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EARTH SYSTEM MONITOR

A guide to NOAA's data and information services

INSIDE

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

New atlas presents global analyses of surface marine data

Joint project between UWM and NODC to aid in global climate research

Christine C. Young[1]
Department of Geosciences
University of Milwaukee - Wisconsin

Arlindo M. da Silva[2]
Goddard Space Flight Center
NASA

Sydney Levitus[3]
National Oceanographic Data Center
NOAA/NESDIS

A recent collaboration between researchers at the Department of Geosciences of the University of Wisconsin—Milwaukee (UWM) and the Ocean Climate Laboratory (OCL) at the National Oceanographic Data Center (NODC) has culminated in the production of objective analyses of observed and derived surface marine parameters. These global analyses are based on individual observations found in the Comprehensive Ocean-Atmosphere Data Set (COADS) Release 1 complemented by an interim release for the 1980's. Results of the analyses are presented in *Atlas of Surface Marine Data 1994*, a five-volume series depicting 45-year seasonal climatologies (1945-1989), anomalies, and standard deviations of various quantities characterizing the surface marine climate (da Silva *et al.*1994a,b,c,d,e). The analyses of monthly climatologies, anomalies and standard deviations are available in a set of 3 CD-ROMs or on exabyte tape. The raw statistics are also available on Exabyte tape for those users desiring to perform their own objective analysis.

Data overview

The analyses presented in *Atlas of Surface Marine Data 1994* are derived from the individual observations found in Compressed Marine Reports—Product 5 (CMR-5) of COADS Release 1 (Slutz *et al.* 1985, Woodruff *et al.* 1987). Observa-

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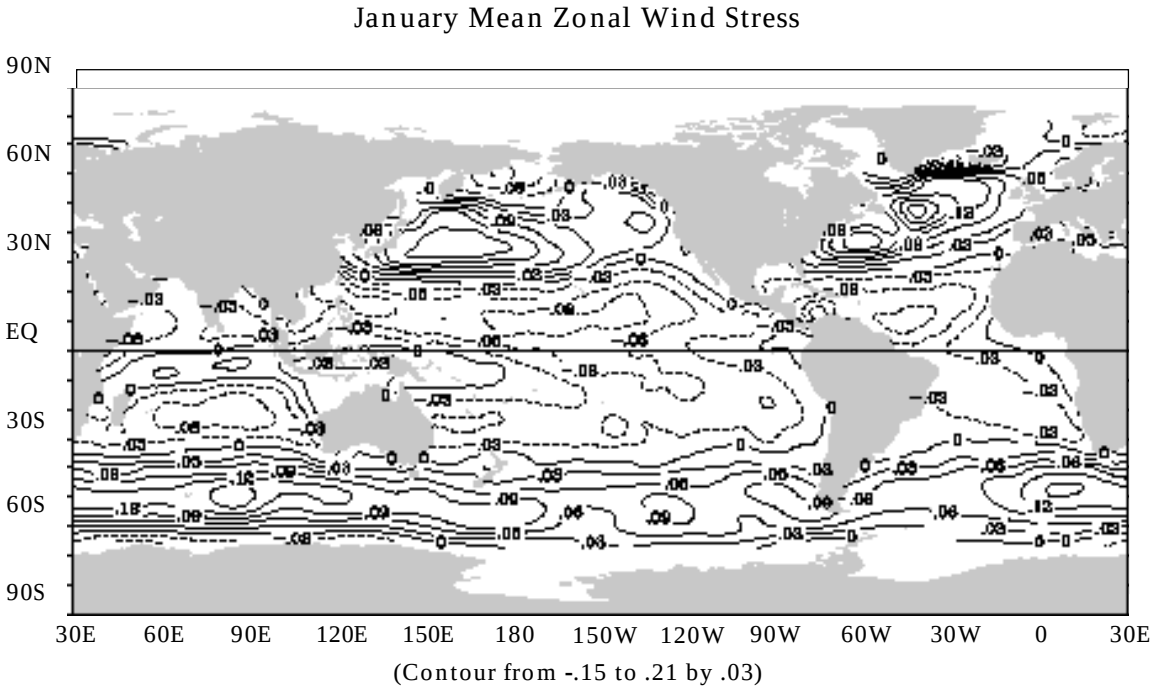

▲ **Figure 1.** January mean zonal wind stress for the years 1945-1989 from the UWM/COADS data set. Zonal stress is not shown in regions covered by climatological sea ice. Contour interval is 0.03 W/m. When calculating wind stress, wind speed estimates based on sea-state are first corrected using the UWM Beaufort Equivalent Scale, then all wind speeds are adjusted to 10 m using Monin-Obukhov similarity theory including stability effects. Transfer coefficients are dependent on stability and wind speed according to Large and Pond (1981, 1982).

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tions included in COADS/CMR-5 consist of reports of wind, air and sea surface temperature, sea level pressure, humidity, and present weather made primarily by ships of the Voluntary Observing Fleet. Observations included in this historical collection have also been taken by various military ships, ocean weather ships, light ships, research vessels, buoys, and bathythermographs. In addition to the observations, COADS/CMR-5 provides metadata such as quality control flags and measurement type indicators. Although COADS/CMR-5 includes observations as far back as 1854, the analyses in *Atlas of Surface Marine Data 1994* cover only the years 1945 through 1989.

The joint project between UWM and OCL (known also as the UWM/COADS project) is an effort to improve and expand the standard COADS statistics. The first improvement is an attempt to reduce known biases in the ship reports in addition to the quality control provided in COADS/CMR-5. In the UWM/COADS project, bias corrections have been applied to individual observations of cloudiness, present weather and Beaufort-estimated winds.

In order to account for biases in wind speed estimates based on sea-state, a new Beaufort equivalent scale was developed. The other bias corrections are the interpretation of certain missing present weather observations as clear weather, trimming cloudiness observations taken in low light conditions, and interpreting certain sky obscured cloudiness observations as 100% cloud cover.

A second improvement is higher resolution. The COADS/MST are on a 2^o x 2^o grid while the UWM/COADS raw statistics have been calculated on a 1^o x 1^o grid identical to that used by Levitus (1982), Conkright *et al.* (1994) and Levitus *et al.* (1994a,b, c). In addition to the raw statistics, UWM/COADS includes objectively analyzed fields, where a successive correction analysis has been applied to interpolate values to missing boxes and remove small-scale, noisy features (similar objective analysis of COADS/MST has been performed at NOAA's Geophysical Fluid Dynamics Laboratory.) This analysis is essentially the same as that used by Conkright *et al.* (1994) and Levitus *et al.* (1994a,b,c).

The UWM/COADS data set also extends the COADS/MST by providing a complete set of heat (sensible, latent, radiational), momentum, and fresh water (evaporation, precipitation, buoyancy) fluxes. These fluxes have been estimated using wind-speed dependent transfer coefficients and stability effects (Large and Pond 1981, 1982), unlike the pseudo fluxes found in the COADS/MST where transfer coefficients have been omitted. Precipitation estimates are based on Present Weather reports using the algorithm of Tucker (1961) with a variant of Dorman and Bourke's (1978) corrections.

By calculating a complete array of atmospheric forcing parameters, and by using the same grid and analysis scheme as in Conkright *et al.* (1994) and Levitus *et al.* (1994a,b,c), the UWM/COADS data set is intended to be used as a complement to the surface and subsurface marine analyses found in Conkright *et al.* (1994) and Levitus *et al.* (1994a,b,c).

Organization

The multi-volume *Atlas of Surface Marine Data 1994* (da Silva *et al.* 1994a,b,c, d,e) is organized into two main categories. The first category, in-depth documentation of the data set, is found in Volume 1. Besides describing all parameterizations, calculations, and analysis methods used in creating the data set, this volume discusses possible biases the COADS data may contain and explains the bias corrections employed. Other subjects discussed in Volume 1 are the constraining of heat and fresh water fluxes by oceanographic transport

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1 *Department of Geosciences*
University of Wisconsin - Milwaukee
P.O. Box 413
Milwaukee, WI 53201
E-mail: ccy@climate.geo.uwm.edu

2 *Data Assimilation Office*
NASA Goddard Space Flight Center
Greenbelt, MD 20771
E-mail: dasilva@hera.gsfc.nasa.gov

3 *Ocean Climate Laboratory*
NOAA/NESDIS/NODC
SSMC3, 4th Floor
1315 East-West Highway
Silver Spring, MD 20910-3282
E-mail: slevitus@nodc.noaa.gov

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The mailing address for the *Earth System Monitor* is:

National Oceanographic Data Center
NOAA/NESDIS E/OC21
SSMC3, 4th Floor
1315 East-West Highway
Silver Spring, MD 20910-3282

EDITOR
Sheri Phillips
Telephone: 202-606-4561
Fax: 202-606-4586
E-mail: sphillips@nodc.noaa.gov

ASSOCIATE EDITOR
Nancy O'Donnell
Telephone: 202-606-4561
Fax: 202-606-4586
E-mail: nodonnell@nodc.noaa.gov

U.S. DEPARTMENT OF COMMERCE
Ronald H. Brown, Secretary

National Oceanic and Atmospheric Administration
D. James Baker,
Under Secretary and Administrator

News briefs

NODC initiates use of new mailing address in preparation for move

As part of NOAA's consolidation effort, the National Oceanographic Data Center (NODC) is scheduled to relocate in January 1996 from its current location at the Universal Building in Washington D.C. to the NOAA complex in Silver Spring, MD. In order to expedite mail delivery during this transition, people desiring to contact the NODC or send materials are requested to use NODC's new address:

National Oceanographic Data Center
NOAA/NESDIS E/OC
SSMC3, 4th Floor
1315 East-West Highway
Silver Spring, MD 20910-3282

NODC mail deliveries to the Universal Building are being routed through the NOAA complex, so that NODC may continue to provide users with high-quality products and services with a minimum of disruption through the relocation period.

