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EARTH SYSTEM MONITOR

A guide to NOAA's data and information services

INSIDE

New volumes planned for release in the *Atlas of Surface Marine Data* series

Monthly anomaly fields extended through 1993

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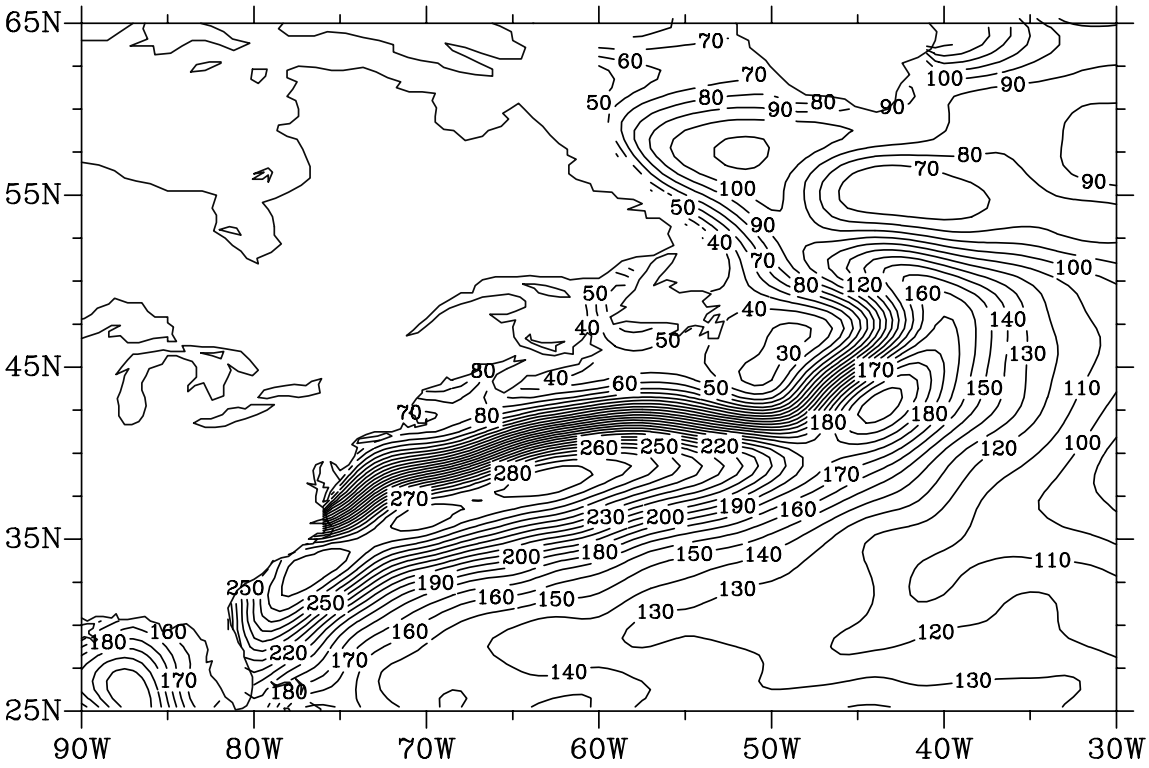
In 1994, the National Oceanographic Data Center began to publish the 5-volume *Atlas of Surface Marine Data 1994* (da Silva *et al.*, 1994) and accompanying CD-ROMs. This atlas series contained 1-degree latitude by 1-degree longitude analyses of observed quantities (such as sea surface temperature, surface air temperature, relative humidity, winds, etc.), heat fluxes, momentum fluxes, and fresh water fluxes derived from individual marine observations found in the Comprehensive Ocean Atmosphere Data Set (COADS) Release 1 (Slutz *et al.*, 1985) and updates. This article introduces a sixth volume of this atlas series and two supplements along with six CD-ROMs containing their corresponding analyzed data, which are expected to be available in April 1998.

Heat flux sensitivity to sea surface temperature

Volume 6 of the *Atlas of Surface Marine Data 1994* is entitled *Heat Flux Sensitivity to Sea Surface Temperature* (Young-Molling *et al.*, 1997a). In this volume, one-degree monthly climatologies and anomalies have been calculated for the first order derivative of the components of constrained net

– *continued on page 2*



▲ **Figure 1.** One-half-degree analysis of latent heat flux over the North Atlantic Ocean for January 1945-1989. Contour interval is 10 Watts/meter^2. Individual marine observations are taken from COADS Release 1 and Release 1 Update. Winds, corrected according to da Silva *et al.*, 1994, and the Large and Pond, 1982, transfer coefficients are used to calculate individual fluxes. Gridded mean fluxes are analyzed with an objective analysis scheme on a one-half-degree latitude by one-half-degree longitude grid. Smallest features resolved are about 386 km in size.

