



EARTH SYSTEM MONITOR

Comprehensive Ocean-Atmosphere Data Set (COADS) Release 1a: 1980-92

A guide to NOAA's data and information services

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Weather observations taken by merchant mariners form one of the longest continuous climate records in existence. Digitized data are currently available starting about 1854, the year following an international meeting held to discuss standardizing observing practices among the maritime nations of the world. These surface marine data, supplemented in recent years by *in situ* measurements from increasing numbers of data buoys and other automated platforms, remain critically important as a baseline data set for comparison with remotely sensed data, for input to climate models and global reanalysis efforts, and for a broad range of climate diagnostic studies.

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The Comprehensive Ocean-Atmosphere Data Set (COADS) is the most extensive collection of surface marine data available for the world ocean over the past century and a half. In COADS processing, the basic observational data have been edited, using a "trimming" procedure to identify outliers with respect to climatological 3.5 σ limits derived from data for three periods (1854-1909, 1910-49, 1950-79). A variety of observed and derived variables has then been summarized for each month of each year and decade of the period of record, currently 1854-1992, using 2° latitude x 2° longitude boxes (and using the 1950-79 limits for trimming after 1979). Resulting observational or summary statistical products are now used by over 200 research groups worldwide, but vigorous efforts continue to update and improve the available products.

Until recently, COADS Release 1 (Slutz *et al.*, 1985; Woodruff *et al.*, 1987), covering 1854-1979, had been extended for 1980-1991 by a set of "interim" products. However, the interim products were constructed using simplified procedures (e.g., for elimination of duplicate reports) that did not yield the full set of Release 1 statistics. Annual updates of the interim products (for 1985-91) had the additional limitation of

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NOAA Central Library moves to new building

In mid-July, the NOAA Central Library moved from Rockville, Maryland, to its new location on the second floor of Silver Spring Metro Center 3, at 1315 East-West Highway in Silver Spring, Maryland. The NOAA building complex in Silver Spring is immediately adjacent to the Silver Spring station on the Washington, D.C. Metrorail (subway) Red Line, about a 20-minute ride from the Washington downtown area. The new facility is easy to find, light, spacious, and in the center of activity within the new NOAA complex. Well-lit reading areas, tables, and study carrels are located throughout the facility.

Library services

The library uses a wide array of products and services to meet its patrons' needs. The library provides on-site access to approximately one million volumes and a computerized literature

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▲ Bronze sculpture and fountain at entrance to Silver Spring Metro Center 3 symbolizes NOAA's concern for Earth's oceans and atmosphere.



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

Ocean Climate Laboratory established at the National Oceanographic Data Center

The developing research group at the National Oceanographic Data Center (NODC) has been designated as the Ocean Climate Laboratory with the status of a new NODC division (Fig. 1). Two branches within the new division reflect the main areas of the laboratory's research: (1) physical oceanography and marine meteorology and (2) biological and chemical oceanography. The division also includes the NODC International Data Exchange Branch, which conducts programs related to international affairs and oceanographic data exchange and also operates the World Data Center A (WDC-A) for Oceanography, one of the U.S. discipline subcenters within the World Data Center system. NODC oceanographer Sydney Levitus, Director of WDC-A, Oceanography, is the head of the new laboratory.

The primary objectives of the new Ocean Climate Laboratory are to:

- develop improved ocean climatologies and investigate interannual to decadal-scale ocean climate variability using historical oceanographic data,
- improve the quality of the NODC's oceanographic data archives by using the data to perform scientific analyses,
- augment the historical ocean data record through efforts to locate, digitize,

and quality control data not yet included in the NODC database.

The major project underway at the NODC Ocean Climate Laboratory is to produce research quality global oceanographic data sets, perform objective analyses of the data, and to study the role of the oceans in Earth's climate system. Comprehensive, quality-controlled databases of ocean temperature, salinity, oxygen, and nutrients (e.g., nitrate, phosphate) have already been produced and objectively analyzed. Diagnostic studies of the annual cycle and interannual variability of these ocean parameters are underway. Results will be published in a series of scientific papers and in a multivolume world ocean atlas that will be issued in late 1993 or early 1994. The data sets will also be released on CD-ROM.

The Ocean Climate Laboratory is directing the international Global Oceanographic Data Archaeology and Rescue (GODAR) Project (see *Earth System Monitor*, March 1993). Initiated by NODC and WDC-A, Oceanography, this project was endorsed by the Intergovernmental Oceanographic Commission and is receiving worldwide support. It has already resulted in the submission to the NODC of nearly 1 million additional ocean temperature or tempera-

ture-salinity profiles from nine countries. The Ocean Climate Laboratory will play a major role in the quality control and analysis of these data sets and others that are expected to be submitted to the NODC in the future.

— Sydney Levitus

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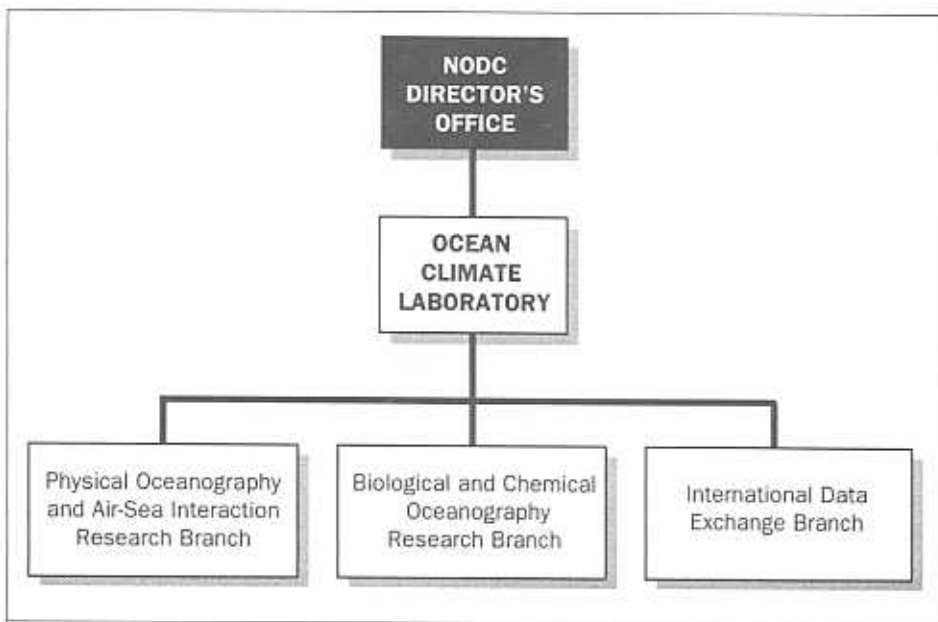


U.S. DEPARTMENT OF COMMERCE

Ronald H. Brown, Secretary

National Oceanic and Atmospheric Administration

Dr. D. James Baker,
Under Secretary and Administrator



▲ Figure 1. Organization of the new NODC Ocean Climate Laboratory.

Landsat data available for global change research

Recent actions by EOSAT, the Landsat Program of NASA, and the EROS Data Center (EDC) have made it cheaper and easier for investigators associated with the U.S. Global Change Research Program to obtain Landsat Thematic mapper (TM) data. EOSAT announced in April that it will sell TM data for \$2500 per scene to investigators funded by federal agencies affiliated with the Committee on Earth and Environmental Sciences (CEES) and working on programs listed in the appendix of the CEES publication *Our Changing Planet: The FY 1993 U.S. Global Change Research Program*.

To facilitate ordering and distribution of these data, EDC has agreed to broker such purchases. Using EDC has the advantages of insuring that the data purchased will become part of the EDC archive and that subsequent orders from verified Global Change researchers for these scenes will be flagged and completed at substantial savings (\$150/scene for each copy after the initial purchase). These advantages are significant and well worth the 5% charge EDC is required, contractually, to impose for serving as the purchasing agent.

Only investigators with written verification of their participation in the U.S. Global Change Research Program from the appropriate federal agency can acquire TM data at this price of \$2500 per scene. EDC has established a procedure for verification and ordering. For more information on ordering data, please contact Linda Hansen at EDC (605-594-6151). For information on the program, please contact Ed Sheffner at 202-488-5138.

International exchange visits

At the invitation of the Chinese National Oceanic Administration (CNOA), John Kinsfather, Chief of the Information Services Division at the National Geophysical Data Center, visited the Chinese State Oceanographic Office from June 11 through July 4, 1993. The visit began in Tianjin and included trips to other CNOA offices. While in China, he provided consultation to Chinese managers and technical specialists on computer systems, data networking, and environmental data management.

Dr. Irina Trofimova, Acting Director of the International Affairs Office of the Ukrainian Hydrometeorological Ministry,

News briefs

recently visited the National Oceanographic Data Center/World Data Center A (WDC-A) for Oceanography. She discussed with Sydney Levitus, Director of WDC-A, Oceanography, the exchange of oceanographic data and Ukrainian participation in the Global Data Archaeology and Rescue Project. Dr. Trofimova indicated that there was great interest on the part of the Ukrainian Hydrometeorological Service in joint bilateral and international projects.

With support from the Intergovernmental Oceanographic Commission (IOC), Alfredo Rolla of the Centro Argentino de Datos Oceanograficos—Argentina's national oceanographic data center—completed one month of data management training at the U.S. National Oceanographic Data Center. His training was undertaken to prepare him to conduct an IOC-sponsored regional workshop on the use of microcomputers for oceanographic data processing and exchange.

1961-90 standard normals

As a contribution to the World Climate Program of the World Meteorological Organization (WMO), the National Climatic Data Center has volunteered to be the world collection center for the official 1961-90 standard normals. Standard normal periods occur as sequential 30-year periods beginning with 1901 (i.e., 1901-30, 1931-60, 1961-90, and so on).