Prototype integrated coastal management CD-ROM debuts at United Nations Conference

A prototype interactive multi-media CD-ROM on integrated coastal management, which was developed by the National Ocean Service's Office of Ocean Resources Conservation and Assessment (NOS/ORCA), debuted in October 1995 at a week-long United Nations Environment Programme (UNEP) conference on protecting the marine environment from land-based activities. The conference, held at the U.S. State Department and attended by 300 delegates from over 100 countries, was convened to negotiate a nonbinding global agreement to help prevent, reduce, and eliminate land-based sources of marine degredation.

The CD-ROM, the second developed this year by ORCA focusing on coastal issues, was introduced at an environmental management and technology forum co-sponsored by NOAA, the State Department, and the U.S. EPA. It was designed to test the use of multimedia techniques to enhance the presentation of concepts and tools of integrated coastal management (ICM) to an international audience. Over 400 copies of the CD-ROM were distributed at the conference.

Entitled "Analysis and Planning for Integrated Coastal Management ," the CD contains still imagery, video, and audio to present a framework for ICM; explains management concepts, processes, and methods; and presents specific case studies where these concepts have been employed. Much of the conceptual and case study description is presented by international coastal planners and managers from countries including the United States, Japan, Ecuador, and Tanzania. In addition, a sample reference list is included, along with an electronic questionnaire on ease of use, depth and accuracy of content, and appropriateness of examples. Responses to the questionnaires will enable ORCA to evaluate both the content and potential uses of the final CD.

Complimentary copies of this new interactive product may be obtained by contacting NOAA/NOS, Office of Ocean Resources Conservation and Assessment (N/ORCA1), 1305 East-West Highway, 9th Floor, Silver Spring, MD 20910; Phone: 301-713-3000, ext. 114.

NOAA honors employees as part of its 25th anniversary celebration

As part of NOAA's 25th Anniversary Celebration to honor 25 years of science and service to the nation, Dr. D. James Baker, Under Secretary for Oceans and Atmosphere, held two ceremonies to recognize NOAA employees who have been with the agency since its inception on November 1, 1970. Dr. Baker and other NOAA leadership were present at both ceremonies.

One ceremony was held at the NOAA complex in Silver Spring, MD, and was highlighted by a featured address from Dr. Robert White, the original administrator of NOAA. A second ceremony was held in Suitland, MD, with additional commentary from NOAA officials. Both ceremonies were followed by a reception.

NCDC participates in All World Data Center Conference

Representing the World Data Center-A for Meteorology, Pete Steuer of the National Climatic Data Center (NCDC) attended the All World Data Center Conference held at Wageningen, Netherlands in October. This was the first gathering of all 37 World Data Centers (WDC). The WDC system consists of representatives from ten countries including the United States, China, Russia, Japan, and several European countries.

The general goals of the meeting were to develop cohesion in the WDC system, learn about successes and challenges in each WDC, and discuss the future of the WDC system. Also, a major discussion item of the conference was the International Council of the Scientific Unions' recent review of the WDC system.

Overall, the conference was a success. A new WDC Guide was drafted, which addresses many of the conference goals. In addition, significant progress was achieved in developing World Wide Web access to all WDC's Home Pages.

Human Dimensions in the Arctic System (HARC) meeting held

Arctic System Science (ARCSS) Data Manager David Mcginnis and Coordinator Matt Cross of the National Snow and Ice Data Center (NSIDC) attended the first meeting of the Human Dimensions in the Arctic System (HARC) in Tuscon, Arizona in October. The primary purpose of the meeting was to begin developing the science plan for the HARC initiative. Meeting participants ranged from anthropologists to climatologists to wildlife researchers. Representatives from the other ARCSS programs were also present as the group worked to define a science plan. The National Science Foundation (NSF) Social Science Program Manager and several representatives from the Alaska Native Science Council also attended. A Steering Committee chosen from meeting participants will take the meeting results and develop the final science plan, which will be delivered to the ARCSS Program Management office at NSF.

Staff changes at NGDC

Dr. Michael S. Loughridge, Chief of the National Geophysical Data Center's (NGDC) Marine Geology and Geophysics Division (MGG), has been appointed as Acting Director of the NGDC. The MGG Division has a new interim management. Dr. Troy R. Holcombe, who served as Senior Scientist in the MGG Division, has been appointed Acting Chief of the division, and Carla J. Moore was also appointed as Acting Assistant Chief. Ms. Moore is the leader of MGG's Marine Geology Program and online data access initiatives, and is a recipient of NOAA's Bronze Medal and the DOC Silver Medal.

▲ **Table 1.** Quantities available in the surface marine atlases and CD-ROMs.

Directly observed quantities

Filename	Units	Description	Volume	CD-ROM	Raw
cloud.nc	%/100.	fractional cloudiness	2	1	A
q.nc	g/kg	specific humidity	2	1	A
sat.nc	C	sea level air temperature	2	1	A
slp.nc	hPa	sea level air pressure	2	1	A
sst.nc	C	sea surface temperature	2	1	A
u3.nc	m/s	zonal wind	2	1	A
v3.nc	m/s	meridional wind	2	1	A
w3.nc	m/s	wind speed	2	3	A

Heat and momentum flux quantities

Filename	Units	Description	Volume	CD-ROM	Raw
ac.nc	W/m^2	short wave cloudiness sensitivity parameter	N/A	2	N/A
achi.nc	W/m^2	long wave Chi sensitivity parameter	N/A	2	A
ae.nc	hPa	long wave vapor pressure sensitivity parameter	N/A	2	A
fvcubed.nc	m^3/s^3	ocean friction velocity cubed	3	3	A
latent3.nc	W/m^2	latent heat flux	3	2	A
longrad.nc	W/m^2	net long wave radiation	3	2	A
netheat.nc	W/m^2	constrained net heat flux	3	2	N/A
sensib3.nc	W/m^2	sensible heat flux	3	2	A
shortrad.nc	W/m^2	net short wave radiation	3	2	N/A
taux3.nc	N/m^2	zonal wind stress	3	2	A
tauy3.nc	N/m^2	meridional stress	3	2	A

Fresh water flux quantities

Filename	Units	Description	Volume	CD-ROM	Raw
buoyancy.nc	kg/(ms3)	constrained buoyancy flux minus precipitation	4	2	N/A
eminusp.nc	mm/(3 hr)	constrained evaporation minus precipitation	4	3	N/A
evaprate.nc	mm/(3 hr)	evaporation rate	4	2	A
precip.nc	mm/(3 hr)	precipitation rate	4	2	A
uq.n	m/s	zonal moisture flux	4	3	A
vq.n	m/s	meridional moisture flux	4	3	A

Miscellaneous Derived Quantities

File Name	Units	Description	Volume	CD-ROM	Raw
airdens.nc	kg/m	sea level air density	N/A	3	A
qs_qa.nc	g/kg	qsea minus q	5	3	A
qsea.nc	g/kg	sea level saturation specific humidity	5	3	A
rh.nc	%	relative humidity	5	3	A
sst_sat.nc	C	sea minus air temperature	5	3	A
ua.ncK	K m/s	zonal heat flux	5	N/A*	A
va.ncK	K m/s	meridional heat flux	5	N/A*	A
vappress.nc	hPa	vapor pressure	5	3	A
virtemp.nc	C	virtual temperature	N/A	3	A
zdl.nc	—	10m/Monin Obukhov length	5	3	A

Additional quantities

Filename	Units	Description	Volume	CD-ROM	Raw
icemask.nc	(none)	ice masks (Alexander and Mobley 1976)	N/A	1,2,3	N/A
salinity.nc	p.s.u.	monthly salinity (Levitus *et al.*, 1994b)	N/A	2	N/A

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estimates, sampling and fair weather biases, surface layer formulation, equations for astronomical calculations (e.g., altitude of the sun), and netCDF data access software.

The second main category is the graphical representation of the data set. Volumes 2 through 5 consist mainly of seasonal contour plots of climatology, standard deviation, and anomalies of the analyzed quantities. The quantities are organized according to parameter type. Volume 2 contains directly observed quantities and Volume 3 contains heat and momentum fluxes. Fresh water fluxes can be found in Volume 4, and Volume 5 has an assortment of miscellaneous derived quantities.

The data files associated with *Atlas of Surface Marine Data 1994* are available in both their analyzed and unanalyzed forms on CD-ROM and Exabyte tape. The majority of the analyzed quantities are contained in a set of three CD-ROMs, organized by parameter type. Disc 1 contains directly observed quantities (and number of observation files). Disc 2 contains heat, momentum, and fresh water fluxes. Disc 3 contains the remaining miscellaneous parameters.

On the CD-ROMs or magnetic tape, the 12 analyzed monthly climatologies (1945-1989) and the 540 analyzed monthly anomalies (12 months x 45 years) are stored in a single binary file for each quantity using Unidata's Network Common Data Format (netCDF). NetCDF allows access to binary files from most computer platforms, using a single set of FORTRAN or C subroutines. Easy-to-use FORTRAN access software is provided for those unfamiliar with netCDF. Number of observations per 1-by 1-degree square are stored similarly. Standard deviation fields are stored in smaller files (12 monthly fields per file) also using netCDF. Each anomaly or number of observations file is approximately 46 megabytes. The standard deviation files are a little more than 1 megabyte in size.

Unanalyzed data for each parameter is stored using netCDF as well, with separate files for each year. An unanalyzed file contains the 12 monthly fields of mean, standard deviation, and number of observations for a single year. Information is stored for only those squares containing 1 or more observa-

tions during that month. While the size of these yearly files varies greatly, the total byte count for each parameter is around 150 megabytes. At this time, the unanalyzed data is available only on Exabyte tape. A CD-ROM set is under consideration.

Products available

The quantities available in the atlases and CD-ROMs are listed in Table 1. The column "Volume" indicates which volume of the atlas contains maps of the quantity. The column "CD-ROM" indicates which CD-ROM disc contains climatology, anomaly, and standard deviation of the analyzed quantity. In the column "Raw", the abbreviation "A" indicates that unanalyzed statistics of the quantity are available. In each column, the abbreviation "N/A" indicates the variable is not available in that form. "N/A*" denotes analyzed files which are not included in the 3 CD-ROM set, but are available on Exabyte tape on request from NODC.