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▲ **Table 1.** Volume 6 of the *Surface Marine Atlas: Sensitivity of heat flux to sea surface temperatures (SSTs)*. The table lists each variable whose one-degree analysis parameterization is contained in Volume 6. Also shown are the types of plots included in the atlas volume and the names of the data files that will be included on Disc 4 of the "Atlas of Surface Marine Data" CD-ROM set.

Variable Description	1945-1989 monthly climatology file	1945-1989 monthly anomaly file	Seasonal Climatology Maps	Seasonal Anomaly Maps
Sensitivity of constrained net heat flux to changes in SSTs	dqdt_clm.nc	dqdsst.nc	X	X
Sensitivity of latent heat flux to changes in SSTs	dldt_clm.nc	dldsst.nc	X	
Sensitivity of sensible heat flux to changes in SSTs	dsdt_clm.nc	dsdsst.nc	X	
Sensitivity of long wave radiation to changes in SSTs	dodt_clm.nc	dodsst.nc	X	
Sensitivity of long wave vapor pressure term to changes in Ts	dedt_clm.nc	daedsst.nc	X	
Sensitivity of long wave Chi term to changes in SSTs	dxdt_clm.nc	daxdsst.nc	X	

Surface Marine Atlas, *from page 1*

heat flux with respect to changes in sea surface temperature. Sensitivities to changes in sea surface temperatures (SSTs) are shown for constrained net heat flux, latent heat flux, sensible heat flux, long wave radiation, long wave vapor pressure term, and long wave cloudiness parameter (Table 1).

The heat flux sensitivity to change in SSTs was estimated for each observation by calculating the heat flux (or heat flux component) at observed SSTs and at SSTs + 0.01°C, subtracting the flux at SSTs from the flux at SSTs + 0.01°C, and dividing by 0.01. These individual derivatives were then averaged in one-degree latitude-longitude boxes over the global ocean for each month.

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Climatologies were produced and analyzed for each of the 12 months, January through December, for the period 1945-1989. Anomalies from the monthly climatologies were produced and analyzed for each of the 540 months from January, 1945 through December, 1989. The analysis technique used is identical to that in the previous *Atlas of Surface Marine Data* volumes (da Silva *et al.*, 1994).

The sensitivities of heat flux to changes in SSTs are intended, in part, for the use of ocean modelers who wish to force sea surface heating as the sum of net heat flux and a Newtonian cooling term. Volume 6 details the calculation of these heat flux sensitivities, shows seasonal climatology (December-January-February 1945-1989 through September-October-November 1945-1989) and seasonal anomalies (January-February 1945 through September-October-November 1989) for constrained net heat flux sensitivity to SSTs, and shows seasonal climatology (1945-1989) figures for each component of the constrained net heat flux sensitivity to SSTs.

A companion CD-ROM containing all the analyzed climatologies and anomalies of heat flux sensitivity to changes in SSTs will also be available. The data and access software will be contained on Disc 4 of the "Atlas of Surface Marine Data" CD-ROM collection.

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EARTH SYSTEM MONITOR

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NODC and NCEP collaborate on archive of ocean modeling output

NOAA's National Oceanographic Data Center (NODC) and the National Centers for Environmental Prediction (NCEP) have launched a joint project through which NODC will archive and distribute model output from the new NCEP Coastal Ocean Forecasting System (COFS). COFS, developed by NOAA in collaboration with Princeton University and the U.S. Navy, is nearly completed. This computer model will provide forecasts of the three-dimensional temperature, salinity, current, and sea level structure of the coastal ocean off of the U.S. east coast (~30-48°N, and from the coast out to 50°W).

Twenty-four hour forecasts of the model fields have been produced since August of 1993 on a daily basis, and improvements have been continually incorporated. NCEP is responsible for running the model and making output available to selected users.

A severe shortage of online storage at NCEP has made it possible to store only six weeks of ocean model output online. To alleviate the storage problem, NODC and NCEP have established a cooperative arrangement whereby the NODC will archive the output from COFS, matching NCEP's computational capability with NODC's ability to efficiently store and archive large quantities of information. Output from COFS has been archived at NODC since January 1997 and is available to selected users. When validation of the model is complete, output from COFS will be available to all users.