Averages of temperature, precipitation, pressure, wind, solar radiation, percent possible sunshine, vapor pressure, and other elements are candidates for calculation of normals. To date, the National Climatic Data Center has received data sets from 50 member countries of the WMO and has converted 49 of these to a standard format. This represents about one-third of the total WMO members.

NOAA paleoclimatologist helps coordinate PAGES Program

Dr. Jonathan Overpeck, Head of the NOAA Paleoclimatology Program and Director of World Data Center A for Paleoclimatology, recently attended the IGBP PAGES (Past Global Changes) Core Project Executive Committee Meeting in Bern, Switzerland. PAGES is a subprogram within the International Geosphere-Bio-

sphere Program (IGBP). At the meeting, Dr. Overpeck and seven other scientists from around the world reviewed presentations by prospective PAGES activity leaders and charted how these activities might be coordinated to meet PAGES objectives. He also discussed with French scientists the possible establishment of a World Data Center C for Paleoclimatology in Europe. Dr. Overpeck was nominated to continue as PAGES representative on the IGBP Data and Information System Standing Committee.

New freezing index developed

In order to recommend changes to building codes for housing foundations in the United States, the National Association of Home Builders (NAHB) contracted the National Climatic Data Center to prepare a new freezing index for over 3000 locations in the United States. This project demonstrates that with proper use of insulation, buildings with foundations as shallow as 16 inches can be constructed in regions with local design frost depths exceeding 6 feet. The new freezing index will result in significant time and monetary savings for the construction industry.

An article describing the new freezing index and comparing it to other freezing indices used internationally was prepared by Peter Steurer (NCDC) and Jay Crandell (NAHB). It has been accepted for publication in the *Journal of Cold Regions Engineering* published by the American Society of Civil Engineers.

Committee seeks to rescue industry geoscience data

Herbert Meyers, Chief of the Solid Earth Geophysics Division, National Geophysical Data Center, participated in a meeting of the American Geological Institute (AGI) Steering Committee on a National Geoscience Data Repository System. The primary purpose of the committee is to devise a way to preserve U.S. industry mineral and petroleum exploration data at risk because of downsizing of companies and lack of incentives for major U.S. companies to explore further in the United States. A key objective is to make data held by these major companies available to researchers, as well as to independent producers who are still prepared to do exploration and drilling in the United States. The first phase of this project, a feasibility study, is being funded by the U.S. Department of Energy.

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relying primarily on the Global Telecommunication System (GTS) for foreign ship reports because receipt of international ship logbook data is often delayed by 2-5 years (Jenne, 1992). Moreover, concerns about the trimming performance during extreme climate anomalies such as the 1982-83 El Niño/Southern Oscillation event (ENSO) (Wolter, 1992) prompted us to reevaluate the quality control procedures employed in COADS.

COADS Release 1a, offering a set of extensive and easily used products for 1980-92, has now been completed to address many of these shortcomings for

that period. To provide consistency with Release 1, as well as the broadest possible coverage and improved quality control, we have created two alternative sets of 2° monthly summaries for 1980-92. These products and other aspects of Release 1a are discussed in the following sections.

Data Sources and Corrections

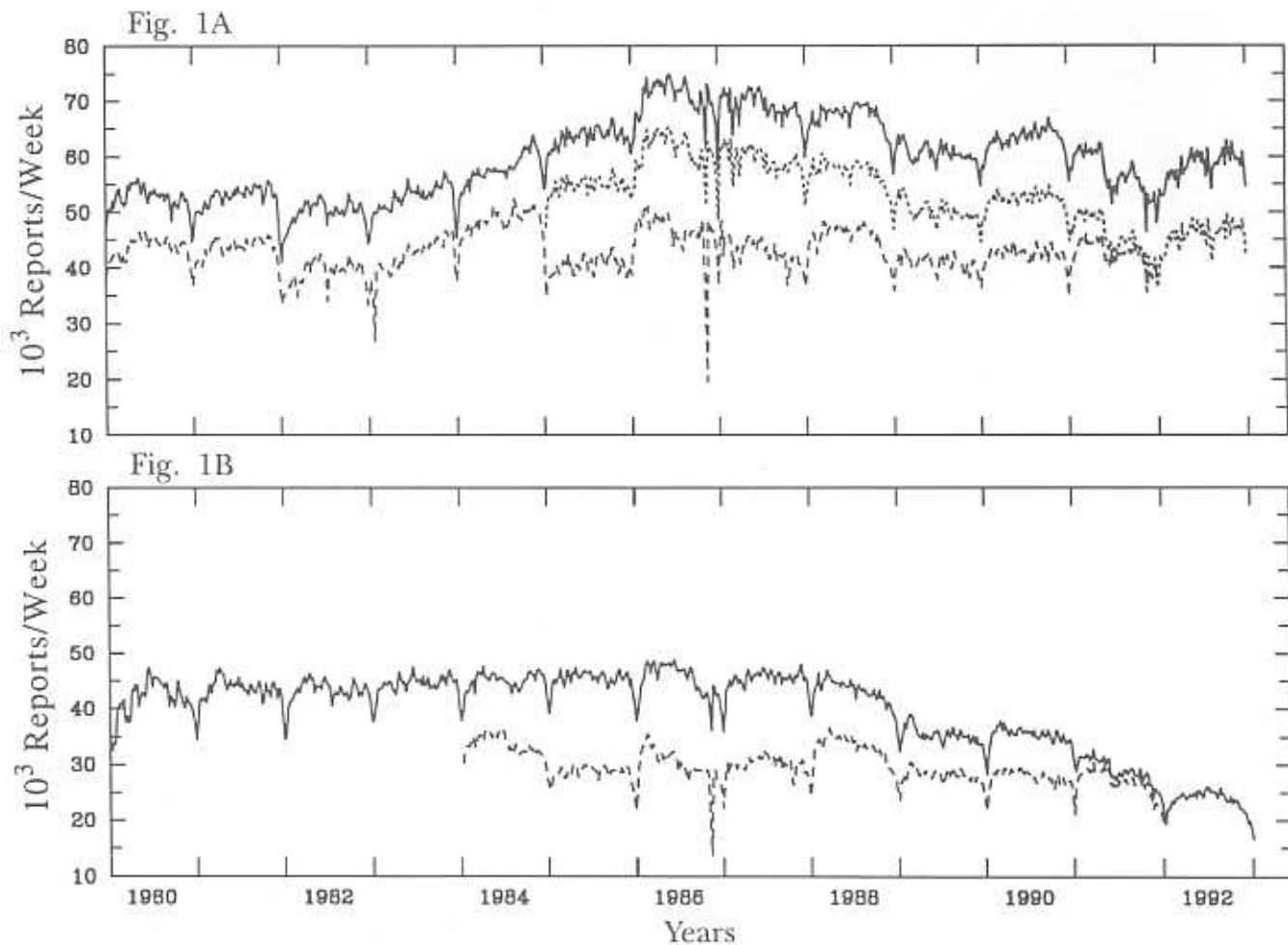
Overall, COADS Release 1a offers a substantial augmentation in weekly numbers of reports in comparison to the interim data (Fig. 1A). When the comparison is restricted to ship data, inclusion of delayed international logbook reports is shown to yield a large benefit with the passage of time (Fig. 1B). In

addition, the logbook reports contain important information, such as the sea surface temperature (SST) measurement method indicator, not currently available in GTS reports. Besides the available international logbook data, records from the Russian Marine Meteorological Data Set have been included, as well as special fishing fleet data that helped fill important gaps in data coverage in the tropical Pacific.

Automated platform data have been similarly improved and expanded by including three important sets of delayed, quality-controlled data:

- Global drifting buoy data prepared by Canada's Marine Environmental Data Service (MEDS). For 1992 it should be

COADS: Release 1a versus Interim



▲ **Figure 1.** (A) Weekly numbers of reports for Release 1a (solid) versus the interim products (dashed). The dotted curve shows 1985-92 Release 1a counts adjusted for better comparability with the interim counts by reduction of NDBC data to 3-hourly values (hourly NDBC data were included in the interim products for 1980-84). Sharp downward spikes in November 1986, especially in the interim data, represent a gap in the NMC data archived at NCDC; it is hoped that it will be possible to eventually fill this and similar gaps with data from NCAR or other institutions. (B) As for Figure 1A, except weekly numbers of ship reports for Release 1a (solid) versus the interim. Prior to 1984 in the interim set, data from ships could not be fully differentiated from data from other platform types.

noted that the MEDS data set includes proprietary World Ocean Circulation Experiment (WOCE) buoys from which only the 2° monthly summaries are available to the general research community, not the quality controlled individual observations.

- Hourly moored buoy and Coastal-Marine Automated Network (C-MAN) data from the NOAA National Data Buoy Center (NDBC).
- Data from NOAA's Pacific Marine Environmental Laboratory (PMEL): (a) Tropical Ocean-Global Atmosphere (TOGA) Program TAO ATLAS moored buoys, and (b) daily averages from Equatorial Pacific Ocean Climate Studies (EPOCS) moored buoys and low-elevation island stations.

As part of Release 1a, a number of important corrections and archival improvements has been implemented in the basic GTS data used for the interim products and also in the delayed ship logbook reports. For example, data from NOAA's National Meteorological Center (NMC), which form the bulk of the basic GTS input for Release 1a, were

COADS Release 1a ELECTRONIC METADATA

More detailed information about COADS can be obtained in electronic form over the Internet. The information is currently available on a computer at the National Center for Atmospheric Research (NCAR) that is publicly accessible using an anonymous FTP login.