Ordering information

Ordering information for one or more volumes of the *Atlas of Surface Marine Data 1994* or the corresponding data set (Table 2) is available via the Internet on the NODC World Wide Web site (URL *http://www.nodc.noaa.gov/*) or from:

National Oceanographic Data Center
User Services
NOAA/NESDIS E/OC21
SSMC3, 4th Floor
1315 East-West Highway
Silver Spring, MD 20910-3282
Phone: 202-606-4549
Fax: 202-606-4586
e-mail: *services@nodc.noaa.gov*

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▲ **Table 2.** *Atlas of Surface Marine Data 1994* publications and corresponding data sets available on CD-ROM. Analyzed files which are not included on the CD-ROMs can be acquired from the NODC on Exabyte tape.

Publications

- *Atlas of Surface Marine Data 1994, Volume 1: Algorithms and Procedures* (83 pp.)
- *Atlas of Surface Marine Data 1994, Volume 2: Anomalies of Directly Observed Quantities* (416 pp.)
- *Atlas of Surface Marine Data 1994, Volume 3: Anomalies of Heat and Momentum Fluxes* (413 pp.)
- *Atlas of Surface Marine Data 1994, Volume 4: Anomalies of Fresh Water Fluxes* (308 pp.)
- *Atlas of Surface Marine Data 1994, Volume 5: Anomalies of Miscellaneous Derived Quantities* (416 pp.)

CD-ROMs

- Atlas of Surface Marine Data 1994: Directly observed quantities and number of observations (Disc 1)
- Atlas of Surface Marine Data 1994: Heat, momentum, and fresh water fluxes (Disc 2)
- Atlas of Surface Marine Data 1994: Miscellaneous derived quantities (Disc 3)

Solar databases for global change models

NGDC compiles comprehensive solar database for use in global climate change studies

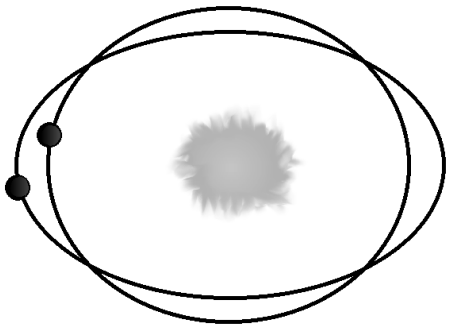
Helen E. Coffey, Edward H. Erwin, and Christine D. Hanchett
National Geophysical Data Center
NOAA/NESDIS

The National Geophysical Data Center (NGDC) is compiling a comprehensive solar database for use in global change models. Solar radiation drives the Earth's weather machine, and variations in the Sun's radiative output impact the Earth's climate. Global change models need to discern between variations caused by anthropogenic and natural occurrences in order to provide a sound scientific basis for policy-making on global change issues. The NGDC data archives are part of a cross-disciplinary effort within NOAA to link observed changes on the Sun with terrestrial climate.

With the advent of total solar irradiance satellite measurements since 1978, it is now documented that the amount of energy from the Sun varies over decadal time scales. The Sun supplies the energy for the Earth's system heat budget. The major components that affect this heat budget are changes in the Earth's orbit, internal processes (such as cloudiness, ice cover, anthropogenic effects, etc.), and variations in solar activity. Because the Earth's climate is changing, it is critical to understand the contributions of each component and take action when necessary to curb possible negative effects we might have control over. A good example of this kind of action is the worldwide effort to reduce the amount of chlorofluorocarbons (CFCs) emitted by man. Climate variability is a major issue and our understanding is still uncertain.

Changes in the Earth's orbit

The largest effect on the amount of solar radiation reaching Earth is due to orbital changes in the Sun-Earth system. The Yugoslav mathematician Milutin Milankovitch studied the orbital parameters that cause seasonal variations on Earth. He calculated insolation curves for different latitudes. (These data were kindly supplied by Dr. A. Berger, Catholic University of Louvain; see Berger *et al.*, 1991, for more details.) The degree of eccentricity changes the relative Sun-Earth distance on a 100,000 year cycle (Figure 1).



▲ **Figure 1.** The Sun-Earth distance changes because the Earth's orbit is not quite circular (eccentricity). Eccenctricity affects the amount of solar radiation reaching the Earth.

The Earth is in an orbit around the Sun that is not quite circular because of the interactions with orbits and gravitational pull of other planets. The Earth's axis tilts (obliquity) between 21.5 and 24.5 degrees with respect to the orbital plane (Figure 2A). It has a cycle of 41,000 years. Like a spinning top, the Earth precesses around a circular path (Figure 2B) in a 19,000 to 21,000 year cycle. Combining these effects, one can calculate when ice ages and warm intervals will tend to occur.

The data show that at times of ice ages, 60°N would receive as little insolation as 80°N today. As noted by Thomson (1995), a lot of other smaller effects contribute to the overall total amount of radiation that the Earth receives, and the picture is very complex.

Complexities of internal processes

The complicated internal processes that couple the atmosphere, the oceans, and terrestrial ecosystems are not well understood. NOAA scientists recently found that clouds absorb more of the Sun's radiation than previously believed — 15% versus the 4% currently accepted theories predict. Thus, less solar radiation reaches the Earth's surface in cloudy areas (39% versus 50% traditionally assumed) (Cess *et al.*, 1995). Other NOAA scientists recently found a significant increase in the levels of water vapor in the atmosphere from 1981-1994, which could lead to global warming and a greater ozone loss (Oltman *et. al*, 1995). A 1% drop in ozone levels causes a 2% increase in skin cancer.

Stone (1995) suggests the effects of global climate warming could contribute to deaths due to a rising incidence of summer heat waves. Just a 2-degree Celsius increase would double the number of unusually hot days. Also, infectious diseases could contribute tens of millions of more cases as mosquitoes and other pests expand their ranges.

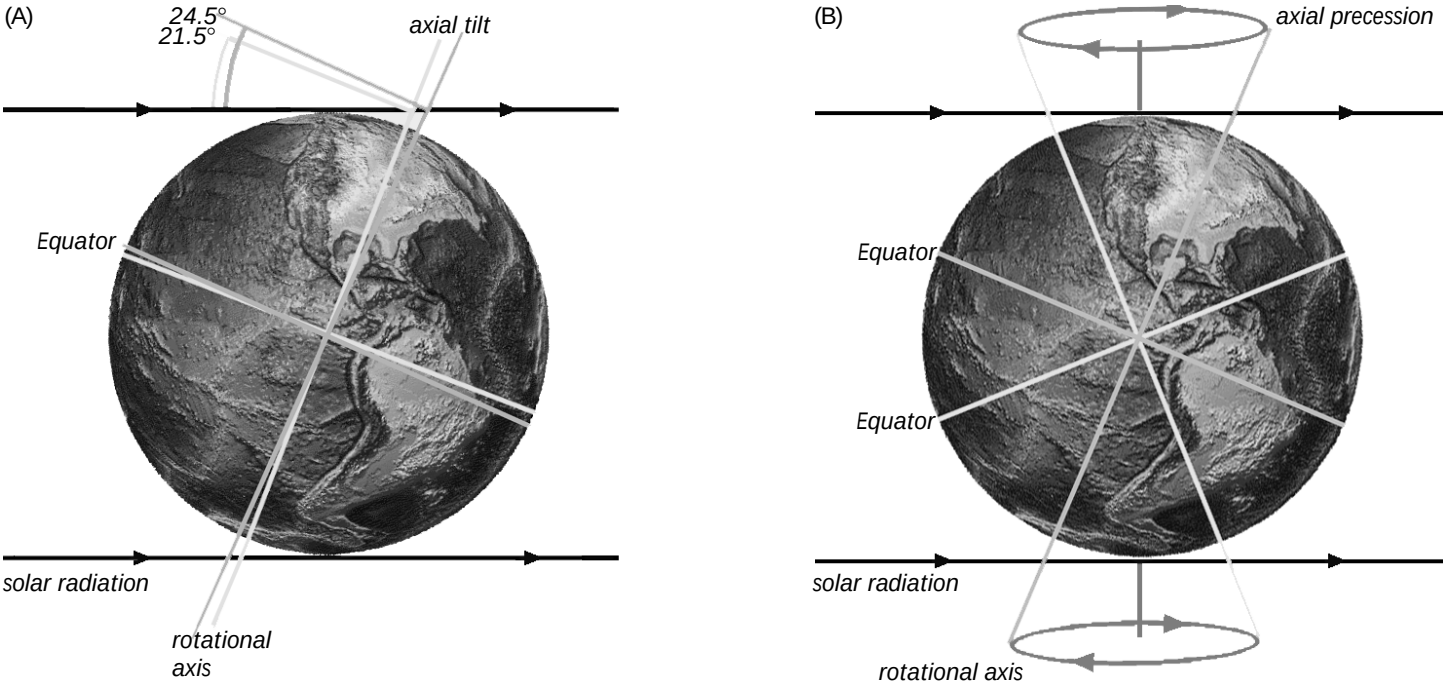
Taubes (1995) points to a 2-degree Celsius warming since the 1880s that affected forests across Canada, Alaska and Siberia. Though initially speeding growth and driving the forests farther into the Arctic at least in the 1930s and 1940s, since the 1970s the trees are showing stress. The stress is probably the result of increased moisture loss, which leaves the trees open to more frequent attacks from insects that have proliferated in the warm weather.

There are many uncertainties in our understanding of the internal processes. It is to the benefit of mankind to study the Sun-climate system and to understand the consequences of our impact on this system.

Variations in solar activity

NOAA's plan for the U.S. Global Change Research Program has a strong focus on solar influences. The solar influences research plan, Atmospheric Responses to a Changing Sun (ARCS) studies solar inputs at the top of the Earth's atmosphere and their effects on the Earth's system, whether immediate, secondary or tertiary. This block diagram (Figure 3) excerpted from the

Solar-Terrestrial Physics Division
National Geophysical Data Center
NOAA/NESDIS
325 Broadway
Boulder, CO 80303
E-mail: info@ngdc.noaa.gov



▲ **Figure 2.** In addition to eccentricity, the amount of solar radiation reaching the Earth is also affected by the tilt of the Earth's axis (A) and axial precession of the Earth as it rotates (B).