NOAA/NASA study Cerro Hudson

The Cerro Hudson Volcano in Southern Chile erupted on August 15, 1991, spewing tons of ash and sulphur dioxide into the upper atmosphere. The resulting plume was detected by NOAA-11 AVHRR (Advanced Very High Resolution Radiometer) while the Nimbus-7 TOMS (Total Ozone Mapping Spectrometer) observed increased levels of sulphur dioxide and aerosols in the mid-latitudes of the Southern Hemisphere shortly after the eruption.

This research merges TOMS and AVHRR datasets to examine the physical and chemical fates of the Hudson eruption clouds as they circled the Earth. Hudson AVHRR data are difficult to analyze for ash mass due to very cold meteorological clouds underlying warmer volcanic clouds; thus, the focus of the joint research effort.

News briefs

Thirty-four AVHRR level 1b datasets were supplied by the National Climatic Data Center's (NCDC) Satellite Services Group for the project.

Opportunities 98: making dollars and sense selling to government agencies

The National Climatic Data Center (NCDC) will staff a booth at the third small business procurement conference, sponsored by Congressman Charles Taylor, 11th District, North Carolina. The conference will be held at the Grove Park Inn Resort in Asheville, NC, on March 16, 1998. Past conferences have been well attended by hundreds of small businesses from all over Western North Carolina who want to know how to market their goods and services to prime contractors and all levels of governmental agencies. Congressman Taylor is sponsoring the conference in cooperation with the Small Business and Technology Development Center (SBTDC), Minority Business Programs and other organizations supporting small business.

Data center technology briefing

Ted Habermann of the National Geophysical Data Center (NGDC) presented a briefing on emerging Web-based data access tools to management and technical leadership from all three NESDIS data centers. He focused on the Internet Map Server recently developed by Environmental Systems Research Institute, Inc. (ESRI) and the Interactive Data Language (IDL) developed by Research Systems Inc., and demonstrated how these commercial off-the-shelf tools could interface with existing data access systems at NGDC. This briefing was an important step toward increasing collaboration between NOAA's National Data Centers.

NODC scientist reconstructs Antarctic plate movement

The January 1998 issue of "Discover (The World of Science)" highlighted the top 100 science stories of 1997, and included the work of Dave McAdoo (National Oceanographic Data Center) among the top five in earth science. McAdoo used altimeter data near Antarctica to reconstruct plate tectonic movements over the last 80 million years, solving a puzzle related to the original breakup of Gondwanaland.

It was first suggested about a decade ago that a Bellingshausen Sea plate had once separated from the main body of Antarctica. McAdoo and Seymour Laxon (University College London) used radar altimeter data from the European satellite, ERS-1, to reveal the surface topography and, hence, deduce a gravity field for these poorly surveyed ice-covered seas. Upon using their ERS-1 gravity field to infer bottom topography, the two men discovered previously unknown fracture zones in what is now the frozen Amundsen Sea. The fractures represent the tracks of the Bellingshausen plate as it moved 100 to 200 miles to the northeast.

McAdoo stated that they had found firm evidence for an extinct plate boundary between the Bellingshausen and the rest of Antarctica. Groundtruthing surveys from icebreakers must now confirm it.

1997 Fall AGU Meeting

Over 7,150 attendees witnessed the first appearance of the NOAA National Data Centers from December 8-12 in San Francisco at the American Geophysical Union annual meeting. The National Geophysical Data Center (NGDC), the National Oceanographic Data Center (NODC), and the National Snow and Ice Data Center (NSIDC) maintained demonstration booths; the exhibit was even more successful this year due to the extra attention given to several new brochures and handouts depicting the Year of the Ocean (calendar), the Icosahedron Surface of the Earth Globe and a new collage of Image Products from NGDC. NGDC's booth included demonstrations of a web-browser based interface to scanned images of Lamont-Doherty seismic profiles. The interface operates on a PC from CD-ROM and does not require an Internet connection.

Blizzard of '93 documentary

The National Geographic Society was provided with Geostationary Operational Environmental Satellite (GOES) and Polar-orbiting Operational Environmental Satellite (POES) satellite images of one of the worst blizzards of the decade, and probably of this century. The best image will be used in the "National Geographic" magazine as an advertisement which spotlights an upcoming television documentary on the storm. The Blizzard of '93, sometimes called the "Storm of the Century," was one of the strongest winter storms ever to hit the eastern third of the U.S.. Over two-hundred people in thirteen states lost their lives during the March 12-15, 1993, storm.

