustrate the statements that would be required by an individual at ORNL who has requested these data on a nine-track, 6250 BPI, standard-labeled tape with characters written in EBCDIC and is attempting to read the tape on an IBM mainframe (e.g., IBM 3090).

```
//UIDSHM JOB (12345),'USER ADDRESS'
//PRT OUTPUT DEFAULT=YES,JESDS=ALL,DEST=LOCAL
//STEP1 EXEC SAS,SASRGN=4096K,WORK=1600
//IN DD UNIT=TAPE62,VOL=SER=TAPEVOL,DISP=(,PASS),
// DSN=TAB.NDP020R1.ANTARC.ANOM,LABEL=(12,SL),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
//FT06F001 DD SYSOUT=A
//SYSIN DD *

DATA ANOMALY;
     INFILE IN;
     INPUT YEAR 21-24 MONTH 29-30 #2 @2 (T1-T180)(:5.);
DATA PRINT;
     SET ANOMALY;
     FILE PRINT;
     ARRAY TEMP(36,5) T1-T180;
     ARRAY LONG(36) X1-X36;
     ARRAY LAT(5) Y1-Y5;
     LONG(1)=0;
     DO I=2 TO 19;
          LONG(I)=LONG(I-1)+10;
     END;
     LONG(20)=170;
     DO I=21 TO 36;
          LONG(I)=LONG(I-1)-10;
     END;
     LAT(1)=65;
     DO I=2 TO 5;
          LAT(I)=LAT(I-1)+5;
     END;
     PUT  '     TEMPERATURE ANOMALY DATA' @35 YEAR= @50
          MONTH= /;
     PUT  @2 'LONG' @26 'LAT (S)';
     PUT  LAT(1) 15-16 LAT(2) 22-23 LAT(3) 29-30 LAT(4)
          36-37 LAT(5) 43-44 /;
     DO I=1 TO 19;
          PUT  LONG(I) 2-4 @5 'E' TEMP(I,1) 12-16 TEMP(I,2)
               19-23 TEMP(I,3) 26-30 TEMP(I,4) 33-37
               TEMP(I,5) 40-44;
     END;
     DO I=20 TO 36;
          PUT  LONG(I) 2-4 @5 'W' TEMP(I,1) 12-16 TEMP(I,2)
```

```
                    19-23 TEMP(I,3) 26-30 TEMP(I,4) 33-37
                    TEMP(I,5) 40-44;
      END;
      PUT //;
RUN;
```

The following is a listing of the SAS data retrieval program provided on magnetic tape (File 9) by CDIAC to read and print either of the monthly mean temperature records for individual stations (Files 13 and 14). The JCL statements shown below are not provided in the file on the magnetic tape. The JCL statements required will vary for each individual requesting these data. The JCL statements shown below are provided to illustrate the statements that would be required by an individual at ORNL who has requested these data on a nine-track, 6250 BPI, standard-labeled tape with characters written in EBCDIC and is attempting to read the tape on an IBM mainframe (e.g., IBM 3090).

```
//UIDSHM JOB (12345),'USER ADDRESS'
//PRT OUTPUT DEFAULT=YES,JESDS=ALL,DEST=LOCAL
//STEP1 EXEC SAS,SASRGN=4096K,WORK=1600
//IN DD UNIT=TAPE62,VOL=SER=TAPEVOL,DISP=(,PASS),
// DSN=TAB.NDP020R1.NHEMST.DATA,LABEL=(13,SL),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=8000)
//FT06F001 DD SYSOUT=A
//SYSIN DD *


DATA STADATA;
  INFILE IN;
  INPUT X $ 5 Y $ 6 @;
  IF X NE ' ' AND Y NE ' ' THEN
    INPUT ID 2-7 LAT 9-12 LONG 14-18 ALT 20-24 STATION $ 26-44
    NATION $ 46-57 TYPE 59 STYEAR 61-64 ENDYEAR 66-69 QCCODE 71-
    72 FRYEAR 74-77;
  ELSE IF X NE ' ' AND Y EQ ' ' THEN
    INPUT YEAR 2-5 TJAN 7-10 TFEB 12-15 TMAR 17-20 TAPR 22-25
    TMAY 27-30 TJUN 32-35 TJUL 37-40 TAUG 42-45 TSEP
    47-50 TOCT 52-55 TNOV 57-60 TDEC 62-65 TMEAN 68-71;
  ELSE INPUT;
  RETAIN STATION;
DATA PRINT;
  SET STADATA;
  FILE PRINT;
  OPTIONS MISSING=' ';
  IF STATION=LAG(STATION) THEN GO TO DATALINE;
  PUT /ID 2-7 LAT 9-12 LONG 14-18 ALT 20-24 STATION $ 26-44
      NATION $ 46-57 TYPE 59 STYEAR 61-64 ENDYEAR 66-69 QCCODE
      71-72 FRYEAR 74-77;
  DATALINE: PUT YEAR 2-5 TJAN 7-10 TFEB 12-15 TMAR 17-20 TAPR
            22-25 TMAY 27-30 TJUN 32-35 TJUL 37-40 TAUG 42-45
            TSEP 47-50 TOCT 52-55 TNOV 57-60 TDEC 62-65 TMEAN
            68-71;
RUN;
```