NOAA Climate and Global Change Special Report No. 8 (1994) indicates the different levels of effects.

The top row lists the solar influences at the top of the Earth's atmosphere. The group of black blocks lists known immediate effects of solar radiation and its variations. These effects have not been fully quantified. The blocks in dark gray list possible secondary and tertiary effects. These effects have not been investigated in any depth. The ARCS program will address these issues.

Several investigations have shown positive correlations of solar influences on climate change. The hydrological system is a major player in the weather system because 70% of the Earth's surface is covered by water. Dr. George Reid, senior NOAA scientist, examined the sea surface temperature record for the last 130 years and found an interesting correlation with the 11-year running mean sunspot number (Reid, 1987, 1991).

Though not identical, the two time series have several features in common, including a prominent minimum during the early 1900s, a steep rise to maximum in the 1950s, a drop in the 1960s and early 1970s, and then a rise that continues to date. Sea surface temperature data are from the British Meteorological Office, Hadley Centre for Climate Prediction and Research. An updated improved version of these data will be provided soon and will reside in our FTP anonymous account under the GLOBAL_CHANGE subdirectory.

Drs. Eigil Friis-Christensen and K. Lassen, Danish Meteorological Institute, studied the length of the solar cycle as an indicator of solar activity closely associated with climate change

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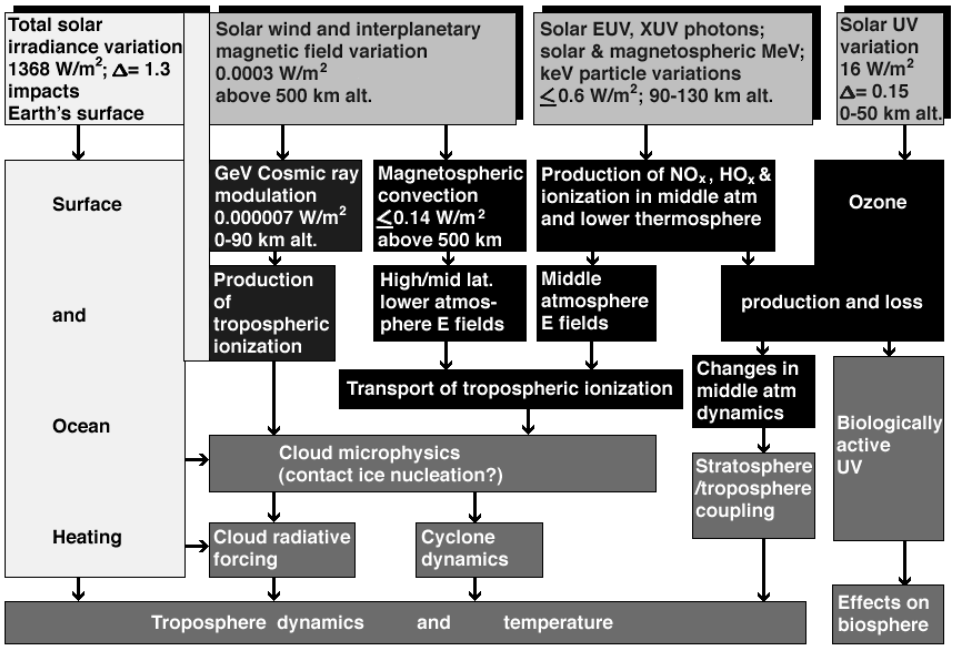
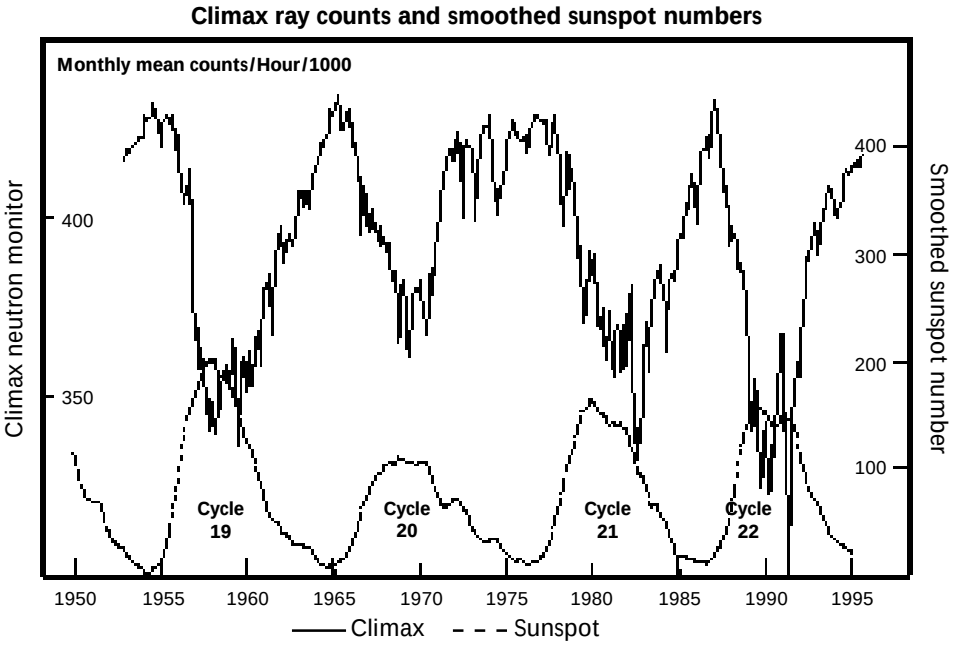


▲ **Figure 3.** Block diagram indicating the different effects of solar radiation on the Earth's atmosphere. The top row lists the solar influences at the top of the atmosphere, giving the amount of energy and its change over a solar cycle. The black boxes list known immediate effects of the radiation (these are not yet fully quantified.) The bottom dark gray boxes list possible secondary and tertiary effects.



▲ **Figure 4.** The solid line is a plot of the monthly averages of the cosmic ray neutron monitor data (1953-1995) from the Climax, CO site operated by the University of Chicago. It shows the inverse solar cycle of cosmic rays—the Sun's magnetic field shields the Earth from cosmic rays during the sunspot maximum, when the field is stronger. The monthly sunspot numbers are plotted with a dashed line.

Solar databases, *from page 7*

(Friis-Christensen *et al.*, 1991). They used the Northern Hemisphere land air temperature during the past 130 years and found a good correlation with the length of the solar cycle. While the temperature data do show the enhanced greenhouse effect due to increased CO_2 in the atmosphere, it also shows a departure from this trend from 1940 to 1970. This occurs simultaneously with a decrease in solar activity as seen in the solar cycle length database.

Thompson (1995) recently ran extensive statistical tests on this database and raises questions about the interpretation, though S. Manabe counters these questions with the fact that we really do not understand how the atmosphere responds to changes in internal processes. The Northern Hemisphere land air temperature data were compiled by Jones *et al.*, 1986, and are based on a large systematic set of temperature measurements. These data will also be put in the GLOBAL_CHANGE subdirectory.

El Niño-Southern Oscillation is a regional variation that has a major influence on global circulation. When solar activity is high, strong El Niños occur farther apart than when it's low. The North Atlantic winter 700 mb wind circulation pattern for data from 1950-1987 correlates with the 11-year solar cycle. The correlation appears only when observations during the west phase of the quasibiennial oscillation (QBO) of equatorial stratospheric winds were used. A similar correlation using geopotential height (30 mb height in summer) suggests that atmospheric dynamics play a major role in the response to the 11-year solar cycle (Labitzke *et al.*,1993).

NGDC solar and related databases

NGDC has collected and distributed a number of historical solar-terrestrial physics databases over the years. Many of these are made available through the monthly publication *Solar-Geophysical Data* (*SGD*). The *SGD* monthly data processing has contributed to a number of databases being stored in digital form. Many data are made available on diskettes and CD-ROMs, as well as online through the Internet. All of these give an indication of historical activity on the Sun.

Over 100 Mbytes of solar and related databases now reside on the NGDC Geophysical On-Line Data (GOLD) FTP anonymous system. The URL address is: *http:/www.ngdc.noaa.gov*. To access FTP anonymous directly, FTP to *ftp.ngdc. noaa.gov* with your e-mail address as the password, cd to STP, then cd SOLAR_DATA. Long-term databases online include:

- SUNSPOT_NUMBERS — yearly averages 1700-1994; monthly data 1749-1995; daily values 1818-1995. These data were originally compiled by Waldmeier and updated by McKinnon (1985);
- GREENWICH — Greenwich sunspot region data 1874-1979 are found under SUNSPOT_REGIONS; summary daily data as well as individual region data. These data were made available by Doug Hoyt and Jack Eddy;
- CORONA subdirectory contains the Lomnicky Stit coronal index 1939-1991 as well as their actual database of daily coronal observations (supplied by V. Rusin and M. Rybansky). The HOLES subdirectory contains the A. Sanchez-Ibarra *et al.* (1992) compilation of coronal hole positions 1970-1991. The SYNOPTIC_MAPS subdirectory contains the Pat McIntosh *et al.* (1991) compilation of H-alpha synoptic charts 1966-1987 that show the evolution of large scale magnetic fields and coronal holes.
- Under COSMIC_RAYS are the monthly averages from about 1953 to the present from five worldwide stations: Climax (Figure 4), Huancayo, Moscow, Deep River, and Calgary. Daily tables for 8 stations are given for 1993 to present.
- Under SECTOR_BOUNDARIES are found Svalgaard's solar sector boundary crossings for the period 1947-1978. Inferred interplanetary magnetic field Away and Toward the Sun data from the individual stations Vostok (1971-1993) and Thule (1979-1981) are also included, along with polarity files 1957-1989 from A. Zaitsev, IZMIRAN.
- Under RELATED_INDICES are the aa index 1868-1995 monthly and yearly means as well as 3-hourly values. aa values provide a measure of the global level of magnetic activity. Also included are the KnKsKm (1983-1995) and amanas (1981-1993) 3-hourly data.
- Another index, the Polar Cap (PC) index, is found here. PC index is a 15-minute index for magnetic activity in the Polar Cap generated by solar wind parameters such as the southward component of the IMF (Bz), the azimuthal component of the IMF (By) and the solar wind velocity v. The PC-index is

based on an idea by Dr. Troshichev and developed by him and others (see Vennerstrom *et al.*, 1994). Files include data from Vostok (1978-1979 and 1983-1992) and Thule (1975-1995).