▲ **Table 2.** Supplement A: *Anomalies of directly observed quantities and surface marine fluxes for 1990-1993*. Listed is each quantity whose 1990-1993 anomalies are described in Supplement A. Additional information, such as the variables plotted in Supplement A and the names of the data files that will be on the accompanying CD-ROM (Disc 5 of "Atlas of Surface Marine Data" CD-ROM set), is also listed.

Variable Description	1945-1989 monthly climatology file	1990-1993 monthly anomaly file	1990-1993 monthly observation density	Seasonal 1945-1989 climatology/1990-1993 anomaly maps
Short wave cloudiness sensitivity parameter	ac_clm.nc		ac.nc2	
Long wave Chi term sensitivity parameter	achi_clm.nc	achi.nc2		
Long wave vapor pressure sensitivity parameter	ae_clm.nc	ae.nc2		
Air density	rho_clm.nc	airdens.nc2		
Fractional cloudiness	c_clm.nc	cloud.nc2	c_n.nc2	X
Constrained evaporation minus precipitation	emp_clm.nc	eminusp.nc2		X
Evaporation	evap_clm.nc	evaprate.nc2		X
Latent heat flux	latn_clm.nc	latent3.nc2		X
Long wave radiation	long_clm.nc	longrad.nc2		X
Constrained net heat flux	neth_clm.nc	netheat.nc2		X
Precipitation	prcp_clm.nc	precip.nc2	wx_n.nc2	X
Specific humidity	q_clm.nc	q.nc2	q_n.nc2	X
Saturation specific minus specific humidity	dq_clm.nc	qs_qa.nc2		X
Air temperature	sat_clm.nc	sat.nc2	sat_n.nc2	X
Sensible heat flux	sens_clm.nc	sensib3.nc2		X
Short wave radiation	shrt_clm.nc	shortrad.nc2		X
Sea level pressure	slp_clm.nc	slp.nc2	slp_n.nc2	X
Sea surface temperature	sst_clm.nc	sst.nc2	sst_n.nc2	X
Sea minus air temperature	dt_clm.nc	sst_sat.nc2		X
Zonal wind stress	taux_clm.nc	taux3.nc2		X
Meridional wind stress	tauy_clm.nc	tauy3.nc2		X
Zonal wind speed	u3_clm.nc	u3.nc2		X
Vapor pressure	vapp_clm.nc	vappress.nc2		X
Meridional wind speed	v3_clm.nc	v3.nc2		X
Wind speed	w3_clm.nc	w3.nc2	w_n.nc2	X

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Supplement A: 1990-1993 update

Supplement A to the *Atlas of Surface Marine Data 1994* is entitled *Anomalies of Directly Observed Quantities and Surface Marine Fluxes for 1990-1993* (Young-Molling *et al.*, 1997b). This supplement contains additional one-degree anomalies for most of the quantities found in Volumes 1-5 of the *Atlas of Surface Marine Data 1994*. Table 2 contains list of variables found within this supplemental work.

Using individual observations from COADS Release 1a (Woodruff *et al.*, 1993) and a supplemental release for 1993, monthly means of selected observed quantities and surface fluxes were calculated for each of the 48 months during 1990-1993 on a one-degree latitude-longitude grid. Anomalies based on the 1945-1989 climatologies were then calculated and analyzed for January 1990 through December 1993. The analysis technique used is the same as in previous volumes of the series (da Silva *et al.*, 1994).

The anomalies found in Supplement A are intended to be an extension of the anomaly time series presented in Volumes 1 through 6. Supplement A shows the 1945-1989 seasonal climatology for each variable (same figure as in found in Volumes 1-6) and the seasonal anomalies for December-January-February 1989/1990 through September-October-November 1993. The monthly anomaly data for 1990-1993 and software with which to read it will be located on a companion CD-ROM, Disc 5 of the "Atlas of Surface Marine Data" CD-ROM collection.

Supplement B: 1/2-degree analysis

Supplement B to the *Atlas of Surface Marine Data 1994* is entitled *Procedures for the 1/2 x 1/2 Degree Data Set* (da Silva *et al.*, 1997). This atlas presents the techniques used in a finer scale analysis of the data found in Volumes 1-5. In Volumes 1-5, analyzed monthly climatologies and anomalies were presented on a one-degree latitude-longitude grid. Supplement B presents analyzed monthly climatologies and weekly climatologies of the same quantities on a half-degree latitude-longitude grid.