After connecting to the NCAR machine (ncardata.ucar.edu or IP address: 128.117.8.111) change directories to pub/COADS. This directory will contain introductory information in a README file, and other sub-directories containing documentation applicable to the different COADS releases or the interim products. It is anticipated that the electronic metadata contained in this directory will be periodically updated.

Table 1. Structure of group files 3-8 (groups 1 and 2 are reserved for "untrimmed" Release 1 products). Each group contains four variables and eight statistics for each variable: the median, the mean, the number of observations, a standard deviation estimate, the mean day-of-month of observations, the fraction of observations in daylight, and the mean longitude and latitude of observations. Derived variables in groups 5-8 are computed as indicated from individual observations of other variables, e.g., the wind-stress parameter "X" is the product of W and U. In addition, QS denotes saturation Q at SST.

Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Sea surface temp. (S)	Scalar wind (W)	Total cloudiness (C)	D=S - A	I=UA	S
Air temperature (A)	Wind U-component	R	E=(S - A)W	J=VA	A
Specific humidity (Q)	Wind V-component	X=WU	F=QS - Q	K=UQ	X=WU
Relative humidity (R)	Pressure (P)	Y=WV	G=FW	L=VQ	Y=WV

reprocessed at the National Climatic Data Center (NCDC) to correct a number of errors in conversion from the original NMC format associated with code changes and insufficient documentation, e.g., doubled wind speeds from ships reporting meters per second during the approximate period February-June 1984.

Similarly, U.K. logbook reports containing erroneous SST measurement method indicators were replaced from update tapes. Another example of a problem in the logbook data, extending through 1988, is a displacement of French reports by 10° of longitude within 90°E-90°W across the dateline, due to a WMO code ambiguity. Replacement data have been received from France; however, because of questions about the exact duration of the problem, it was possible for Release 1a only to delete the logbook reports under the assumption that they would be replaced in many cases by properly located GTS data. Several comparatively minor archival problems were also left partially corrected or uncorrected in other data sources, awaiting future updates. Electronically available documentation for COADS products (see box) includes additional information about data problems and corrections.

Improvements in Processing and Products

As a first processing step, individual marine reports for Release 1a were translated into an expanded version of the variable-length binary format for Long Marine Reports (LMRs) used for Release 1 (1854-1979). In contrast to 1980-91 interim processing, an expansion of the duplicate elimination algorithm for Release 1 was used to eliminate dupli-

cate LMRs, including improved identification of exact matches of duplicate reports in time/space location and ID (e.g., ship call sign or buoy number). The resulting Release 1a output totals about 41 million LMRs for 1980-92 (3.8 gigabytes), of which hourly NDBC data make up 19%.

For Release 1a, a fixed-length version of the LMR format is also available, which contains all regularly observed weather elements and ID information, and has a flag set whenever feasible to indicate platform type (ship, drifting buoy, moored buoy, etc.). This represents an improvement over the Compressed Marine Report (CMR) format used for the interim products, which lacked some basic meteorological elements (e.g., wave fields) and ID information, and contained much less information regarding platform type.

The requirements of many COADS users are better met by 2° monthly summary products rather than individual observations. For Release 1, 14 statistics, such as the mean and the median of data falling within a given year-month-2° box, were computed for each of 19 observed and derived variables, such as SST and heat-transport parameters. In contrast, although the interim products included all 19 variables, only the mean and the number of observations were recorded for each variable. For Release 1a, we have extended the full matrix of 19 variables x 14 statistics used for Release 1 through 1992. However, because the full matrix is voluminous even for the 13-year update period (~0.5 gigabyte), selected statistics are most commonly distributed in the form of "group" files (~50 megabytes/group) (Table 1).

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Table 2. Composition of the enhanced (4.5σ trimming) and standard (3.5σ) Release 1a statistics, and of the 1980-91 interim (3.5σ) statistics by platform type and variable (for observed variables only with abbreviations as given in Table 1, except that here W and R refer to wind and psychrometric data in general). For a given platform type, "x" indicates that no data were used, and "-" indicates data not observed, with some experimental exceptions, e.g., NDBC moored buoy and Coastal-Marine Automated Network (C-MAN) humidity observations.

Platform type	Enhanced S A W P R C	Standard S A W P R C	Interim S A W P R C
Ships (& Ocean Wea. Stat.)	S A W P R C	S A W P R C	S A W P R C
Drifting buoys*	S A x P - -	x x x x - -	S A W P - -
Moored buoys**	S A W P - -	x x x x - -	S A W P - -
EPOCS daily buoys/islands	S A W P - -	x x x x - -	x x x x - -
Fishing fleet data	S - x - - C	x - x - - x	x - x - - x
Rigs and platforms	S A W P R C	x x x x x x	S A W P R C
C-MAN	x x x x - -	x x x x - -	S A W P - -

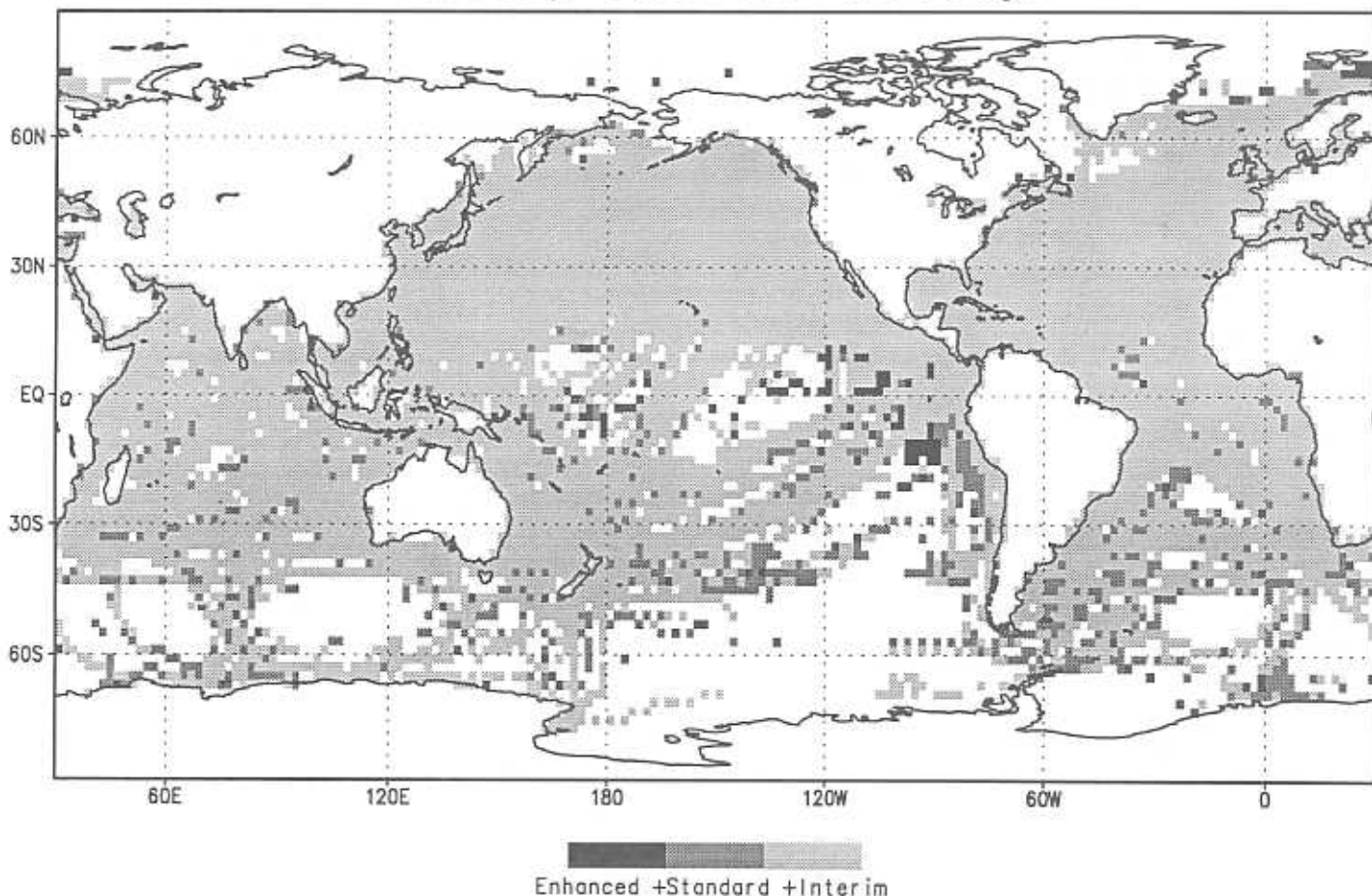
* Note that the enhanced statistics include some drifting buoy data that passed the MEDS quality control as acceptable but that occurred in 2° boxes for which 1950-1979 trimming limits could not be computed.

** Includes NDBC buoys (reduced from hourly to 3-hourly for 1980-92 in the enhanced statistics, and for 1985-91 in the interim statistics), PMEL TOGA/TAO ATLAS buoys, and foreign moored buoys.