Table 1. Partial listing of the gridded surface air temperature anomalies for the Northern Hemisphere (File 10)

```
-9999 -9999 -9999  1851     1 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999   190   161   167 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999   230   208    65   154   235    20 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999   166    37    -5    15 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999    90 -9999   170   -30 -9999  -233  -100 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999   360 -9999  -130 -9999 -9999  -170 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999   111   -30 -9999  -367 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999  -180  -110 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999   220 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999  -340 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999   120 -9999 -9999 -9999 -9999 -9999    50 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999    50
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999   -90 -9999   130 -9999   240 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999   100 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999   -10 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999  -290 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999   210 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999   260 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999   210   220   190   100   230 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999    70   -15 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999   190 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
-9999 -9999 -9999  1851     1 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
    0     0     0     0     0     0     2     2     5     0     0     0     0     0     0     0     0     0
    0     0     0     0     1     2     2    10     7     1     0     0     0     0     0     0     0     0
    0     0     0     0     0     2     3     6     2     0     0     0     0     0     0     0     0     0
    0     0     0     1     0     2     1     0     3     1     0     0     0     0     0     0     0     0
    0     0     0     0     1     0     1     0     0     1     0     0     0     0     0     0     0     0
    0     0     0     0     0     2     1     0     2     0     0     0     0     0     0     0     0     0
    0     0     0     0     0     0     1     1     0     0     0     0     0     0     0     0     0     0
    0     0     0     0     0     1     0     0     0     0     0     0     0     0     0     0     0     0
    0     0     0     0     0     0     1     0     0     0     0     0     0     0     0     0     0     0
    0     0     0     0     0     0     1     0     0     0     0     0     1     0     0     0     0     0
    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     1
    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0     0     0     0     0     0     0     1     0     1     0     1     0     0     0     0     0     0
    0     0     0     0     0     0     0     0     0     0     1     0     0     0     0     0     0     0
    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
```

Table 1. (continued)

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0
0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-9999	-9999	-9999	1851	1	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
0	0	0	0	0	0	133	70	93	0	0	0	0	0	0	0	0	0
0	0	0	0	103	135	78	87	102	66	0	0	0	0	0	0	0	0
0	0	0	0	0	107	109	86	59	0	0	0	0	0	0	0	0	0
0	0	0	200	0	133	61	0	81	138	0	0	0	0	0	0	0	0
0	0	0	0	200	0	106	0	0	42	0	0	0	0	0	0	0	0
0	0	0	0	0	111	175	0	142	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	91	47	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	82	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	52	0	0	0	0	0	64	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	169
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	126	0	62	0	98	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	72	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	51	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	49	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	68	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	66	45	76	56	99	0	0	0	0	0
0	0	0	0	0	0	0	0	47	64	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	141	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-9999	-9999	-9999	1851	2	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	120	-15	-71	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	270	202	161	-7	112	-30	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	124	230	94	28	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999

Table 2. Partial listing of the gridded surface air temperature anomalies for the Southern Hemisphere (File 11)

-9999	-9999	-9999	1851	1	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	170	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
0	0	0	1851	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

Table 2. (continued)

0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1851	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0

Table 2. (continued)

0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	46	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1851	2	0	0	0	0	0	0	0
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999
-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999	-9999

Table 3. Partial listing of the gridded surface air temperature anomalies for the Antarctic (File 12)