Monthly anomalies were not produced on this finer grid due to insufficient data density. However, the weekly half-degree climatologies were produced in order show the annual cycle in more detail. Table 3 has a complete list of the variables described in this supplement.

Calculation of the monthly half-degree climatologies was similar to the calculation of the one-degree climatologies. Individual observations from COADS Release 1 and Release 1 Update were used. Quantities were then averaged on a 1/2-degree longitude by 1/2-degree latitude grid over the global ocean for each month. These grids were averaged to produce 12 monthly climatologies (1945-1989) and then analyzed. The analysis procedure is similar to that for the one-degree analysis, except that the smallest features resolved are about 386 km in size.

The half-degree weekly climatologies were produced by averaging quantities on a half-degree latitude-longitude grid for each of the 52 climatological weeks. A climatological week contains all observations from the period 1945-1989 which fall in the same seven days during any year (two of the weeks have 8 days). For example, week 1 climatology is an average of all observations

that take place on January 1st through January 7th, regardless of year. The weekly gridded means were then analyzed in a way similar to the monthly half-degree analysis.

The monthly and weekly climatologies found in Supplement B are intended to provide a finer scale study (in both area and time) of the one-degree climatologies presented in Volumes 1 through 5. Supplement B shows 1945-1989 seasonal climatology plots, produced from the half-degree monthly climatologies, for most variables in the half-degree data set. Also shown are plots of weekly climatologies for sea surface temperature, zonal wind stress, meridional wind stress, and constrained net heat flux. The monthly climatology data for all variables will be located on Disc 6 of the "Atlas of Surface Marine Data CD-ROM" collection. The weekly climatology data for all variables will be located on Discs 7, 8, and 9 of the collection.

Availability

Tables 1, 2, and 3 show what will be available in each *Atlas* volume, supplement, and CD-ROM introduced in this article. Each variable which has data on the appropriate atlas/CD-ROM has a listing. Each atlas volume or supplement contains parameterizations for all the variables listed, although not all of those variables may be plotted in the atlas volume.

Ordering information for one or more volumes of the *Atlas of Surface Marine Data 1994* or the corresponding data set will be made available via the Internet on the NODC Home Page (URL *http://www.nodc.noaa.gov/*) or from:

NOAA/NESDIS
National Oceanographic Data Center
User Services
NOAA/NESDIS E/OC1
1315 East-West Highway
Silver Spring, MD 20910-3282
Phone: 301-713-3277
Fax: 301-713-3302
E-mail: *services@nodc.noaa.gov*
WWW: *http:/www.nodc.noaa.gov/*

Interested parties are encouraged to refer to the NODC home page or to contact the NODC directly in April/May of 1998 for availability.

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▲ **Table 3.** Supplement B: *Procedures for the 1/2 x 1/2 Degree Data Set*. Listed is each quantity whose half- by half-degree monthly and weekly analyses are described in Supplement B. Also listed are names of variables plotted in Supplement B as well as names and disc number of the data files that will be placed on the accompanying CD-ROMs (Discs 6-9 of "Atlas of Surface Marine Data" CD-ROM set).