• Under SUDDEN_COMMENCEMENTS are the geomagnetic sudden storm commencements 1868-1975 by Fr. Mayaud (*IAGA Bulletin 32*) and continuing to the present preliminary data issued by the *ISGI Bulletin*, Debilt Netherlands (1983-1987) and now issued monthly by Fr. Cardus, Ebro Magnetic Observatory and the Institut de Physique du Globe, Paris.

• Under ATM_HANDBOOK is the *Atmospheric Handbook* compiled by Dr. Vern Derr, NOAA ERL (1984). The data are largely from results published in journals. The descriptive text is in digital form along with over 200 data files.

Data include attenuation coefficients for the atmosphere and H_2O, atmospheric parameters for 1962 standard atmosphere, cloud drop size distributions, solar spectral irradiance, sky spectral irradiance, etc. Several FORTRAN programs exist for retrieving select data.

• STRATWARMS lists all the stratospheric warmings issued for 1987-1995 by the Frei University of Berlin. A STRATWARM is a major disturbance of the winter polar middle atmosphere (troposphere to D-region) resulting from a breakdown of the polar vortex into two cells. Air trapped in the vortex is mixed by the new meridional flow and can be exposed to sunlight. Solar Lyman alpha ionizes the nitric oxide, enhancing electron density and producing strong HF absorption.

• The total SOLAR_IRRADIANCE data cover the satellite observing time period 1978 to present and include data from Nimbus, SMM, NOAA, ERBS and UARS. Earlier proxy data on-line include the Greenwich sunspot area database (1876 to present) for sunspot blocking data and McMath Calcium II K-line plage data (1942-1987) for brightness data (see CALCIUM). Most of these Calcium data were reduced by Dr. Helen Dodson Prince. A digital database of calcium plage imagery from Mt. Wilson will soon be available from Dr. Peter Foukal.

• On-line SOLAR_UV databases include SME (1982-1988), SERF3, UARS SOLSTICE (HI Lyman alpha, Mg core-to-wing ratio, Ca core-to-wing ration, and 200-205 nm integrated flux — Oct 91-Sep 94), Nimbus-7 (1978-1984) and NOAA9 (1986-1988). Solar UV interacts significantly with the ozone layer — a 1% drop in ozone levels can cause a 2% increase in skin cancer. Solar UV may be 50% of the variation of the total solar irradiance. Proxy data for UV include the Penticton solar radio flux at 2800 MHz (10.7 cm). We have on-line data from 1947 to the present.

• Event data, like solar flares (FINAL_FLARE) and SOLAR_RADIO BURST and PARTICLES data can be found as well as background data, such as the CALCIUM plage daily values, the GOES SAT_ENVIRONMENT ELECTRONS and X-RAY background database, sunspot regions (SUNSPOT_REGIONS) and Stanford Sun-as-a-Star data (STANFORD_DATA).

• In addition to the solar INSOLATION database, the NGDC Paleoclimate group has tree ring data (International Tree-ring Data Bank 6000 B.C. to 1991 A.D.) on-line, along with radio carbon (C14) data (10,000-2,000 ybp). They also hold other relevant databases.

NGDC holds archives of GOES, NOAA/TIROS and DMSP satellite environment data. Some of these data are available on-line and accessible through the GOLD on-line system. CD-ROMs of the data are also available. Extensive cosmic ray archives (hourly values from more than 100 stations) are available on CD-ROM.

We refer the reader to the NOAA Climate and Global Change Program Special Report No. 8, *Solar Influences on Global Change — A Strategic plan for a NOAA Program* (available on request) for an in-depth article by Dr. Brian Tinsley entitled "Review of Correlations, Processes, and Future Research." Tinsley reviews recent work in the field, including criticisms, and addresses topics for further research. The comprehensive NRC report, *Solar Influences on Global Change*, is also a valuable tool for addressing future research.

Acknowledgments

Inspiration for this work came from the book *Climate — our future?* by Ulrich Schotterer that uses artistic imagery and sophisticated scientific text to present a global analysis of the issues and processes affecting climate change. We are also indebted to the recent National Research Council report, *Solar Influences on Global Change*, for an in-depth overall study of the effects of solar variations on our climate. Dr. Peter Sloss, NGDC, provided the planet Earth

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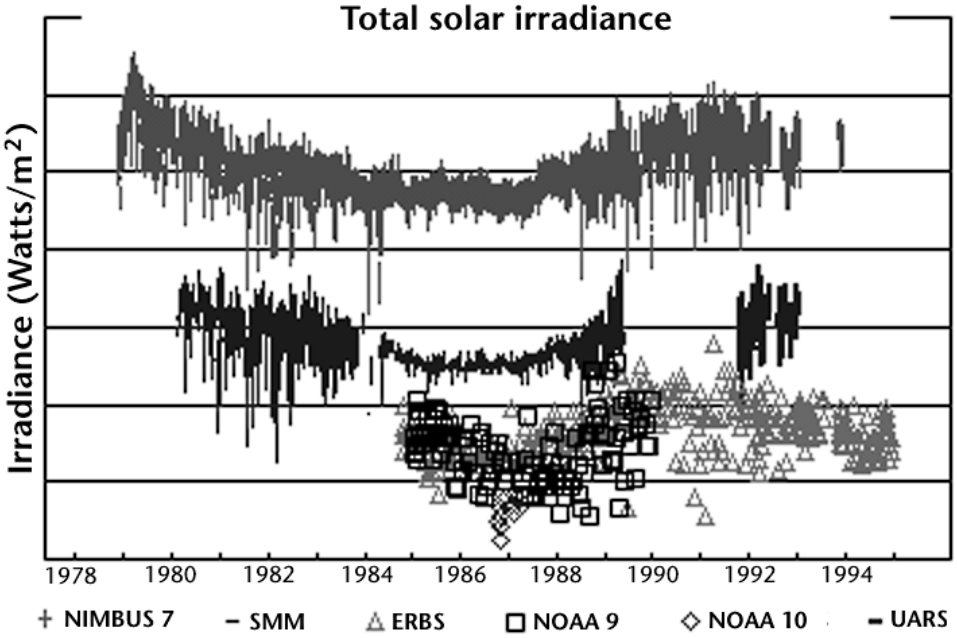


▲ **Figure 5.** Total solar irradiance data from six different satellites are plotted from 1978 to 1995. This measures the total amount of energy from the sun hitting the top of the Earth's atmosphere (Watts/m^2). A 0.01% change is seen between sunspot maximum and unspot minimum. It is thought that the extended sunspot minimum during the early 1700s contributed to the Little Ice Age on Earth.

GLOBE program brings relevance to science activities for today's students

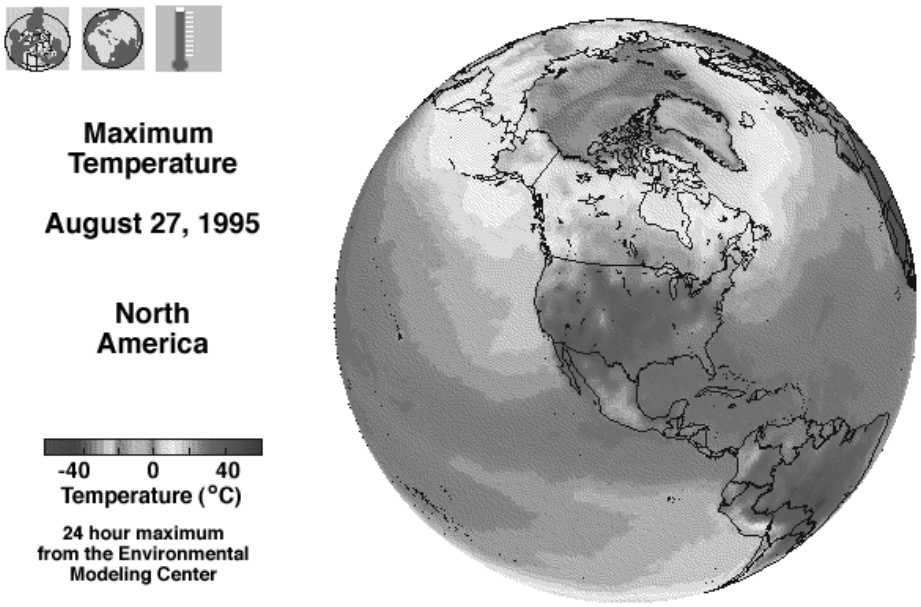
International education program coordinates work of students, teachers, and scientists

Wayne M. Faas [1]
National Climatic Data Center
NOAA/NESDIS

Valerie LaHart [2]
Cobb Middle School
Tallahassee, FL

Global Learning and Observations to Benefit the Environment (GLOBE) is an international hands-on environmental science and education program that was officially started on Earth Day, 1995. GLOBE uses scientific instruments and state-of-the-art technology to make science relevant to today's K-12 students. Vice President Gore articulated his vision for the GLOBE program in his book, *Earth in the Balance*. He proposed a program "involving as many countries as possible that will use school teachers and their students to monitor the entire earth..." (Gore, 1992). Today, GLOBE is a worldwide science and education program coordinating the work of students, teachers, and scientists to study and understand the global environment.

The GLOBE Program office sent school districts grant applications in the fall of 1994. Schools (K-12) could request federal assistance in the form of computer equipment, scientific tools, and/or travel expenses. Hundreds of proposals were reviewed and selected "GLOBE schools" were based on the geographic location, the student population and other factors. By the summer of 1995, over 1,500 schools representing every state were participating in the implementation of GLOBE. Several foreign countries have indicated an interest in GLOBE, and many have received training.



▲ **Figure 1.** Gray scale rendition of color visualization of temperature collected worldwide. Data utilized in creating this graphic was collected by students participating in GLOBE. Presentations such as this aid in demonstrating to GLOBE students how their data is applied in global environmental monitoring programs.