-9999	-9999	-9999	1957	1
-9999	-9999	-9999	-9999	-20
-9999	-9999	-9999	-9999	-20
-9999	-9999	-9999	-9999	-10
-9999	-9999	-9999	-9999	-10
-9999	-9999	-9999	-9999	-10
-9999	-9999	-9999	-9999	-10
80	60	-9999	-9999	-10
90	60	-9999	-9999	-10
-9999	-9999	-9999	-9999	-10
110	70	-9999	-9999	-10
110	70	-9999	-9999	-10
-9999	-9999	-9999	-9999	-10
-9999	-9999	-9999	-9999	-10
100	60	-9999	-9999	-10
100	60	-9999	-9999	-10
100	50	-10	-50	-10
-9999	-9999	-20	-60	-10
-9999	-9999	-30	-60	-10
-9999	-9999	-20	-50	-60
-9999	-9999	-9999	-60	-60
-9999	-9999	-9999	-9999	-60
-9999	-9999	-9999	-9999	-60
-9999	-9999	-9999	-90	-70
-9999	-9999	-9999	-90	-60
-9999	-9999	-50	-90	-60
-9999	-9999	-9999	-80	-60
-9999	-9999	-9999	-70	-60
-9999	-9999	-9999	-9999	-50
-9999	50	-9999	-9999	-50
80	90	-9999	-9999	-40
30	60	-9999	-9999	-30
-10	-9999	-9999	-9999	-30
-9999	-9999	-50	-9999	-30
-9999	-9999	-60	-50	-30
-9999	-9999	-70	-50	-20
-9999	-9999	-60	-9999	-20
-9999	-9999	-9999	1957	2
-9999	-9999	-9999	-9999	130
-9999	-9999	-9999	-9999	130
-9999	-9999	-9999	-9999	140
-9999	-9999	-9999	-9999	140
-9999	-9999	-9999	-9999	150
-9999	-9999	-9999	-9999	150
-10	30	-9999	-9999	160
-10	30	-9999	-9999	160
10	20	-9999	-9999	160
50	50	-9999	-9999	160

Table 3. (continued)

40	50	-9999	-9999	170
-9999	-9999	-9999	-9999	170
-9999	-9999	-9999	-9999	170
-10	20	-9999	-9999	170
-20	10	-9999	-9999	180
-20	10	40	70	180
-9999	-9999	30	70	190
-9999	-9999	30	60	190
-9999	-9999	-100	-60	-10
-9999	-9999	-9999	-50	-10
-9999	-9999	-9999	-9999	10
-9999	-9999	-9999	-9999	0
-9999	-9999	-9999	-90	0
-9999	-9999	-9999	-90	0
-9999	-9999	-60	-90	10

Table 4. Partial listing of the monthly mean temperature records for individual stations in the Northern Hemisphere (File 13)