Variable Description	1945-1989 monthly climatology file	1945-1989 weekly climatology file	Seasonal climatology maps (from monthly)	Weekly climatology maps
Short wave cloudiness sensitivity parameter	ac_clm.nc (6)	ac_wkc.nc (8)		
Long wave Chi term sensitivity parameter	achi_clm.nc (6)	achi_wkc.nc (8)		
Long wave vapor pressure sensitivity parameter	ae_clm.nc (6)	ae_wkc.nc (8)		
Buoyancy flux	buoy_clm.nc (6)	buoy_wkc.nc (9)	X	
Fractional cloudiness	cld_clm.nc (6)	cld_wkc.nc (7)	X	
Saturation specific minus specific humidity	dq_clm.nc (6)	dq_wkc.nc (7)	X	
Sea minus air temperature	dt_clm.nc (6)	dt_wkc.nc (7)	X	
Vapor pressure	e_clm.nc (6)	e_wkc.nc (7)	X	
Constrained evaporation minus precipitation	emp_clm.nc (6)	emp_wkc.nc (9)	X	
Evaporation	evap_clm.nc (6)	evap_wkc.nc (9)	X	
Cube of friction velocity	fv3_clm.nc (6)	fv3_wkc.nc (8)	X	
Latent heat flux	latn_clm.nc (6)	latn_wkc.nc (8)	X	
Long wave radiation	long_clm.nc (6)	long_wkc.nc (8)	X	
Constrained net heat flux	neth_clm.nc (6)	neth_wkc.nc (8)	X	X
Precipitation	prcp_clm.nc (6)	prcp_wkc.nc (9)	X	
Specific humidity	q_clm.nc (6)	q_wkc.nc (7)	X	
Saturation specific humidity	qs_clm.nc (6)	qs_wkc.nc (9)	X	
Relative humidity	rh_clm.nc (6)	rh_wkc.nc (7)	X	
Air density	rho_clm.nc (6)	rho_wkc.nc (9)		
Air temperature	sat_clm.nc (6)	sat_wkc.nc (7)	X	
Sensible heat flux	sens_clm.nc (6)	sens_wkc.nc (8)	X	
Short wave radiation	shrt_clm.nc (6)	shrt_wkc.nc (8)	X	
Sea level presuure	slp_clm.nc (6)	slp_wkc.nc (7)	X	
Sea surface temperature	sst_clm.nc (6)	sst_wkc.nc (7)	X	X
Zonal wind stress	taux_clm.nc (6)	taux_wkc.nc (8)	X	X
Meridional wind stress	tauy_clm.nc (6)	tauy_wkc.nc (8)	X	X
Virtual temperature	tv_clm.nc (6)	tv_wkc.nc (9)	X	
Zonal wind speed	u3_clm.nc (6)	u3_wkc.nc (7)	X	
Zonal temperature flux	ua_clm.nc (6)	ua_wkc.nc (9)		
Zonal moisture flux	uq_clm.nc (6)	uq_wkc.nc (9)	X	
Meridional wind speed	v3_clm.nc (6)	v3_wkc.nc (7)	X	
Meridional temperature flux	va_clm.nc (6)	va_wkc.nc (9)		
Meridional moisture flux	vq_clm.nc (6)	vq_wkc.nc (9)	X	
Wind speed	w3_clm.nc (6)	w3_wkc.nc (7)	X	
10m/(Monin-Obukhov Length)	zdl_clm.nc (6)	zdl_wkc.nc (9)	X	

The NCDC Global Temperature Index

Land-air surface and sea surface temperatures indicate 1997 to be century's warmest year

Robert G. Quayle, Thomas C. Peterson, Alan N. Basist, and Catherine S. Godfrey
National Climatic Data Center
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On December 8, 1997, the National Climatic Data Center (NCDC) received a request from the U.S. delegation to the Third Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change in Kyoto, Japan. The information requested was whether 1997 was likely to be the warmest year on record for the global surface temperature, as predicted by the U.K. Meteorological Office Hadley Centre and the University of East Anglia. Tom Karl of the NCDC responded to the delegation that 1997 appeared to be approaching a record, but that there was no readily available hard data to verify this.

A small group at NCDC undertook an exercise to see if, indeed, 1997 was likely to be the warmest year of the century. The notion of a very warm 1997 was obvious from the data. The global land station update through November showed global surface land temperatures to be among the warmest years of the record, and the sea surface was very warm as a result of the ongoing record El Niño, but how warm? To answer this, NCDC had to work with readily available data, as no time was available to search for new sources.