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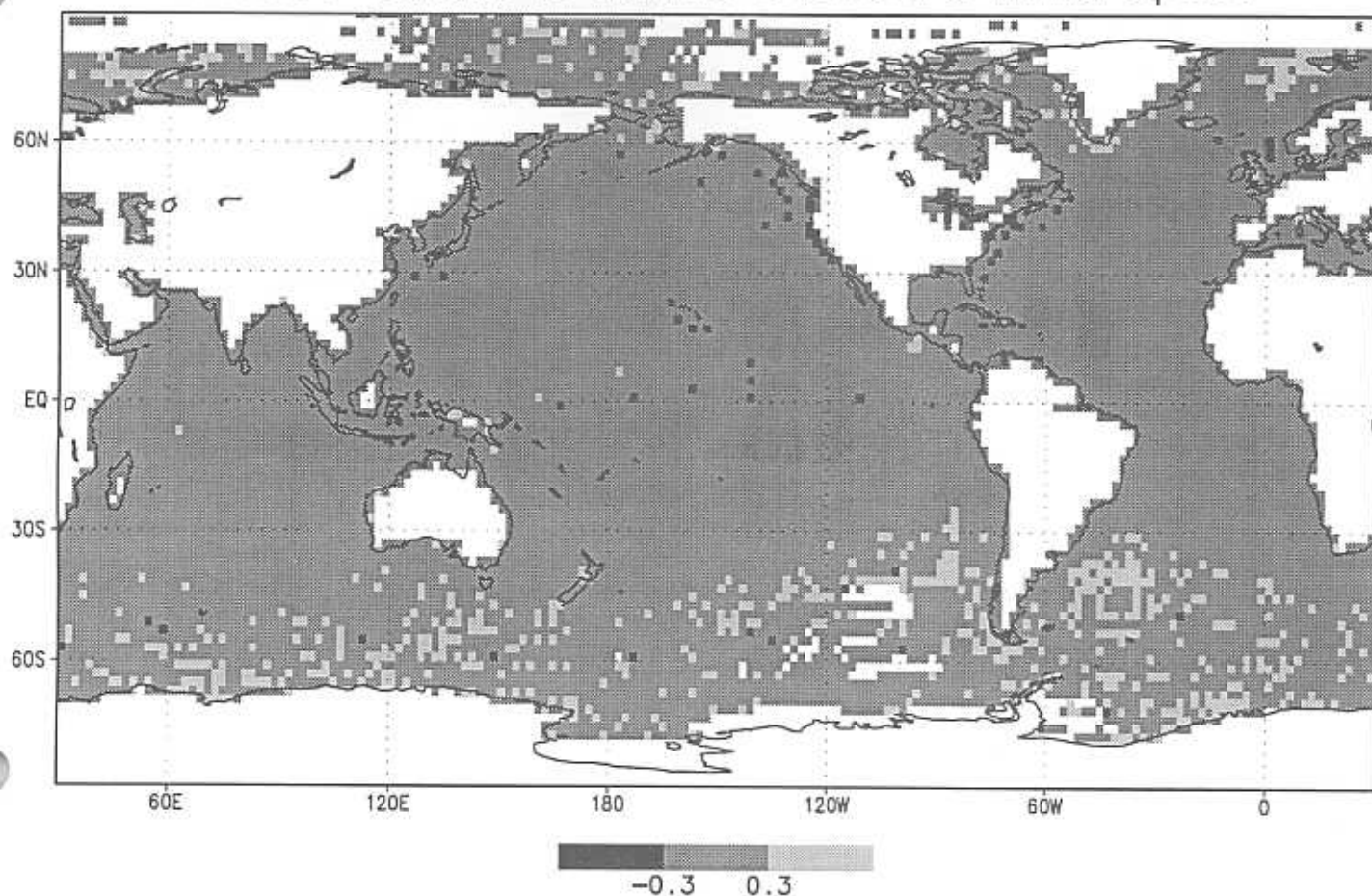
Two separate sets of 2° monthly summaries were calculated for Release 1a: The "standard" set provides closest compatibility with Release 1, by retaining the original (1950-79) 3.5σ limits, and by restriction to ship data as nearly as practical. In contrast, the alternative set of "enhanced" statistics includes ships plus other *in situ* platforms, and employs wider 4.5σ limits to accommodate more extreme climate events. However, all NDBC C-MAN (near shore) data and non-3-hourly (i.e., not 0000, 0300, ..., 2100 UTC) moored buoy data, plus selected variables from other platform types, such as experimental wind observations from drifting buoys, were omitted from the enhanced statistics because of concerns about systematic data differences and over-sampling. Table 2 gives a summary of the compo-

January 1983 SST coverage



▲ **Figure 2.** Global 2° box coverage for SST observations in January 1983. Light gray shading denotes 2° boxes covered by the interim, standard, and enhanced sets, medium gray refers to the standard and enhanced sets only, and black stands for coverage unique to the enhanced set.

Annual Enhanced minus Standard Wind Speed



▲ **Figure 3.** Annual average of 1980-92 monthly average differences between the Release 1a enhanced minus standard mean of scalar wind (meters per second). In many cases, negative differences (> -2 m/s) in 2° boxes around the U.S. coastline and across the equatorial tropical Pacific correspond to NDBC and PMEL moored buoy locations. Positive differences (< 5 m/s, but rarely above 2 m/s) arise from relaxation of the trimming limits to 4.5σ .

sition of the resulting standard and enhanced statistics, as compared with that of the interim statistics.

Discussion

When comparing Release 1a with interim data, the large amount of delayed ship reports (ref. Fig. 1B) provides the largest increase in global 2° box coverage (illustrated for SST in Fig. 2). Globally, the number of year-month- 2° boxes during 1980-91 containing data in the standard statistics increases by about 4% in comparison to the interim data. However, the more heterogeneous platform mixture used for both the enhanced and interim statistics complicates comparison with the ship-based standard statistics (see Table 2). Variables commonly measured by drift buoys, such as SST and sea level

pressure, gain up to an additional 3% coverage in the enhanced statistics (e.g., Fig. 2). This increase combines the effects of inclusion of more delayed data from automated platforms and of wider trimming limits.

By itself, relaxation of the trimming limits to 4.5σ appears to have had a relatively small effect on overall data density and coverage (on the order of 1%) in the enhanced set. However, testing of the 4.5σ limits on subsets of Release 1a data, which did not consider effects of changes in platform mixture, showed important smaller-scale impacts:

- For particularly large climate extremes such as the 1982-83 ENSO, local increases over 10% in the number of observations were possible for varying time intervals.

- The number of 2° boxes with any observation was increased in areas with low observational density. The net effect was to reduce large gaps and spotty coverage (polar ice-edges, extratropical southern hemisphere) while well-observed regions (northern midlatitudes) did not gain additional coverage.

- The size of recorded climate anomalies is less restricted by the 4.5σ versus the 3.5σ limits, thus overall climate variability is enlarged. For instance, during the 1982-83 ENSO, peak SST anomalies in the eastern equatorial Pacific are up to 1°C higher.

Preliminary comparisons between mean fields from the standard and enhanced statistics show compelling evidence that the combination of ship and buoy data is subject to systematic

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differences in boxes dominated by observations from one platform type or the other (see, e.g., Wilkerson and Earle, 1990; Woodruff *et al.*, 1991). Figure 3 illustrates this for wind speed, and also shows frequent increases in wind speed in high latitudes stemming from the relaxed trimming limits.

Future Plans

Two major COADS updates beyond Release 1a are planned over the next few years. Release 1b, a partial update for the period since about 1947, is now planned for completion during 1994. The period for Release 1b was chosen primarily on the basis of requirements for data inputs to global reanalysis (Jenne, 1992). Release 2 will involve a consistently processed update for the total period of record, incorporating a variety of new data sources as a result of international cooperation with countries such as Canada, China, France, Germany, Norway, U.K., and Russia. Release 2 is planned to include the surprisingly small amount of U.S. merchant marine data that was apparently preserved for the data sparse periods spanning the two World Wars, which is being digitized by NCDC. The period of record might even be extended before 1854 if sufficient data can be digitized (Elms, 1992).

For Release 2, substantial improvements are also planned in quality control and product availability to better meet the needs of researchers (Diaz *et al.*, 1992, pp. 377-383). For example, research continues toward an improved trimming procedure, which may include removal of outliers with reference to a local year-month mean in addition to climatological information. Furthermore, we are considering separations of statistics by time-of-day and platform type for selected variables, to address possible diurnal biases and biases between buoy and ship data. Availability of Release 2 is anticipated in the mid-1990s. However, that schedule is dependent on the difficulty of resolving these processing and quality control issues, including availability of adequate resources to complete the task.

As a side benefit of the COADS project, the integration and comparison

COADS Release 1a DATA AVAILABILITY

COADS products for Release 1 (1854-1979) and Release 1a (1980-92) are available from :

Data Support Section
National Center for Atmospheric
Research
P.O. Box 3000
Boulder, CO 80307
USA

or contact Steve Worley at 303-497-1248 (worley@ncar.ucar.edu) or Dennis Joseph at 303-497-1216 (joseph@ncar.ucar.edu).

Fortran software is available to help read packed binary products. In addition, Release 1 individual marine reports in an ASCII format can be obtained from NCDC.

of many different data sources have revealed numerous data and archival problems that strongly indicate the need for improved interactions among different groups within NOAA involved with marine data, as well as among other organizations both nationally and internationally. To help strengthen interaction and provide adequate attention to issues of data continuity, we have recommended that a working group of marine data experts be established to serve as a focal point for facilitating and improving coordination with the climate research community.

Acknowledgements

COADS is the result of a continuing cooperative project between the National Oceanic and Atmospheric Administration (NOAA)—specifically its Environmental Research Laboratories (ERL), National Climatic Data Center (NCDC), and Cooperative Institute for Research in Environmental Sciences (CIRES, conducted jointly with the University of Colorado)—and the National Science Foundation's National Center for Atmospheric Research (NCAR). The NOAA portion of COADS is currently supported by the NOAA Climate and Global Change Program and the NOAA Environmental Services Data and Information Management (ESDIM) Program.