10010	710		84		9 JAN MAYEN				NORWAY			1	1921 1988 10 1921	
1921	-44	-71	-68	-43	-8	22	47	58	27	-20	-21	-40	-13	
1922	-10	-18	-62	-38	-16	28	47	62	27	-1	-38	-27	-4	
1923	-60	-30	-9	-16	-16	10	48	41	22	9	-24	-38	-5	
1924	-8	-49	-51	-38	-2	27	68	72	38	13	-26	-26	2	
1925	-34	-32	-42	-9	9	38	50	61	42	1	-30	-46	1	
1926	-19	-24	-59	-5	1	32	61	57	23	-26	-10	-48	-1	
1927	-45	-23	-39	-54	-17	20	60	60	32	-13	-12	-36	-6	
1928	-35	-33	-36	-20	-7	19	41	47	37	13	-11	-22	-1	
1929	-30	0	-19	-32	0	26	40	49	28	-18	-6	1	3	
1930	-32	-28	-50	8	14	53	60	73	43	1	-30	-12	8	
1931	-36	-42	-61	-3	-5	22	61	52	35	-20	20	-37	-1	
1932	-45	-16	-35	-40	6	28	66	61	21	-4	-31	-20	-1	
1933	-8	-49	-32	-46	-1	43	61	73	55	-4	-2	-6	7	
1934	-43	-71	-35	-46	-5	33	68	77	80	19	-14	3	6	
1935	-30	-60	-31	-32	-15	22	54	55	28	2	9	-31	-2	
1936	-70	-46	-58	-34	17	30	57	69	36	7	-18	-70	-7	
1937	-9	-61	-69	-10	9	29	54	60	40	-3	-20	-6	1	
1938	-51	-34	-59	-39	-11	37	58	59	41	42	11	17	6	
1939	-26	-32	-14	-29	12	31	59	74	45	21	-37	-58	4	
1940	-31	-72	-49	-42	6	36	48	45	-999	-999	-999	-999	-999	
1941	-999	-103	-999	-999	-13	18	56	49	44	4	8	-43	-999	
1942	-31	-145	-86	-73	-29	-999	-999	45	30	4	-31	-57	-999	
1943	-76	-52	-55	-45	-26	12	41	22	29	12	-25	-31	-16	
1944	-68	-36	-52	-46	1	24	49	49	36	2	-30	-30	-8	
1945	-54	-63	-36	-21	5	31	56	58	47	-6	-4	-53	-3	
1946	2	-52	-48	-39	-9	29	56	65	48	30	-17	6	6	
1947	12	-20	-74	-31	14	32	64	69	41	9	-33	-68	1	
1948	-79	-21	-38	-29	-18	9	48	42	20	-2	-33	-44	-12	
1949	-46	-39	-47	-41	-9	33	47	41	32	-9	3	-37	-6	
1950	-2	-999	-43	-27	-5	22	53	72	45	21	-5	-41	-999	
1951	-43	-24	-70	-52	-7	3	39	62	41	7	-39	-38	-10	
1952	-43	-59	-51	-13	-4	25	45	35	21	37	-16	-34	-5	
1953	-50	-56	-60	-59	-6	46	55	74	47	19	-4	-5	0	
1954	-42	-33	-87	-41	-1	15	45	43	26	-2	23	-16	-6	
1955	-71	-78	-66	-31	-20	17	49	53	43	-12	-21	-41	-15	
1956	-49	-39	-27	-45	-6	6	49	37	20	0	-4	1	-5	
1957	-11	-33	-32	-12	-9	13	42	51	34	6	-5	-41	0	
1958	-26	-48	-32	-12	-3	27	42	57	41	24	-7	-41	2	
1959	-66	-54	-28	-59	-16	9	36	47	33	34	-10	-11	-7	
1960	-25	-51	-16	-14	4	25	53	57	59	7	4	-22	7	
1961	-21	-36	-69	-56	2	24	42	64	46	41	-14	-58	-3	
1962	-29	-37	-72	-30	5	11	41	55	36	-18	-26	-31	-8	
1963	-67	-116	-30	-39	4	30	33	46	40	20	-28	-37	-12	
1964	-52	-60	-17	-22	-10	15	37	44	8	5	-59	-64	-15	
1965	-55	-43	-110	-31	-20	12	36	58	30	19	-33	-76	-18	
1966	-111	-89	-87	-12	-12	33	49	40	13	-7	-37	-42	-22	
1967	-79	-38	-92	-43	-10	11	35	34	30	-28	-59	-55	-25	

Table 4. (continued)

1968	-999	-123	-134	-51	-31	10	22	25	24	-35	-18	-83	-999
1969	-97	-999	-97	-52	-12	26	51	67	22	-22	-61	-71	-999
1970	-999	-999	-999	-44	1	28	37	44	27	0	-19	-55	-999
1971	-100	-49	-74	-47	-1	25	36	44	25	13	-89	-60	-23
1972	-11	-62	-51	-36	-1	29	53	44	32	-6	-19	-18	-4
1973	-20	-126	-66	-74	-9	19	41	51	41	-11	-74	-66	-25
1974	-14	-38	-13	-14	9	31	37	45	29	13	6	-56	3
1975	-68	-36	-59	-50	-16	6	41	52	14	9	-16	-84	-17
1976	-66	-26	-15	-44	4	30	51	53	28	33	-27	-31	-1
1977	-59	-52	-82	-56	-15	15	40	42	28	11	-28	-23	-15
1978	-69	-95	-55	-27	-7	21	45	56	31	3	-58	-45	-17
1979	-98	-68	-50	-34	-27	18	39	54	22	13	-24	-13	-14
1980	-33	-49	-28	-27	9	27	50	52	32	-22	-41	-68	-8
1981	-77	-52	-69	-40	-7	6	37	46	21	-10	-28	-60	-19
1982	-90	-35	-46	-58	-19	7	36	47	14	9	-30	-42	-17
1983	-41	-49	-53	-33	-1	16	44	43	20	-14	-18	-45	-11
1984	-30	-13	-33	-4	-5	27	46	51	34	10	-1	4	7
1985	-34	-50	-46	-58	-3	21	50	48	21	-3	-34	-73	-13
1986	-59	-60	-44	-36	-7	27	36	52	26	11	-20	-20	-8
1987	-26	-93	-42	-16	2	25	53	48	36	8	-21	-110	-11
1988	-109	-33	-77	-71	-10	15	44	58	31	4	-46	-87	-23
10050	780	-142	9	ISFJORD RADIO				NORWAY			1	1912 1979 10 1912	
1912	-245	-264	-219	-197	-60	19	41	26	-28	-87	-130	-125	-106
1913	-158	-208	-178	-97	-52	2	46	52	7	-86	-78	-132	-74
1914	-218	-240	-199	-105	-52	18	49	48	-9	-46	-133	-179	-89
1915	-143	-196	-216	-110	-88	16	39	36	-5	-49	-208	-226	-96