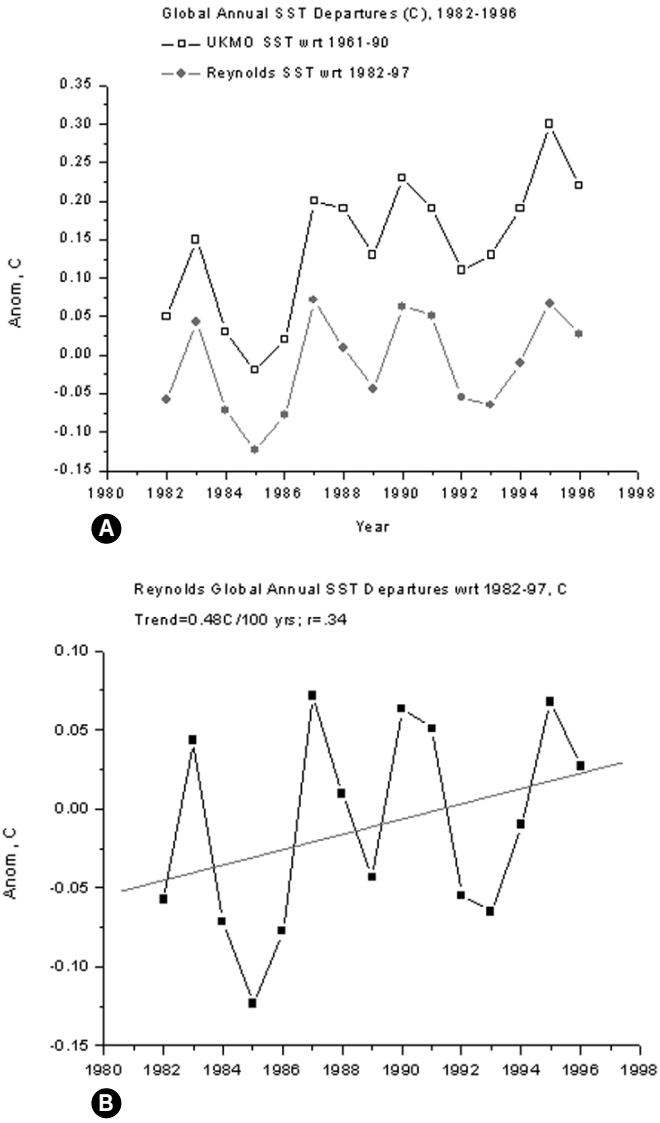
Land surface Air Temperatures

Land surface Air Temperature (LAT) climatology (at instrument shelter height) was derived from the Global Historical Climatology Network version 2 data set (GHCN, Peterson and Vose, 1997). GHCN v.2 includes previously unavailable Colonial Era data that fill in data-sparse times and places (Peterson and Griffiths, 1997). All data were processed via the Climate Analysis System (CAS) developed at NCDC by David Easterling, Tom Peterson, and Paul Jamason. NWS-CPC provided NCDC with a clean file of current GTS CLIMAT reports. These data were appended to GHCN using an update system developed by Catherine Godfrey. Cross-matching all stations in the real-time record with the correct GHCN records was not a trivial exercise. The update system subjected the most recent data to a rigorous quality control (Peterson *et al.*, 1997a).

Russ Vose's unique duplicate preservation scheme preserved the integrity of the input data streams (Peterson and Vose, 1997). The First-Difference area averaging technique thrives on these duplicates and maximized the global data available for analysis (Peterson *et al.*, 1997b). Homogeneity adjustment procedures, developed over several years, assured an objective, reproducibly homogeneous time series (Peterson and Easterling, 1994, Easterling and Peterson, 1995, Peterson *et al.*, 1997c). In the end, over 14,000 individual station monthly records for 1997 were used in the analysis to produce 5x5 degree grid box data that were summarized into hemispheric and global averages.

Sea surface temperatures

NCDC compiled a global record of 5x5 degree grid box *in situ* Sea Surface Temperature (SST) means by year through 1996 (Figure 1A) from the excellent work of the U.K. Meteorological Office and MIT: *The Global Ocean Surface Temperature Atlas* "GOSTA" (Bottomley *et al.*, 1990+). However, the most timely 1997 data was needed to give a true century-scale perspective. Available for the period 1982-1997 was the benchmark National Centers for Environmental Prediction–Optimum Interpolation (NCEP OI) blended satellite, ship and buoy SST data set, also in 5x5 degree grid box format (Figure 1B; Reynolds and Smith, 1994). NCDC produced global averages



▲ **Figure 1.** NCDC's global record of 5x5 degree box *in situ* SST means by year through 1996 (Figure 1A); the National Centers for Environmental Prediction–Optimum Interpolation (NCEP OI) blended satellite, ship and buoy SST data set (Figure 1B).