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OSCAR, the Online Satellite Catalog and Request System

An online inventory of NOAA meteorological satellite data

Data collected by NOAA's meteorological satellites are archived and disseminated by the Satellite Data Services Division (SDSD) of NOAA's National Climatic Data Center. Although the main facility of the National Climatic Data Center is located in Asheville, North Carolina, the SDSD is located in close proximity to NOAA's satellite operations offices in the Washington, DC metropolitan area.

Inventory information about SDSD holdings of data and data products from NOAA polar-orbiting satellites is available through the Online Satellite Catalog and Request System (OSCAR). OSCAR currently resides on a MicroVax 3300 with access through local and domestic 1-800 numbers. The system will soon be available through the Internet.

The first phase of the system contains inventories of data holdings from the Advanced Very High Resolution Radiometer (AVHRR), an instrument used to produce radiance measurements, and from the TIROS Operational Vertical Sounder (TOVS), which produces atmospheric profiles of temperature and humidity. Subsequent phases or follow-on systems will handle data from the Special Sensor Microwave Imager (SSM/I), an instrument system of the most recent DMSP (Defense Meteorological Satellite Program) satellite, and the Coastal Zone Color Scanner (CZCS), an instrument system aboard the NASA Nimbus-7 satellite.

Users are free to query one or more inventories of satellite data. However, they are strongly urged to contact an SDSD data specialist to obtain the required user IDs and information regarding any changes or recent revisions to procedures for accessing OSCAR. These inventories contain information that uniquely describes each digital data set such as satellite name, data type, data set names, date and time. The access software uses the inventories to calculate areas of coverage and to select only those data within the user-defined area. The system returns this information to the user, along with an input tape count and estimated number of output tapes for the order. This information (with a

current price list) may be used to calculate the price of the order. Once the data meeting the specified requirements have been selected, the user may submit the request for those data directly through OSCAR.

Inventories held in OSCAR span the time period from April 1985 to the present for 1-km resolution High Resolution Picture Transfer (HRPT), Local Area Coverage (LAC), and TOVS data sets, and from November 1978 to the present for 4-km resolution Global Resolution (GAC) data.

Access to OSCAR is available at no charge to users. The system is available

24 hours a day, 7 days a week, so users may inquire or order data at their convenience. Once a user ID has been assigned, further contact with SDSD is unnecessary except to pay for data orders. If a deposit account has been established, however, and it contains funds sufficient to cover an order, even payment can be made automatically.

— Laura K. Metcalf

Satellite Data Services Division
National Climatic Data Center
NOAA/NESDIS E/CC61
Princeton Building, Room 101
5627 Allentown Road
Camp Springs, MD 20746 ■

HOW TO ACCESS OSCAR

NOAA's Online Satellite Catalog and Request System

Initial settings:

- Any modem speed up to 9600
 - Parity to N
 - Data bits to 8
 - Stop bits to 1
 - Full duplex
 - Terminal emulation VT100 or ANSI
1. Dial: 301-702-1488 (Washington, D.C. metro area or international) or 1-800-528-2514 (other U.S.)
 2. You will receive a "CONNECT" message, then a "LOGIN" message. All keyed inquiries of OSCAR must be made in lower case characters.
Type: `oscar` <return, or enter>
 3. You will be asked for a password.
Type: `oscar1` <return, or enter>
 4. You are now automatically assigned to the OSCAR system. A menu will be presented, from which you may choose one of several options. Typically, users will either request the help function (option 1) or will search the NOAA Polar Orbiting Data Inventory (option 3).
 5. If option 3 is chosen, you will be asked to enter an SDSD assigned user ID. If you do not have one, please contact SDSD, and one will be assigned to you and entered into the data base.
 6. You are now ready to continue with the OSCAR system. This program is menu-driven, and should be simple to follow. *Entries should be made with particular care. Backspacing to correct an entry is not possible at present, although this is expected to be corrected soon. If you make a mistake, simply complete the invalid entry, and the system will request a correction.*
 7. If at any time there is no activity for 5 minutes you will automatically be logged off.
 8. Once you exit OSCAR, you are automatically logged off.
 9. To receive a password for using OSCAR, or to receive assistance if you encounter any problems, please contact SDSD personnel at 301-763-8400.

NOAA CoastWatch

An innovative tool for coastal decision making

Isobel Sheifer

Coastal Ocean Office

NOAA/Office of the Deputy Administrator

The Coastal Ocean Program (COP) provides a focal point in NOAA through which the agency—together with other organizations with responsibilities for the coastal environment and its resources—can make significant strides toward protecting coastal resources and ensuring their availability and well-being for future generations. The COP's vision is to deliver the highest quality science in time for important coastal policy decisions. To assist in this goal, COP, together with the NOAA National Environmental Satellite, Data, and Information Service (NESDIS) and other NOAA line organizations, has developed CoastWatch.

Background

In the fall of 1987 a "red tide" event occurred off the North Carolina coast, causing an estimated \$25 million loss to fisheries and tourism in that area. The toxic plankton bloom was caused by a single-celled dinoflagellate, *Ptychodiscus brevis*. This was the first recorded red tide off the North Carolina coast. Data from NOAA-9, a polar orbiting satellite, were used retrospectively to detect the ocean thermal features associated with the event. The data were collected from the Advanced Very High Resolution Radiometer (AVHRR), a five-channel instrument onboard the satellite, and processed by NESDIS in Washington, DC.

Satellite-derived sea surface temperature (SST) images provided by NESDIS to the National Marine Fisheries Service (NMFS) in Beaufort, North Carolina were used to diagnose the cause of the red tide. It was determined that this outbreak resulted from the transport of toxic plankton from the Gulf of Mexico to the South Atlantic Bight via the Gulf Stream.

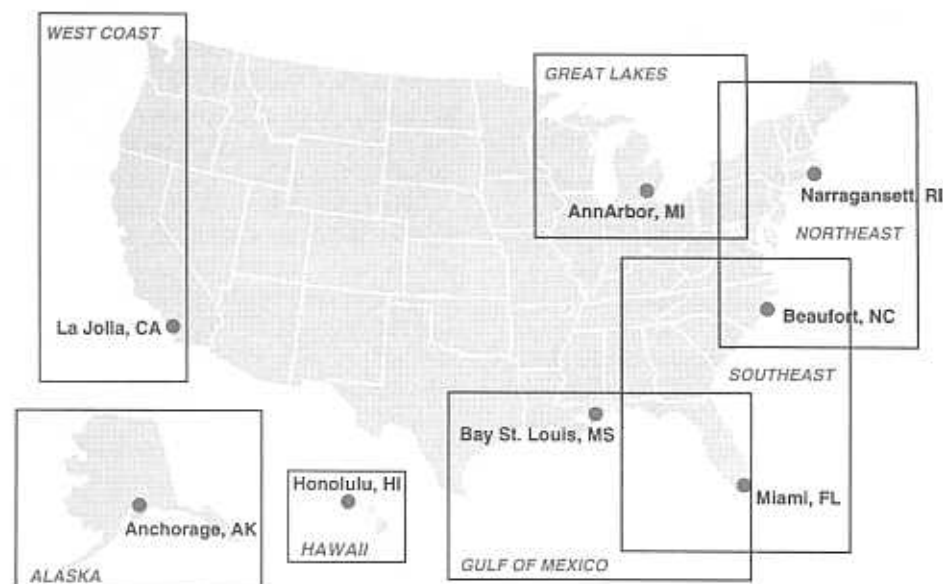
The success of this retrospective

NOAA Coastal Ocean Office (NCOP)

SSMC 3, Station 15140

1315 East-West Highway

Silver Spring, MD 20910



▲ Figure 1. CoastWatch Regional Nodes and Sites.

analysis prompted the North Carolina Department of Environment, Health and Natural Resources to begin a program of monitoring satellite imagery received by the Beaufort lab for possible detection of water masses that might contain red tide cells. *In situ* sampling follows identification of any suspicious features in the imagery. The use of satellite imagery for environmental monitoring and management of East Coast red tides provided the impetus for the national development of CoastWatch by the NOAA Coastal Ocean Program.

CoastWatch was initially developed to monitor conditions along the southeast U.S. coast. Mapped sea surface temperature satellite imagery, windrift and Ekman transport fields, and ocean current information were supplied to the Beaufort laboratory once a week in hard copy format. From this rudimentary system, CoastWatch moved through several phases until it achieved its present status as a fully automated near-real-time system.

CoastWatch goals

Coastal decision makers require accurate and immediate information concerning environmental processes and events that may affect the health and stability of the coastal marine envi-

ronment. The CoastWatch program is designed to support the information needs of coastal managers by providing rapid dissemination of satellite observation data to regional coastal sites in eight regional nodes (see Fig. 1). Among its objectives, CoastWatch seeks to:

- provide access to quality-controlled near-real-time and retrospective satellite, aircraft, *in situ*, and analysis/forecast model data and derived products for the coastal and Great Lakes regions of the U.S. by supporting an operational distributed communications and data storage network;
- adopt, develop, and support quality measures and standards that affect data exchange, usage, and management;
- develop and implement new and improved products that meet the needs of environmental researchers and decision makers; and
- conduct research into new and improved applications of CoastWatch data and data products and to improve CoastWatch systems.

Early development of the system concentrated on hardware, software, and communications technology for the CoastWatch regional sites. Emphasis of the program is changing to a product development/product applications research agenda.