Table 5. Partial listing of the monthly mean temperature records for individual stations in the Southern Hemisphere (File 14)

619000	-80	145	-999	ASCENSION IS.					ASCENSION IS		1 1923 1976 10 1923		
1923	-999	-999	271	268	268	262	251	252	277	254	263	271	-999
1924	272	278	281	277	273	266	254	248	243	247	248	252	262
1925	257	267	277	275	271	265	256	252	254	252	-999	258	-999
1926	263	276	279	281	268	263	253	251	246	249	248	254	261
1927	262	269	274	271	271	261	253	249	245	247	251	255	259
1928	261	271	276	276	267	259	251	246	243	242	244	251	257
1929	262	271	279	281	273	263	252	247	239	243	244	251	259
1930	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1931	259	274	278	277	273	261	251	243	243	241	243	251	258
1932	261	266	268	277	269	261	248	246	239	237	246	248	256
1933	260	268	277	279	272	264	255	252	246	248	245	252	260
1934	259	270	274	277	268	262	261	258	259	258	258	262	264
1935	266	277	281	279	276	270	253	253	247	250	252	256	263
1936	263	268	271	275	271	264	259	248	245	246	250	256	260
1937	263	269	276	278	273	263	258	249	255	256	253	258	263
1938	262	269	268	272	272	269	266	253	254	254	259	262	263
1939	264	266	269	272	269	266	256	254	253	254	254	257	261
1940	259	263	265	268	267	267	256	255	256	259	258	263	261
1941	267	271	271	267	267	264	255	255	243	244	249	253	259
1942	256	266	272	268	264	257	248	245	246	247	251	252	256
1943	254	255	256	256	255	257	255	247	247	249	247	250	252
1944	257	258	262	266	263	265	258	253	250	253	252	257	258
1945	258	258	264	262	259	253	257	252	251	254	257	256	257
1946	257	266	267	269	267	262	256	255	244	243	248	251	257
1947	264	273	282	277	272	261	252	251	247	251	256	258	262
1948	263	274	285	280	276	263	254	248	243	243	247	252	261
1949	263	274	281	284	278	265	259	252	252	252	254	257	264
1950	265	274	281	279	276	262	253	248	246	248	249	252	261
1951	258	266	275	276	271	259	253	247	245	243	249	260	259
1952	265	272	282	279	273	259	249	244	244	243	254	258	260
1953	263	268	279	279	271	262	251	245	246	247	251	256	260
1954	261	269	274	274	271	260	252	246	238	244	249	253	258
1955	258	271	277	278	273	264	255	246	244	245	253	253	260
1956	258	268	272	274	272	262	254	250	248	246	253	255	259
1957	262	274	277	281	275	267	258	251	248	245	252	257	262
1958	261	271	278	278	275	272	253	245	237	240	247	249	259
1959	262	263	271	273	268	259	254	248	243	245	246	251	257
1960	259	267	279	277	269	258	256	246	247	242	251	253	259
1961	267	275	281	277	273	261	253	247	242	243	252	256	261
1962	261	271	275	277	271	260	253	249	245	249	251	257	260
1963	264	275	280	284	273	262	253	245	253	253	261	268	264
1964	276	281	286	283	274	263	256	250	245	249	248	251	264
1965	261	269	279	279	275	254	253	250	239	244	246	253	259
1966	259	271	277	278	273	266	259	251	251	247	252	261	262
1967	267	278	280	280	272	254	250	241	241	239	245	255	259
1968	267	275	275	275	271	261	257	251	248	249	251	251	261