Teachers attend an intense, three-day workshop session conducted by professional teams of meteorologists and other scientists, computer technicians, and educators. Participants receive teaching materials, software, inservice credit, and other support materials to make their participation in GLOBE a success.

Through the GLOBE program, students monitor certain environmental parameters for scientists who are studying environmental and global changes. Monitoring three Earth systems—the atmosphere, hydrosphere, and biosphere—students enter their observations on the GLOBE student data screen through the computer, disseminate them via the World Wide Web on Internet, and receive graphic visualizations of how their data "fits" in the global environmental monitoring programs (Figure 1). With GLOBE, "Measure locally, learn globally" enables students to discover their connection to the Earth's systems.

After preparatory activities, students map out a "pixel" (30m x 30m study area) using a Magellan Ground Positioning System. Students read the latitude, longitude, and determine the elevation of the study area; the number of satellites that are helping to determine the precise location; and other relevant data. By determining the latitude and longitude, students are giving NASA their specific school location. A 15km x 15km Landsat Thematic Mapper (TM) image, centered on their school, is sent to each GLOBE school. Using a computer program called Multispec™, students manipulate the image and learn more about remote satellite imaging and their specific area.

GLOBE schools establish a atmosphere/climate study site where students take daily readings of minimum, maximum and current temperature, daily rainfall, and cloud coverage. Students report these data to the NOAA database through a GLOBE student data

National Climatic Data Center
NOAA/NESDIS
151 Patton Ave
Asheville, NC 28801-5001
E-mail: wfaas@ncdc.noaa.gov

Physical Sciences
Cobb Middle School
915 Hillcrest Avenue
Tallahassee, FL 32308
Phone: 904-488-3364

page on the World Wide Web. Using the student data and other NOAA National Weather Service products, GLOBE transmits maps via the web to the student's computer.

Scientists chose temperature and precipitation to study because they are fundamental weather parameters. They determine the "suitability" of a location to live or an area to grow certain crops. What is the average temperature? What is the range of temperatures? How much precipitation falls in a particular area?

Reliable temperature and precipitation data are unavailable to the scientific community for many regions of the world. Student-collected data will fill in some of these "data sparse" areas. Data collected in "data-rich" areas are also important. They can be used to study the local effects of cities, ground cover, and topography. These important weather data help international scientists answer questions about global change.

When students explore the biosphere (biology study site), they map and study vegetation. Students use specified scientific protocol to measure the canopy cover, height and diameter of trees and other plant species. They also specify the land cover type, using the Anderson Level II Ground Cover chart. These data are transmitted at least twice a year so that scientists can track changes.

GLOBE students conduct a number of measurements about the kind and size of the vegetation that characterizes their own study areas. Since satellites such as Landsat TM have resolutions which do not allow scientists to identify individual trees and ground cover, detailed assessment of these conditions by GLOBE students are making a significant contribution to the understanding and use of satellite data.

Student exploration of the hydrosphere (water study site) includes measuring water temperature and pH and submitting data once a week. In addition, high school students measure soil moisture daily. This measurement allows students and scientists to monitor how precipitation patterns influence this important component of the hydrologic cycle. Access to the GLOBE network of soil moisture data collected at different soil depths provide scientists with a unique and important source of information.

The international scientific community will use the information collected by GLOBE students because the students make their measurements following strict protocols with calibrated instruments. Participating GLOBE scientists access the data available via Internet (*http://www.ncdc.noaa.gov*). In some cases, student data constitutes "ground truthing" that supports research which use satellite datasets. These satellite data are used to monitor environmental parameters from space.

As students observe the normal seasonal changes (phenology) that occur within their study site, their data allow scientists to monitor the green wave (spring leaf development) and brown wave (fall foliar color change) phenomena with greater precision. Subtle changes in phenology are a useful indicator of climate change. In addition, differences in phenology within an area is an early indicator of environmental stress on local vegetation. In both cases, GLOBE phenology data makes a valuable contribution to interpreting satellite-based assessments of vegetation types and condition.

The GLOBE program addresses both science and education objectives and is an equal partnership founded on the needs of both. Students learn the rigors and excitement of hands-on science and scientists have additional data to conduct their research. The GLOBE program contributes significantly by gathering important data, educating students and to a better understanding of our world. Take a look at the GLOBE home page at *http://globe.fsl.noaa.gov*.

The National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA), the National Science Foundation (NSF), and the Environmental Protection Agency (EPA) support the GLOBE program. For further information contact: GLOBE, 744 Jackson Place, NW, Washington, DC. 20503, or by Internet at URL: *info@globe.gov*.

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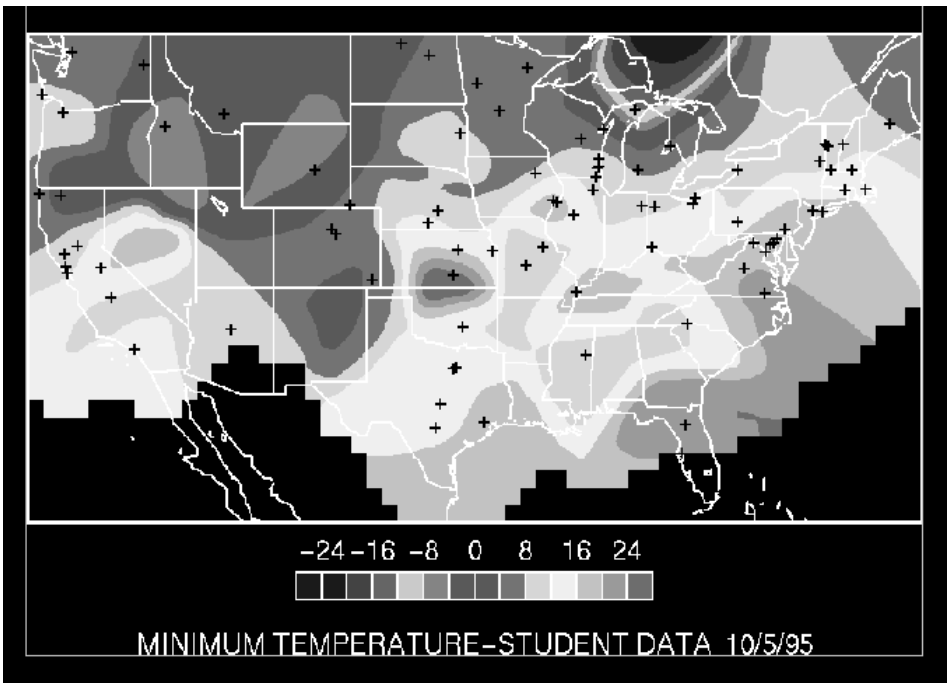
About the authors:

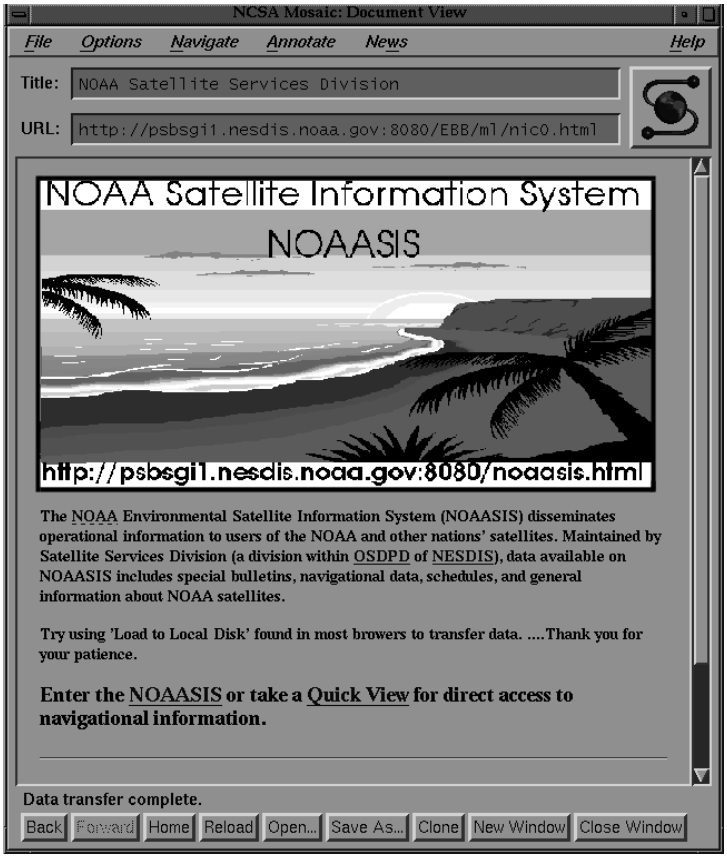
W. Faas is a meteorologist with the NOAA/National Climatic Data Center, Asheville, NC, and one of the principal investigators who selected and designed the student measurements of atmospheric parameters. V. LaHart teaches 8th grade Physical Science at Cobb Middle School, Tallahassee, FL., where she is a lead GLOBE teacher. Both are members of the GLOBE teaching staff. ■



▲ **Figure 2.** Gray scale rendition of the first temperature contour map for the continental U.S. generated solely from GLOBE student data.

NOAA Satellite Information System (NOAASIS)

World Wide Web sites provide access to environmental satellite-related products and information



▲ **Figure 1.** Gray scale rendition of the NOAASIS Web site, which is accessible through the Internet version of SSD's dial-up bulletin board.

Lieutenant (jg) Michael Soracco
Satellite Services Division
NOAA/NESDIS

The Satellite Services Division (SSD) of NOAA's National Environmental Satellite, Data, and Information Service (NESDIS) currently maintains a World Wide Web (WWW) site on the Internet to distribute NOAA environmental satellite information. The NOAA Satellite Information System (NOAASIS) serves as a central location for disseminating satellite information provided by various contributors within NESDIS and the external satellite community.

Satellite Services Division
NOAA/NESDIS E/SP2
NOAA Science Center
5200 Auth Road, Room 806
Camp Springs, MD 20746
E-mail: satinfo@ssd.wwb.noaa.gov

For this reason, the site is considered an operational bulletin board rather than simply a Home Page. From its onset in March 1995, usage has increased steadily with approximately 3000 users routinely accessing the site per week.