COP and Line Office roles

CoastWatch activities are distributed through several NOAA offices:

- COP. At the highest level, CoastWatch receives program direction on such items as allocation of funds and general program and agency requirements from the COP and its governing body, the Coastal Ocean Council, composed of a representative from each NOAA line organization. The role of the COP is to provide innovative program oversight and guidance.
- NESDIS. Day-to-day direction of CoastWatch is provided by NESDIS, which is advised by the CoastWatch Management Team composed of a technical representative from each line organization plus a member from outside NOAA. In addition, NESDIS is responsible for the acquisition of data, the production of products, archiving, and providing operational support to the regional nodes. CoastWatch retrospective AVHRR products are disseminated by the NESDIS National Oceanographic Data Center (see box on page 12).
- Other Line Offices. NOS distributes NESDIS products to the eight regional nodes. In addition to supplying operational data, NOAA's line organizations support the regional nodes. Five of these (Southeast, Northeast, Gulf of Mexico, West Coast, and Hawaii) are

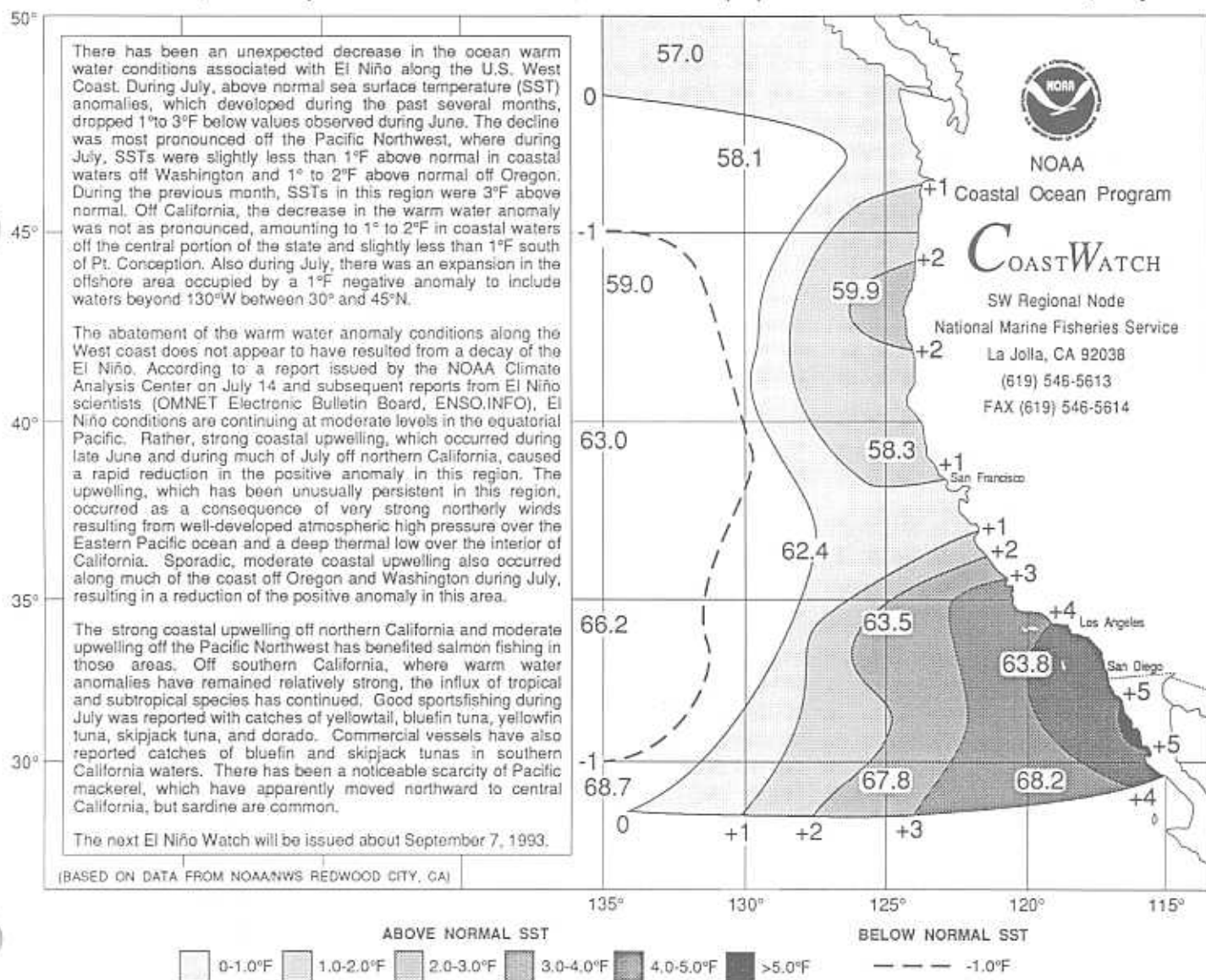
supported by NMFS; the Caribbean and Alaska nodes are supported by the National Weather Service; and the Great Lakes node by the Office of Oceanic and Atmospheric Research.

Products/Applications

From its first use in analyzing the 1987 red tide event in North Carolina, CoastWatch has become an operational monitoring tool along all U.S. coasts in a variety of applications for coastal problem solving. The system of regional nodes supplies users with data that are tailored to their own applications. To make available products of the

- continued on page 12

El Niño Watch, Advisory no. 93-7. Coastal Ocean Mean SST(°F) and Deviation From Normal, July 1993.



▲ Figure 2. Sample El Niño advisory issued monthly by the CoastWatch Site in La Jolla, California.

NOAA CoastWatch, from page 11

Federal government produced at the CoastWatch regional sites, institutional users like universities must sign a Memorandum of Agreement (MOA) specifying the data will be used for noncommercial purposes. CoastWatch currently has 70 of these MOAs in place. Each user must also sign an agreement specifying that the data will be used in noncommercial applications or research dealing with coastal resource management. Among the most significant developments of CoastWatch data have been:

- **Red Tide Watch.** Red tide watches are now in effect on both the East and the West Coast as coastal managers use a battery of satellite imagery and *in situ* sampling to analyze coastal waters for the possible outbreak of such things as paralytic shellfish poisoning. Though colorful in description, algal cells do not appear red in satellite imagery. Analysis of possible cell intrusion in coastal waters is made by water mass analysis based on sea surface temperature.

- **El Niño Watch.** The El Niño Watch was initiated in January 1992 with the onset of warm water conditions on the West Coast. The purpose is to provide a wide spectrum of users with information of the onset of El Niño conditions. Satellite observations are used as an analytical tool in understanding *in situ* observations. The El Niño Watch as it has developed consists of several components: 1) El Niño advisory charts (developed from *in situ* measurements) showing sea surface temperature and its anomalies and a narrative description of ocean conditions and their potential impacts on living marine resources (see Fig. 2); 2) an information clearinghouse; 3) research vessel cruises to evaluate impacts of El Niño on selected fish stocks; and 4) presentations to the public. El Niño Watch Advisory Charts are circulated by Fax or mail to about 240 users who then may post them or transmit the information to others.

- **Fisheries Management.** This spring CoastWatch sea surface temperature data products were used by fisheries managers to assess the relative risk of summer flounder trawling to sea turtles. Sea turtles prefer warmer water

NOAA CoastWatch Active Access System (NCAAS)

Data products and images derived from measurements of the Advanced Very High Resolution Radiometer (AVHRR) instrument onboard NOAA's Polar Orbiting Environmental Satellites are provided to CoastWatch users in near-real time through the CoastWatch nodes. The data products and images are then archived and made available for retrospective use by researchers and other noncommercial users through the NOAA CoastWatch Active Access System (NCAAS).

NCAAS is being developed and operated by the National Oceanographic Data Center (NODC). Since 1990 over 50,000 AVHRR images have been archived on optical platters at the NODC. The primary product is sea surface temperature (SST) images for the Great Lakes, Gulf of Mexico, and northeast and southeast coasts of the United

States at 1.1-km and 4-km resolution, and for Jamaica and Puerto Rico at 1.1-km resolution. SST images at 4-km resolution are also available for the Aleutian Islands, Hawaii, and the U.S. West Coast. Channel 1, channel 2, and solar zenith angles are available for selected subregions for calculating turbidity.

Each data product or SST image is in a compressed binary format with a 512-byte header record and approximately 512 data records of 512 bytes each. Users must decompress the data files (PC source version available from the NODC) and provide their own image display capability.

Further information about NCAAS is available from:

National Oceanographic Data Center
NOAA/NESDIS E/OC21, Attn: NCAAS
1825 Connecticut Avenue, NW
Washington, DC 20235

than the summer flounder. By being able to delineate, from the imagery, where the colder waters were located, managers were able to lift the Federal requirement for the use of turtle excluder devices (TEDs) along a northern portion of the North Carolina coast. Similarly, satellite imagery is used to guide tagging operations for king and spanish mackerel off the North Carolina coast. Fisheries managers locate these species by using imagery to identify areas that are in the preferred temperature ranges of these species. Also, CoastWatch data are being used to develop models explaining recruitment dynamics off the southeast U.S. coast.

- **Great Lakes Forecast System.** CoastWatch will deliver satellite imagery of sea surface temperature for use in the two-day forecasts of environmental conditions including winds, waves, water levels, currents, and temperatures in the Great Lakes that are being planned by Great Lakes Forecasting System. This system, which will have a variety of management oriented applications, is being developed by NOAA's Great Lakes Environmental Research Laboratory in cooperation with researchers at Ohio State University.