Table 5. (continued)

1969	251	271	272	274	265	251	242	233	229	231	239	241	250
1970	245	255	260	261	261	250	251	238	235	233	-999	228	-999
1971	254	267	281	282	266	263	255	248	251	242	244	249	259
1972	265	271	279	270	273	264	257	253	251	247	251	259	262
1973	271	277	285	284	-999	-999	-999	-999	-999	-999	-999	-999	-999
1974	-999	278	281	280	272	261	-999	-999	-999	-999	-999	-999	-999
1975	-999	-999	280	283	-999	-999	-999	-999	246	251	250	254	-999
1976	262	275	279	275	268	-999	-999	-999	-999	-999	-999	-999	-999

619010	-160		57	604 ST HELENA					ST. HELENA		1	1892	1980	10 1892
1892	-999	191	191	179	164	148	139	138	131	142	143	158	-999	
1893	166	175	181	181	173	158	148	135	134	144	143	161	158	
1894	182	186	187	178	168	152	148	136	142	152	158	175	164	
1895	183	190	191	187	178	154	154	149	148	150	157	166	167	
1896	180	182	192	191	172	164	149	133	146	151	151	156	164	

15. VERIFICATION OF DATA TRANSPORT

The data files containing the gridded surface air temperature anomalies and the mean monthly temperatures for individual stations can be read by using the FORTRAN or SAS input/output routines provided. Users should verify that the data have been correctly transported to their systems by generating some or all of the statistics presented in Tables 6 through 10. These statistics were generated in SAS (PROC MEANS) but can be duplicated in other statistical packages or languages. If the statistics generated by the user differ from those presented here, the data sets may have been corrupted in transport.

These statistics are presented only as a tool to ensure proper reading of the data sets. They are not to be construed as summarizing these data.

Table 6. Characteristics of numeric variables for the gridded surface air temperature anomaly file for the Northern Hemisphere

Variable	Number of observations	Mean	Minimum value	Maximum value
YEAR	1680	1920.500	1851.000	1990.000
MONTH	1680	6.500	1.000	12.000
MTEMP	1680	-6884.168	-9305.241	-4497.821
MSTA	1680	1.073	0.130	2.350
MDIST	1680	37.603	6.370	405.093

The following is a listing of the SAS program used to generate the statistics described in the table.

```
DATA SUMSTATS(KEEP=YEAR MONTH MTEMP MSTA MDIST);
     INFILE 'NDP020R1.NHEM90.ANOM';
     INPUT YEAR 21-24 MONTH 29-30 #2 @2 (T1-T648)(:5.) #39 @2
          (S1-S648) (:5.) #76 @2 (D1-D648)(:5.);
     ARRAY TEMP(648) T1-T648;
     ARRAY STA(648) S1-S648;
     ARRAY DIST(648) D1-D648;
     SUMTEMP=0;
     SUMSTA=0;
     SUMDIST=0;
     DO I=1 TO 648;
          SUMTEMP=SUMTEMP+TEMP(I);
          SUMSTA=SUMSTA+STA(I);
          SUMDIST=SUMDIST+DIST(I);
     END;
     MTEMP=SUMTEMP/648;
     MSTA=SUMSTA/648;
     MDIST=SUMDIST/648;
PROC MEANS DATA=SUMSTATS MAXDEC=3;
     VAR YEAR MONTH MTEMP MSTA MDIST;
RUN;
```

Table 7. Characteristics of numeric variables for the gridded surface air temperature anomaly file for the Southern Hemisphere

Variable	Number of observations	Mean	Minimum value	Maximum value
YEAR	1680	1920.500	1851.000	1990.000
MONTH	1680	6.500	1.000	12.000
MTEMP	1680	-8612.954	-9975.947	-7094.181
MSTA	1680	0.243	0.002	0.639
MDIST	1680	10.671	0.106	22.512