History

SSD has provided the environmental satellite user community with satellite-related information since September 1990. Early distribution was performed by mailings, electronic mail and a dial-up bulletin board. Dial-up service continues with direct modem access to a multi-line system, however, data transfer is costly and quality is poor for out-of-state and international users, due to long distance charges and/or noisy phone lines.

In March 1995, SSD implemented an Internet version (Figure 1) of the dial-up bulletin board that has become an invaluable tool for distributing information. Since implementation, dial-up usage has decreased from 600 calls per month to 40 while Internet activity has grown to 12,000 accesses per month. However, the dial-up service remains available to users without Internet connectivity and also serves as a back-up to NOAASIS.

Environmental satellite information

NOAASIS includes information updated daily, weekly, monthly, and important messages called "Special Bulletins" that informs users of activities that impact customer satellite operations. The HTML Source pages are automatically updated daily and on-demand when warranted. Cooperation among offices provides for the timely posting of satellite status reports, data schedules, navigational messages, and "Special Bulletins."

The data provided is not imagery; rather, it is the information necessary to collect and process imagery data. Other available information includes satellite and sensor descriptions, some publications and technical reports, descriptions of available data services, links to other satellite related sites, and upcoming events such as user conferences and meetings.

NOAASIS focuses on NOAA's geostationary and polar satellites. Descriptions of the platforms, data formats, and sources of additional information are all available through a Satellite Information page. Links to other country's satellites such as METEOSAT are also provided. The most frequently accessed files are those pertaining to satellite broadcast schedules, coverage, and navigation.

Customers, whether using Automatic Picture Transmission (APT), High Resolution Picture Transmission (HRPT), or Weather Facsimile (WEFAX), require information such as satellite orbital parameters and data transfer periods to align their antennae and acquire a transmission signal. NOAASIS provides these customers, universities, corporations and commercial entities, the U.S. Government, and other individuals with the information needed to receive satellite imagery.

Navigation and scheduling information can be accessed in several ways. The hierarchical "tree" structure of the web pages leads a user to the data usually within three web pages. Since most of the NOAASIS customers access data several times a week, all navigational and scheduling data is presented on one page (Figure 2). This feature allows users to view or retrieve only the data that changes daily.

Anonymous FTP has recently been made available for automated access to

the most popular files (Polar Recorder Schedules and GOES and Polar TBUS Messages). Continuing efforts are being made to improve the service and provide alternative access to the information.

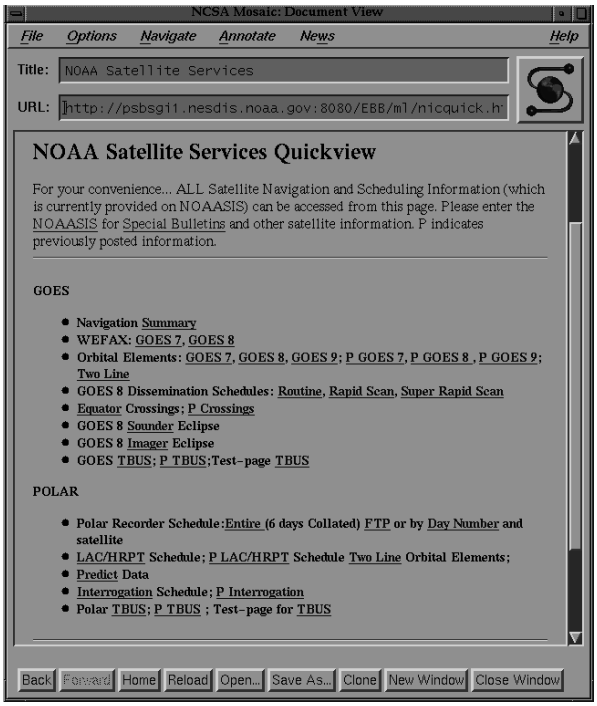
Additional resources include NOAA publications. The *NOAA Polar Orbiter Data User's Guide, NOAA Technical Report NESDIS 82: An Introduction to the GOES I-M Imager and Sounder Instruments and the GVAR Retransmission Format, NOAA Technical Memorandum NESDIS 40: The Geostationary Operational Environmental Satellite Data Collection System*, and other publications are available online to browse or download as a text file.

Approximately 65 Hypertext Markup Language (HTML) pages make up the NOAASIS web site. Large graphics and stunning layouts were purposely avoided so that the NOAASIS pages would be compatible across different platforms and appear in the same format regardless of the type of Web browser. Automated UNIX scripts run daily to generate HTML pages that incorporate changes in schedules or data files. Files are manipulated, renamed, and then referenced by the HTML pages by day-of-year, period of coverage, or subject.

Future plans

User feedback has been important in designing and implementing the NOAASIS. A mail form is accessible at the bottom of each Web page; mail is submitted to a central mailbox that is accessible by a team of employees who respond to the questions or comments.

In the future, users should expect access to more files via anonymous FTP, and more publications online and available for downloading. Also, the World Meteorological Organization (WMO) has requested permission to mirror the NOAASIS to allow easier Internet access for European users. The task should be completed this winter. Early in 1996, oversight of the NOAASIS will be transferred to the Direct Services Division; the transition should be transparent to customers. For additional information about NOAASIS, server, scripts, or access to the information please contact the Data Services Team at 301-763-8325 or send E-mail to: *satinfo@ssd.wwb .noaa.gov*. NOAASIS can be accessed through the WWW at URL: *http://psbsgi1.nesdis.noaa.gov :8080/noaasis.html.* ■



▲ **Figure 2.** The NOAA Satellite Services Quickview Page, accessible through NOAASIS on the World Wide Web. Through this page NOAASIS customers can readily access satellite navigational and scheduling data, particularly data that changes daily.

NSORS: NOAA Satellite Ocean Remote Sensing Program

The NOAA Satellite Ocean Remote Sensing (NSORS) Program utilizes the Internet WWW to distribute NOAA and non-NOAA environmental satellite data and products. The program has an initial focus on CoastWatch, ocean color, synthetic aperture radar, scatterometer, and National Technical Means products.

The NSORS Home Page (Figure 1) branches into four subtopics: Platforms and Sensors, Retrospective Data, the CoastWatch Program, and NSORS Program Elements. The Platforms and Sensors page provides links to information on the satellites and sensors which will contribute data and imagery to the NSORS Program. Retrospective data is available through the National Oceanographic Data Center (NODC) and the Satellite Active Archive (SAA); and within the CoastWatch Program, NOAA satellite products such as cloud masking, sea surface temperature, and GOES remapped imagery will be distributed through CoastWatch for evaluation of the products.

If the scientists at the regional nodes find the data and imagery applicable to their nodes' respective environment, the system and products will be further developed and made available on a wider basis. NSORS Program ele-

– continued on page 16

▲ **Figure 1** The NSORS Home Page on the WWW.

Solar databases, *from page 9*

images. We owe a great debt to all of the researchers who have contributed to this field of study over many years and to the solar observatories and related observing stations who toil for years taking basic measurements of an ever-changing Sun.

We invite all interested observers to send their data to the NOAA GOLD system for inclusion in the collected databases. NGDC is co-located with the World Data Center A (WDC-A) for Solar-Terrestrial Physics and the WDC-A for Paleoclimatology (contact *info@ngdc.noaa.gov*). On-line data are available at no charge over the Internet or can be obtained on diskettes for the cost of reproduction.

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NODC presents Geosat Altimeter Data on CD-ROM

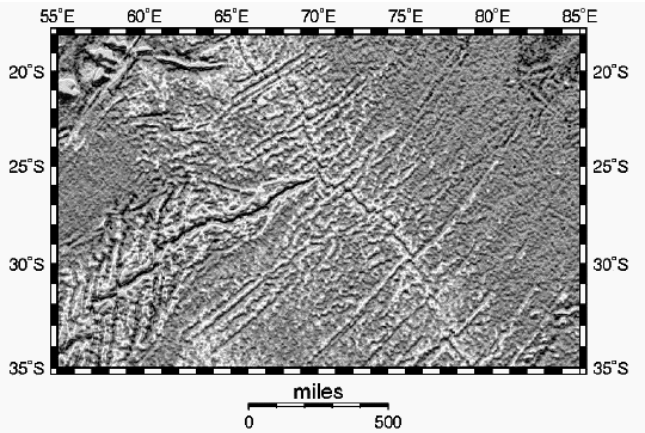
The National Oceanographic Data Center (NODC) has released a set of four CD-ROMs containing Geosat geophysical data records (GDRs) collected during the 1985-1986 Geosat Geodetic Mission. The Geodetic Mission was designed to produce a tightly spaced ground track pattern (typically 3 to 4 km at 30°S., resulting in a denser data coverage of the ocean surface than that of other satellite altimeters. Data on the CD-ROMs are organized chronologically and stored in a binary Hewlett-Packard format.

In combination with additional satellite data, these Geosat data were utilized by scientists at the Scripps Institution of Oceanography (SIO) and from NOAA in generating a computerized image of the global seafloor that is the most detailed to date (Figure 1). Numerous published articles describing the release of the new map resulted in a flood of inquiries to SIO, NODC, and the National Geophysical Data Center (NGDC), requesting copies of the map and further information.

Information about the CD-ROMs containing the Geosat Geodetic Mission data can be obtained from the NODC at the contact address listed on p. 15. Users are cautioned that these CD-ROMs contain data only; they DO NOT contain any digitized images.

A color poster of the new map is available for $40.00 from: Ginny Wells, Geological Data Center - SIO/UCSD, 9500 Gilman Drive-0223, La Jolla, CA 92093-0223. Checks should be made out to the Univ. of California Regents.

The global gravity map and additional images and information are available through the World Wide Web at URL: *http://www.ngdc.noaa.gov/mgg/announcements/images_predict.HTML*.



▲ **Figure 1.** Gravity anomaly over the Indian Ocean triple junction derived from Geosat and ERS-1 altimeter data. A triple junction is where three tectonic plates meet. D.T. Sandwell of SIO and W.H.F. Smith of NOAA used combined satellite data to map the global seafloor.