Future developments

The CoastWatch system of data delivery is constantly being upgraded, validated, and improved to provide the best possible service to users. In order to further enhance the tools which coastal managers have available, COP is supporting efforts to provide users with data from the NASA SeaWiFS (Sea-viewing Wide Field-of-view Sensor), an instrument designed to deliver satellite remotely sensed ocean color data. Ocean color data has not been available since the Coastal Zone Color Scanner ceased functioning in 1986. COP is funding the acquisition of SeaWiFS data and regional research to develop applications for those data. The satellite carrying the SeaWiFS sensor is scheduled to be launched in 1994. Additionally, future activities will include development of a system to acquire, process, and distribute data from the color sensor and scatterometer onboard the Japanese satellite ADEOS (Advanced Earth Observing Satellite). ■

NOAA Marine Environmental Buoy Data on CD-ROM

The National Oceanographic Data Center (NODC) has produced from its Marine Environmental Buoy Database a two-disc set of CD-ROMs containing marine meteorological, oceanographic, and wave spectra data for the Gulf of Mexico. The data were collected by moored buoys and C-MAN (Coastal-Marine Automated Network) stations operated by the NOAA National Data Buoy Center (NDBC). C-MAN stations are located on piers, offshore towers, lighthouses, and beaches with excellent exposure to the marine environment.

These two discs are the first in a projected series of about 14 CD-ROMs that will hold all the NDBC buoy and C-MAN data in the NODC archive through July 1992. CD-ROMs holding data for the Atlantic Ocean will be issued next, followed by the CD-ROMs for the Pacific Ocean and, finally, the Great Lakes. Update discs holding data after July 1992 data will be issued subsequently.

The NDBC buoys began reporting in the early 1970s and the NODC archive holds data from October 1972. The first C-MAN stations became operational in March 1983, and the NODC archive of C-MAN data begins in 1985. Principal measured parameters reported by both moored buoys and C-MAN stations include air temperature and pressure, wind speed and direction, wind gust, and sea surface temperature. The buoys (and a few C-MAN stations located on offshore platforms) also report wave data, which usually include wave height, wave period, and wave spectra. Since the late 1980s, some buoys have reported directional wave spectra.

The data and information files are recorded in ASCII format. Data files for each buoy or C-MAN station are arranged chronologically in directories by their station identifier. Each file contains data for one month for that buoy or station. Contact: NODC

Permafrost Bibliography Update, 1988-1992

World Data Center A for Glaciology (Snow and Ice) has published *Permafrost Bibliography Update, 1988-1992* (Report GD-26) that covers the topics of permafrost, ground ice, frozen soils, and geocryology. It extends the bibliography is-

Data products and services

sued in 1988 as *Glaciological Data* (Report GD-21) and provides a total of over 3,000 references published between 1988 and 1992. The 401-page bibliography was published to coincide with the Sixth International Conference on Permafrost held in Beijing, China, in July 1993. Copies are available for \$10 in either hardcopy form or as an ASCII file on diskette.

Contact: WDC-A, Glaciology, CIRES, Campus Box 449, University of Colorado, Boulder, CO 80309-0449. Telephone: 303-492-5171. Internet: nsidc@kyros.colorado.edu

Global relief data on CD-ROM

A CD-ROM containing a number of digital databases, sample images, and software files related to global topography and geography has been released by the National Geophysical Data Center (NGDC). The disc holds gridded databases of global topography and bathymetry at various scales, digitized continental coastlines, gridded oceanic gravity anomalies, ocean floor gazeteers, and digital relief images in a wide variety of formats. Soft-

CONTACT POINTS

For further details and ordering information about any of the NOAA products or services listed here or elsewhere in this issue of the Earth System Monitor, please contact the appropriate source listed below.

National Climatic Data Center (NCDC)

Climate Services: 704-271-4682
Satellite Services: 301-763-8399
FAX: 704-271-4876 FAX: 301-763-8443

National Geophysical Data Center (NGDC)

303-497-6958
FAX: 303-497-6513

National Oceanographic Data Center (NODC)

202-606-4549
FAX: 202-606-4586

NOAA Earth System Data Directory

202-606-5012
(Gerald Barton)
FAX: 202-606-0509

NOAA Central Library

Reference Services:
301-713-2600
FAX: 301-713-4599

ware for PC-DOS, Macintosh, and UNIX platforms is provided to access the major databases. The CD-ROM holds over 630 megabytes. About 500 Mb are accessible to all types of hardware, while the remainder is in specific Macintosh image and software formats. A flier providing details about the contents of this CD-ROM is available on request.

Contact: NGDC

Values of Earth's magnetic field from mathematical models

The National Geophysical Data Center and the collocated World Data Center A for Solid Earth Geophysics have available on PC-compatible diskettes a number of geomagnetic field models and related computer programs. Because its direction and intensity at the surface of the Earth is constantly changing (primarily due to fluid motions within the core), Earth's main magnetic field is usually approximated by mathematical models based on available data. The models describe the magnetic field and its rate of change over relatively short periods of time, usually five to 10 years. The unpredictable nature of change in the magnetic field requires that the mathematical models be periodically updated, usually every five years. Available models include global spherical harmonic models such as the International Geomagnetic Reference Field and the World Magnetic Model, as well as a United States regional model. ANSI Standard FORTRAN programs are available to compute the magnetic field for a given location and date or for a given area.

Contact: NGDC

Annual sea level data update

The National Oceanographic Data Center has received from the TOGA Sea Level Center at the University of Hawaii the annual data submission that updates the cooperating institutions' Joint Archive for Sea Level (JASL). Data from an additional 48 stations are now included, bringing the total number of reporting stations to 239, representing contributions from over 50 agencies in over 60 countries. The archive now holds a total of 2650 site-years of hourly, daily, and monthly sea level values. The database now holds data from 137 stations in the Pacific Ocean, 55 stations in the Indian Ocean, and 47 stations in the Atlantic Ocean.

Contact: NODC

CD-ROM Data Products of the National Climatic Data Center

This summary from the NCDC is the first in a series listing CD-ROMs currently available from the NOAA national data centers. They are presented as a sequel to the article on CD-ROM activities at the centers presented in the June 1993 issue of the Earth System Monitor.

• International Station Meteorological Climate Summary (ISMCS), Version 2.0

This CD-ROM, which was released in August 1992, gives detailed climatological summaries for about 980 locations worldwide. These locations include National Weather Service locations, domestic and overseas Navy and Air Force sites, and selected foreign stations. Limited summaries are also given for almost 5000 additional worldwide sites. Tabular or statistical data can be exported to a printer or spreadsheet. Version 2.0 also supports limited mouse capability.

• National Climate Information Disc-Volume 1

This disc contains monthly sequential temperature, precipitation, and drought data for the 334 climate divisions in the contiguous United States. The data can be viewed in a tabular or graphical format and output sent to a printer. The disc covers the period 1895-1989 and contains 1032 time-series graphs, 4180 maps, and 5400 frames of video animation.

• U.S. Navy Marine Climatic Atlas of the World, Version 1.0

This CD-ROM includes analysis and display software for climatological averages of atmospheric and oceanographic data. The data are summarized with user-defined 1° and 5° grid areas covering the global marine environment. The summaries are produced using predominantly ship data collected between 1854-1969.

The major elements include air and sea temperature, dew-point temperature, scalar wind speed, sea level pressure, wave height, and wind and ocean current roses. This CD also allows the user to define element intervals (e.g., 5 to 10 knots, 2°C temperature intervals). The software supports contouring of explicitly user-defined

regions and export of data to a printer or diskette.

• Upper Air Atlas

The Global Upper Air Climatic Atlas is a two-disc set of gridded (2.5-degree) upper air data from the European Center for Medium Range Weather Forecasts covering the 12-year period 1980-1991. Statistics for 15 vertical levels in the Northern and Southern Hemispheres are provided for dry bulb and dew-point temperature, geopotential height, air density, and vector and scalar wind speed. The climatology covers the entire 12-year period as well as individual year-months. Access and display software that includes plotting of vertical profiles and contouring of user-defined areas is also provided.

• CLIVUE CD-ROM

This CD-ROM was originally developed in support of a museum exhibit that travelled across the United States. The CD contains a 1500-station subset of the NCDC's nearly 8000-station U.S. daily cooperative stations. The user selects a date and area of the United States, and the CD-ROM database is queried for stations within the specified domain that have data. The system then displays maximum and minimum temperatures and

precipitation, and snowfall for the sites. Graphs showing data for 7 years, 21 years, and the full period of record (which varies by station) can be shown. Visual displays enable users to view trends, variability, and extremes.

• SAMSON CD-ROM data set

Data from the Solar and Meteorological Surface Observational Network (SAMSON) is available on a set of three CD-ROMs. The three discs cover the eastern, central, and western portions of the United States. They contain hourly solar radiation data along with selected meteorological elements for the period 1961-1990. The data set encompasses 237 National Weather Service stations in the United States as well as Guam and Puerto Rico.

The data set includes both observational and model data. The hourly solar elements are: extraterrestrial horizontal and extraterrestrial direct normal radiation; global, diffuse, and direct normal radiation. Meteorological elements are: total and opaque sky cover, temperature and dew point, relative humidity, pressure, wind direction and speed, visibility, ceiling height, present weather, precipitable water, aerosol optical depth, snow depth, days since last snowfall, and hourly precipitation.

• Radiosonde Data of North America, 1946-1992

This set of four discs contains all available radiosonde data for North America (United States, Canada, Mexico, and Caribbean Islands) through the 100 mb level. Data on the four discs cover the periods 1946-1965, 1966-1979, 1980-1989, and 1990-1992. Data includes significant, mandatory, and special wind levels for all observation times and includes geopotential height, temperature, dew point, and wind direction and speed.