The following is a listing of the SAS program used to generate the statistics described in the table.

```
DATA SUMSTATS(KEEP=YEAR MONTH MTEMP MSTA MDIST);
     INFILE 'NDP020R1.SHEM90.ANOM';
     INPUT YEAR 21-24 MONTH 29-30 #2 @2 (T1-T432)(:5.) #39 @2
          (S1-S432) (:5.) #76 @2 (D1-D432)(:5.);
     ARRAY TEMP(432) T1-T432;
     ARRAY STA(432) S1-S432;
     ARRAY DIST(432) D1-D432;
     SUMTEMP=0;
     SUMSTA=0;
     SUMDIST=0;
     DO I=1 TO 432;
          SUMTEMP=SUMTEMP+TEMP(I);
          SUMSTA=SUMSTA+STA(I);
          SUMDIST=SUMDIST+DIST(I);
     END;
     MTEMP=SUMTEMP/432;
     MSTA=SUMSTA/432;
     MDIST=SUMDIST/432;
PROC MEANS DATA=SUMSTATS MAXDEC=3;
     VAR YEAR MONTH MTEMP MSTA MDIST;
RUN;
```

Table 8. Characteristics of numeric variables for the gridded surface air temperature anomaly file for the Antarctic

Variable	Number of observations	Mean	Minimum value	Maximum value
YEAR	408	1973.500	1957.000	1990.000
MONTH	408	6.500	1.000	12.000
MTEMP	408	-5183.105	-9999.000	-4330.278

The following is a listing of the SAS program used to generate the statistics described in the table.

```
DATA SUMSTATS(KEEP=YEAR MONTH MTEMP);
     INFILE 'NDP020R1.ANTARC.ANOM';
     INPUT YEAR 21-24 MONTH 29-30 #2 @2 (T1-T180)(:5.);
     ARRAY TEMP(180) T1-T180;
     SUMTEMP=0;
     DO I=1 TO 180;
          SUMTEMP=SUMTEMP+TEMP(I);
     END;
     MTEMP=SUMTEMP/180;
PROC MEANS DATA=SUMSTATS MAXDEC=3;
     VAR YEAR MONTH MTEMP;
RUN;
```

Table 9. Characteristics of numeric variables for the monthly mean temperature records for individual stations in the Northern Hemisphere

Variable	Number of observations	Mean	Minimum value	Maximum value
ID	1584	538993.548	10010.000	999060.000
LAT	1584	355.812	-23.000	825.000
LONG	1584	157.770	-1799.000	1795.000
YEAR	113763	1934.064	1701.000	1988.000
TMEAN	113763	-136.370	-999.000	318.000

The following is a listing of the SAS program used to generate the statistics described in the table.

```
DATA SUMSTATS;
            INFILE 'NDP020R1.NHEMST.DATA';
            INPUT X $ 5 Y $ 6 @;
            IF X NE ' ' AND Y NE ' ' THEN
              INPUT ID 2-7 LAT 9-12 LONG 14-18;
            ELSE IF X NE ' ' AND Y EQ ' ' THEN
              INPUT YEAR 2-5 TMEAN 68-71;
            ELSE INPUT;
PROC MEANS MAXDEC=3 DATA=SUMSTATS;
      VAR ID LAT LONG YEAR TMEAN;
RUN;
```

Table 10. Characteristics of numeric variables for the monthly mean temperature records for individual stations in the Southern Hemisphere

Variable	Number of observations	Mean	Minimum value	Maximum value
ID	288	827340.538	619000.000	999006.000
LAT	288	-238.736	-608.000	-26.000
LONG	288	-124.083	-1791.000	1800.000
YEAR	16163	1947.656	1787.000	1988.000
TMEAN	16163	-55.135	-999.000	296.000

The following is a listing of the SAS program used to generate the statistics described in the table.

```
DATA SUMSTATS;
            INFILE 'NDP020R1.SHEMST.DATA';
            INPUT X $ 5 Y $ 6 @;
            IF X NE ' ' AND Y NE ' ' THEN
              INPUT ID 2-7 LAT 9-12 LONG 14-18;
            ELSE IF X NE ' ' AND Y EQ ' ' THEN
              INPUT YEAR 2-5 TMEAN 68-71;
            ELSE INPUT;
PROC MEANS MAXDEC=3 DATA=SUMSTATS;
      VAR ID LAT LONG YEAR TMEAN;
RUN;
```

APPENDIX A

REPRINTS OF PERTINENT LITERATURE