NESDIS Office of Satellite Operations announces new Home Page

The National Environmental Satellite, Data, and Information's (NESDIS) Office of Satellite Operations now has a Home Page on the Internet World Wide Web (WWW). Although still under development, the Office of Satellite Operations Home Page contains information on both the geostationary and polar satellite systems, as well as the latest Geostationary Operational Environmental Satellite (GOES-8) images of North America and the Western Hemisphere.

New links to WWW home pages will also be incorporated to provide a more complete understanding of our operational satellites and ground equipment. The new Home Page is at URL:

http://www.nnic.noaa.gov/SOCC/SOCC_Home.html

(Users should be careful to type the address exactly, as it is case-sensitive.) The Office of Satellite Operations can be contacted at: NESDIS/NSDS E/SO, Federal Building #4, Room 1035, Suitland, MD, 20233-001, Phone: 301-457-5130.

Contact: NESDIS/NSDS

USFWS presents new servers now available on the Internet

Dr. Alan R. Fisher, National Data Administrator for the U.S. Fish and Wildlife Service (USFWS), recently announced the availability of several new USFWS servers on the Internet. These new servers support the USFWS's goal of sharing data and information. The new servers are:

- National Education and Training Center at URL:
  http://www.fws.gov/~bennishk/netc.html
- Press Releases and Speeches at URL:
  http://www.fws.gov/~r9extaff/pubaff.html
- San Francisco Bay National Wildlife Refuge at URL:
  http://www.r1.fws.gov/sfbnwr/sfbnwr.html
- Endangered Species has updated their server at URL:
  http://www.fws.gov/~r9endspp/endspp.html

These servers may be directly accessed or through the USFWS Home Page at URL:

http://www.fws.gov

In the near future, a list server will be announced by which subscribers can receive news releases and bulletins from the USFWS Public Affairs headquarter office.

Contact: Alan_Fisher@mail.fws.gov

Data products and services

NGDC issues new data product for studies in geomagnetism

The National Geophysical Data Center (NGDC) has made available a new data product entitled "Utility Programs for Beginning Studies of Geomagnetic Fields." This DOS-compatible disk contains a collection of files designed for those beginning their studies in geomagnetism, and should be an item of interest for both high school and college students. The disk was prepared by Wally Campbell, a guest worker from the U.S. Geological Survey, and is being advertised on an announcement that will be mailed to NGDC customers in January 1996. The announcement was distributed during the American Geophysical Union meeting in San Francisco in December.

Contact: NGDC

CONTACT POINTS

National Climatic Data Center (NCDC)
Climate Services:
704-271-4800
Fax: 704-271-4876
E-mail: orders@ncdc.noaa.gov

Satellite Services:
704-271-4800
Fax: 704-271-4876
E-mail: satorder@ncdc.noaa.gov

National Geophysical Data Center (NGDC)
303-497-6958
Fax: 303-497-6513
E-mail: info@ngdc.noaa.gov

National Oceanographic Data Center (NODC)
202-606-4549
Fax: 202-606-4586
E-mail: services@nodc.noaa.gov

NOAA Environmental Services Data Directory
301-713-0572
(Gerry Barton)
Fax: 301-713-1249
E-mail: barton@esdim.noaa.gov

NOAA Central Library
Reference Services:
301-713-2600
Fax: 301-713-4599
E-mail: noaalib@libmail.lib.noaa.gov

NCDC completes a productive year with release of new CD-ROMs

The National Climatic Data Center (NCDC) released a group of four different CD-ROMs through the fall of 1995, some of which were the result of joint efforts with other Federal agencies. The NCDC may be contacted at the address listed for detailed information regarding system requirements, data formats, and prices of these new CDs.

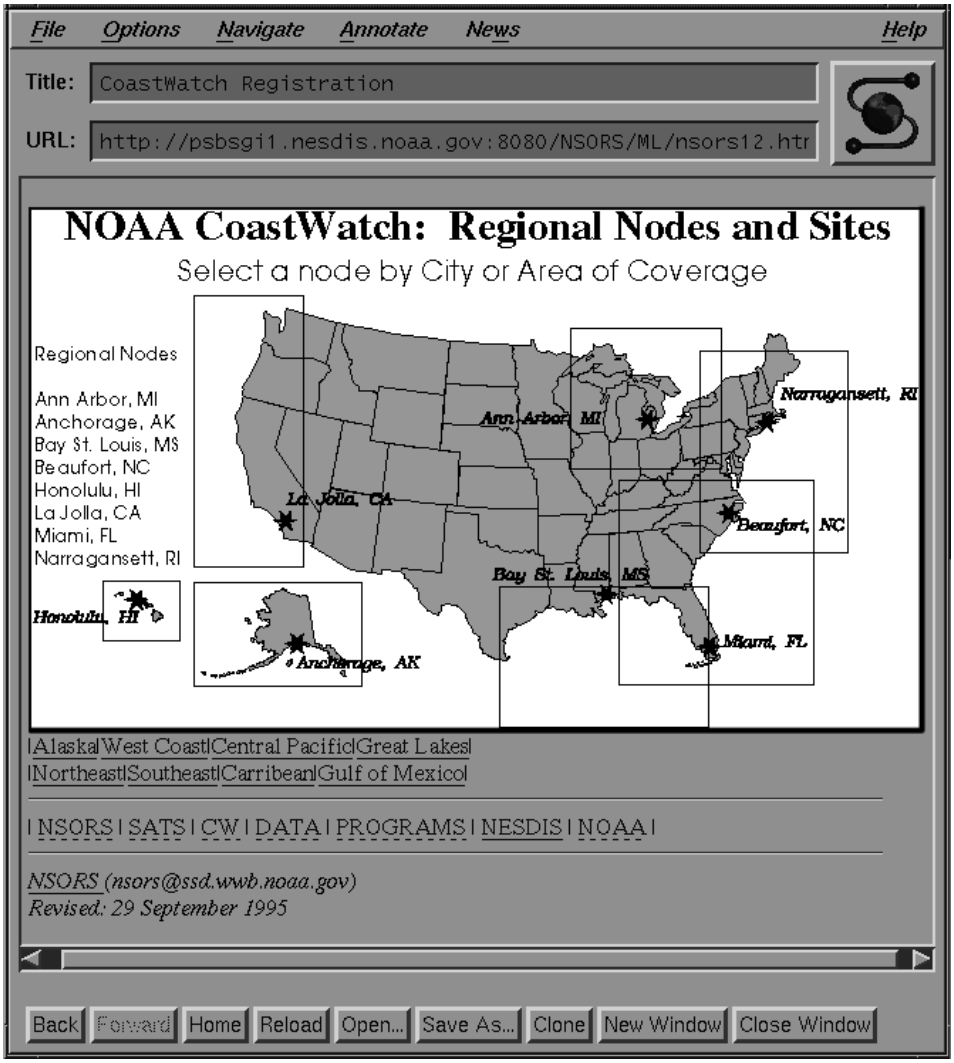
The MM4-1990 Meteorology Data CD is a 12-disk (23 gbyte) set containing modeled hourly upper air data on an 80-km grid covering the United States, southern Canada, and northern Mexico. It provides access to wind speed/direction, temperature, height and dew-point depression for 23 atmospheric levels for the year 1990. This product resulted from a joint effort with NOAA's Atmospheric Research Laboratory and the U.S. Environmental Protection Agency (EPA) designed to provide modeling tools to assess individual and cumulative impacts of existing and proposed sources of air pollution on local and regional scales.

The Global Gridded Upper Air Statistics CD contains summarized monthly summarized European Center for Medium Range Weather Forecasting (ECMWF) upper air data for 15 levels from the surface to 10mb. The period is covered is from 1980-1991 on a global 2.5-degree grid.

The 1994 Cooperative Data Summary of the Day CD-ROM is the latest in a CD-ROM series containing cooperative station data (daily maximum/minimum temperature, precipitation, soil temperature, and evaporation) for over 11,000 U.S. stations. Preceding volumes of this disk contained data from the 1850s to 1993. The 1994 disk also contains data inventory and station history information. Copies will be provided to the National Weather Service (NWS) for the Weather Forecast Offices (WFOs).

Final copies of the upgraded Marine Climatic Atlas were received for distribution. Funded by the U.S. Navy, this atlas CD adds looping capability to basin contours, multiple rose displays, .PCX file export, basin-wide narratives of climatology and oceanography, and Severe Weather Port Guides for 55 Mediterranean locations. Copies of this CD will also be provided to the NWS for use by the WFOs.

Contact: NCDC



▲ **Figure 2.** NOAA CoastWatch program regional nodes and sites.

***NSORS**, from page 13*

ments such as ocean color and Synthetic Aperture Radar (SAR) products will also be available through the home page.

The NSORS Program currently relies upon the success and distributive network of the NOAA CoastWatch Program. CoastWatch makes polar satellite environmental data and products available to Federal, state and local marine scientists and coastal resource managers. Eight regional nodes run by NOAA personnel located at NOAA line office facilities (Figure 2) distribute data and provide a "local" point-of-contact for qualified CoastWatch customers. NSORS will make use of these distribution points for delivery of new data products.

The NSORS Home Page provides information on the CoastWatch Program and registration procedures. The NSORS web site guides users to the nearest CoastWatch regional node for completion of local registration and data access procedures. The NSORS pages distribute the registration procedures and point-of-contact information for the Alaska and Southeast Regional Nodes whose home pages are still under development.

Questions about the NSORS Program can be submitted through the NSORS Home Page at URL: *http://psbsgi1.nesdis.noaa.gov:8080/nsors.html* or contact: Kent Hughes, NOAA/NESDIS (E/SP), FB #4, Room 1069, Suitland, MD 20746, E-mail: *nsors@ssd.wwb.noaa.gov*.

—Lieutenant (jg) Michael Soracco
Satellite Services Division
NOAA/NESDIS E/SP2
NOAA Science Center
5200 Auth Road, Room 607
Camp Springs, MD 20746
E-mail: msoracco@ssd.wwb.noaa.gov ■

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