Users can select a single station, multiple stations for a defined time period, or all stations within a specified geographic region. Selected data subsets can be presented in either synoptic or station sort order. Output can be sent to a printer,

Ordering Information

The National Climatic Data Center's Climate Services Branch distributes NCDC CD-ROM data products. For the latest information on availability and pricing, contact the Branch at:

National Climatic Data Center
Climatic Services Branch
NOAA/NESDIS E/CC31
Federal Building
Asheville, NC 28801

Telephone: 704-271-4800
Fax: 704-271-4876
Omnet: NCDC.SERVICE
Internet: orders@ncdc.noaa.gov
tross@ncdc.noaa.gov
nlott@ncdc.noaa.gov

NOAA Central Library, from page 1-

service that includes CD-ROM and online retrieval. The centralized, automated NOAA Library and Information Catalog (NOAALINC) is also available for determining the availability of materials in NOAA libraries throughout the country and from libraries of the Environmental Protection Agency. Information from NOAALINC is available on-site as well as off-site (see box on page 16).

Library staff members are available to answer simple or complex reference questions. Simple questions include determining if an item is available in the library, title or author verification, and referrals. For in-depth information retrieval, the Library provides a computerized literature service, including CD-ROM and on-line retrieval from over 500 databases of environmental and other information.

The collection

The NOAA Central Library collection contains historic (i.e., pre-computer) materials as well as CD-ROMs.

The historic part of the collection incorporates subcollections of the holdings of NOAA's predecessor agencies: Coast and Geodetic Survey, U.S. Weather Bureau, U.S. Fisheries Commission, and Environmental Data Service. The Library contains comprehensive coverage of hydrographic surveying (from 1820), oceanography, weather, meteorology, and hydrology (from 1870), living marine resources (from 1970 with limited coverage from 1870), and meteorological satellite applications (from 1960).

The library subcollections are filed separately, based on their source or individual classification scheme. The Coast and Geodetic Survey (C&GS) subcollection is the oldest, having been started by F.R. Hassler, the first Superintendent of the Coast Survey shortly after the establishment of the Survey in 1807.

Information on weather, meteorology, and hydrology is found in two subcollections obtained from the Weather Bureau. The first or "C" subcollection (named for the identifying "C" classification on each unit) contains descriptions of the earth's climate and weather observations from foreign countries dating from the late 1830s to the mid-

1970s. The second or "M" subcollection is named for the identifying "M" on each unit that replaces meteorology class number 551.5 in the Dewey Decimal system. This subcollection contains proceedings of international meetings and congresses on meteorology and navigation, as well as weather records for foreign countries from the 1850s to the mid-1970s.

The modern and growing subcollection (classified according to Library of Congress classification, except journals which are filed alphabetically) contains information on the topics described in the C and M subcollections, plus other topics such as living resources, marine biology, environmental pollution, estuaries, geophysics, marine geology, ocean engineering, and oceanography. This subcollection encompasses books and technical reports, CD-ROMs, journals, and climatological summaries.

The NOAA Central Library houses archival copies of all NOAA publications. CD-ROMs available at the library were described in an earlier issue of the

— continued on page 16

KEY TO FACILITIES

- 1 Reference Desk
- 2 NOAALINC workstations
- 3 CD-ROM workstations
- 4 Microfilm/fiche readers
- 5 Photocopy machines
- 6 Study carrels
- 7 Meeting rooms
- 8 Women's restrooms
- 9 Men's restrooms

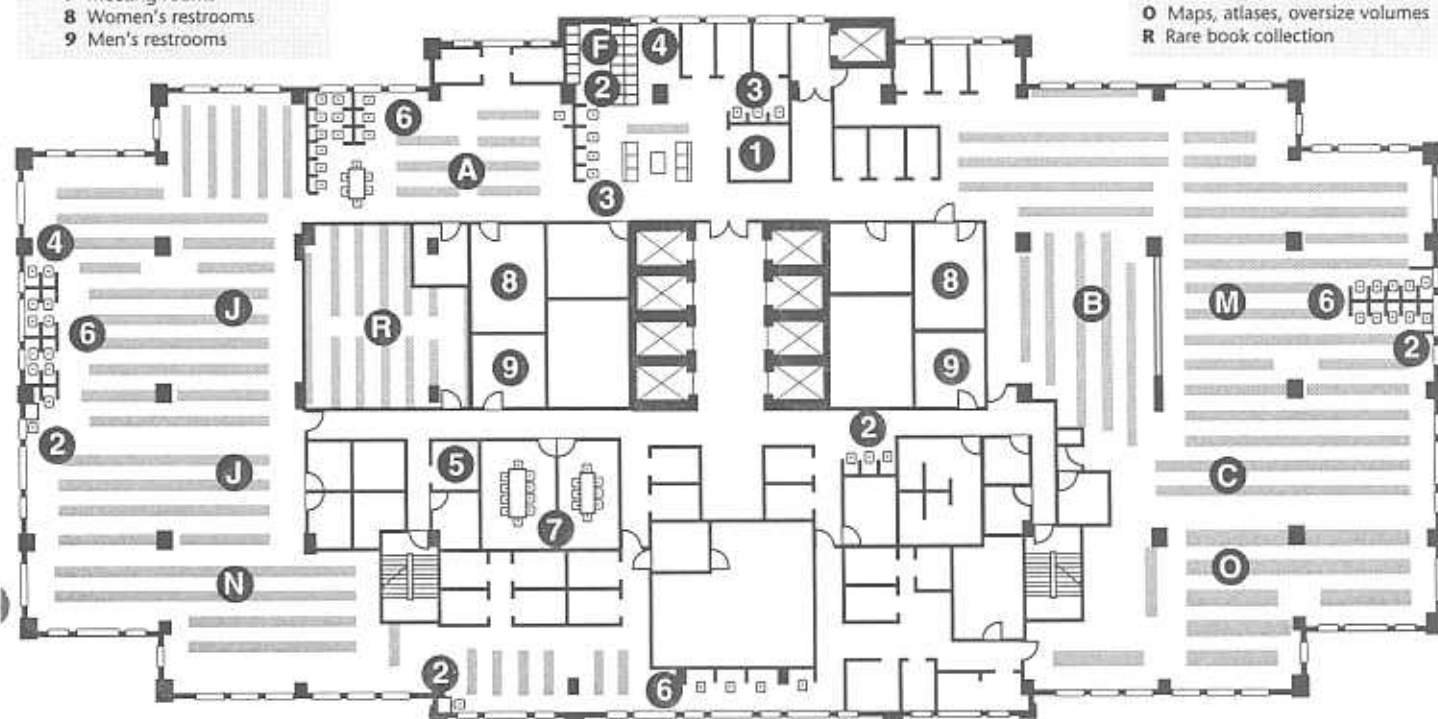
NOAA Central Library

1315 East-West Highway, Second Floor
Silver Spring, MD 20910

Reference Desk: Telephone (301) 713-2600; Fax (301) 713-4599

KEY TO THE COLLECTION

- A Current journals
- B Modern collection
- C Foreign meteorological data
- F Microfilm/microfiche
- J Journals
- M Meteorological collection
- N C&GS collection
- O Maps, atlases, oversize volumes
- R Rare book collection



NOAA Central Library, from page 15

Earth System Monitor (January 1991). At the present time, the NOAA Central Library subscribes to approximately 500 individual journal titles. Climatological summaries for U.S. cities, states, and other geographic areas are also received regularly.

An Open House for the Central Library will be held in October 1993, in conjunction with the Open House for the entire NOAA building complex. Plan to attend the Open House at the NOAA complex in Silver Spring and top off your trip with a visit to the new NOAA Central Library.

To obtain library services, contact the Central Library Main Desk (Telephone 301-713-2600, Fax 301-713-4599, or TDD/TTY 301-713-2779) or a NOAA field library. The new Central Library address is 1315 East-West Highway, 2nd Floor, SSMC3, Silver Spring, MD 20910.

— Elaine Collins

National Oceanographic Data Center
NOAA/NESDIS E/OC4
SSMC3, Second Floor
Silver Spring, MD 20910 ■

NOAA Library and Information Catalog

The NOAA Library and Information Catalog (NOAALINC) is a tool for locating material in NOAA and EPA libraries. You can now access NOAALINC from your PC:

- Settings:
 - Terminal emulation: ANSI.
 - Modem speed as high as it will go up to 9600.
 - 8 bits, 1 stop bit, no parity.
- Direct dial:
 - From the DC area:
301-713-4544.
 - From anywhere else in the US:
1-800-352-7281
- Press <ENTER> at least twice to establish a "handshake." This enables NOAALINC to recognize your call and to determine the speed at which the communication is taking place.
- At the prompt **USER ID**, enter ANSI.
- Follow the instructions on the screen to search NOAALINC.

If you have problems or technical questions, please call Lynda Kuntz at 301-713-2605.

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Publication Distribution Facility
1315 East-West Highway
Silver Spring, MD 20910
ATTN: Earth System Monitor

NCDC CD-ROMs, from page 14

screen, or file. The CD-ROMs also contain available station metadata.

• Global Tropical and Extratropical Cyclone Climatic Atlas (GTECCA)

This single CD-ROM contains historical tropical storm track data for five tropical storm basins. The period of record varies with each basin, beginning as early as the 1870s and extending through 1992. Northern Hemisphere extratropical storm track data are included from 1965 to 1992. Tropical storm track data includes time, position, storm stage (and maximum wind and central pressure, when available). Users can display tracks and track data for any basin or user-specified area. Users can also select storm tracks passing within a user-defined radius of any point. Narratives for all tropical storms for the 1980-1992 period are included, as

well as basin-wide tropical storm climatological statistics.

• Global Daily Data

This CD-ROM provides access to a 10,000 station set of daily maximum/minimum temperature, daily precipitation, and 3-hourly present weather for the period 1977-1991. Data can be selected by geographic area or by a user-defined list of stations for viewing or output to a file. Each data record includes element flags for data suspected of being erroneous. A data inventory contains station name, latitude and longitude, elevation, period of record, and the number of observations. (Available November 1993)

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