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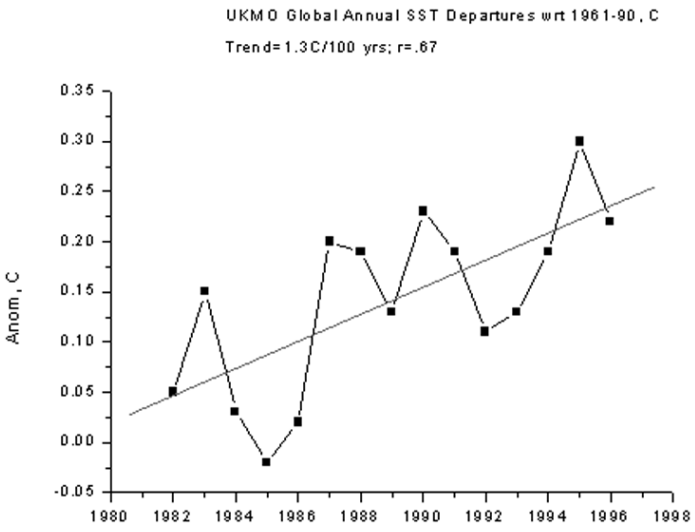
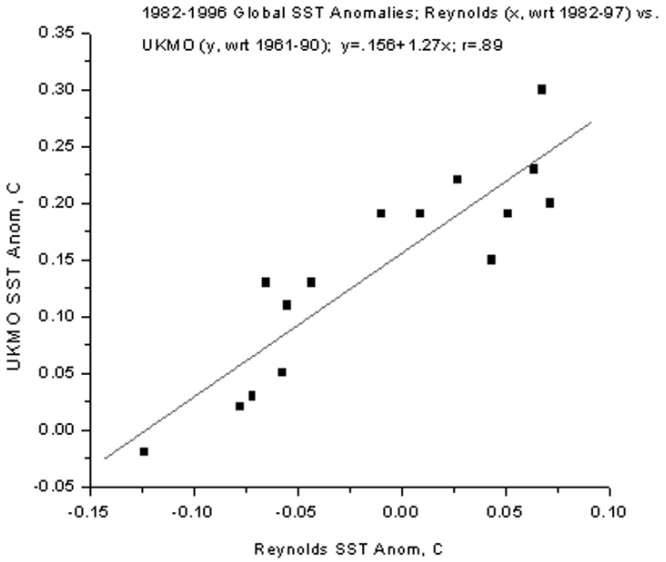


▲ **Figure 2.** A simple linear regression was performed for global annual mean anomalies for the years 1982-1996, using NCEP OI SST with respect to 1982-1996 as the independent variable and *Global Ocean Surface Temperature Atlas* (GOSTA) SST with respect to 1961-90 as the dependent.



▲ **Figure 3.** Global mean annual Reynolds SST anomalies (SSTR) were converted to modeled GOSTA-compatible SST anomalies (SSTM) for each year, 1982-1997, and the new values were spliced onto the GOSTA record for the years after 1982.

and the accompanying anomaly series from both data sets. Combining these two SST data sets through 1997, and merging these with the GHCN was the next step. To fuse the two SST data sets, a simple linear regression was performed for global annual mean anomalies for the years 1982-1996, using NCEP OI SST with respect to 1982-1996 as the independent variable and GOSTA SST with respect to 1961-90 as dependent (Figure 2). The fit was fairly good (r = 0.89) considering that the areas covered were somewhat different, with GOSTA ship data along shipping lanes only, but blended NCEP OI data being virtually global. Global mean annual Reynolds SST anomalies (SSTR) were then converted to modeled GOSTA-compatible SST anomalies (SSTM) for each year, 1982-1997, via the regression (1) SSTM (C) = 0.156 + 1.27 SSTR(C), and those new values were spliced onto the GOSTA record for the years after 1982 (Figure 3). For a thorough explanation of the various SST data sets, see Folland *et al.*, 1993.

The Global Index

NCDC now had readily updatable global LAT and global SST anomalies through November 1997. Since the LAT data set was essentially independent from the SSTs (except for some pre-1950 GOSTA adjustments), it was decided to treat LATs independently from SSTs. To combine these data, the LAT were weighted with a coefficient of 0.3

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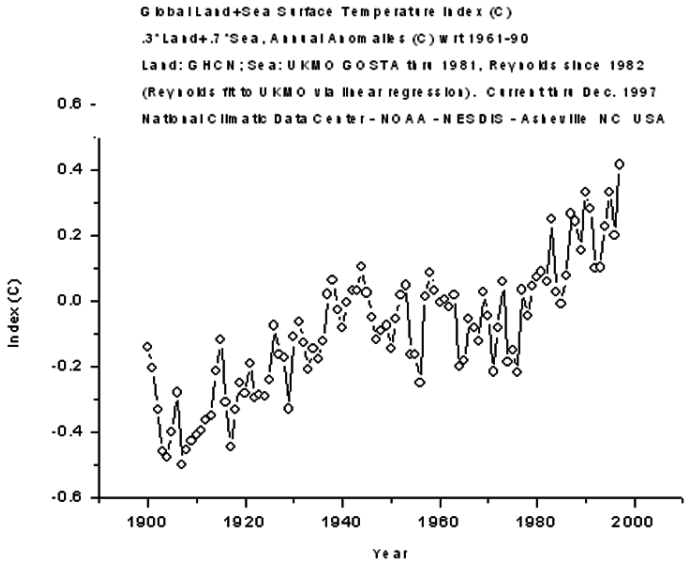
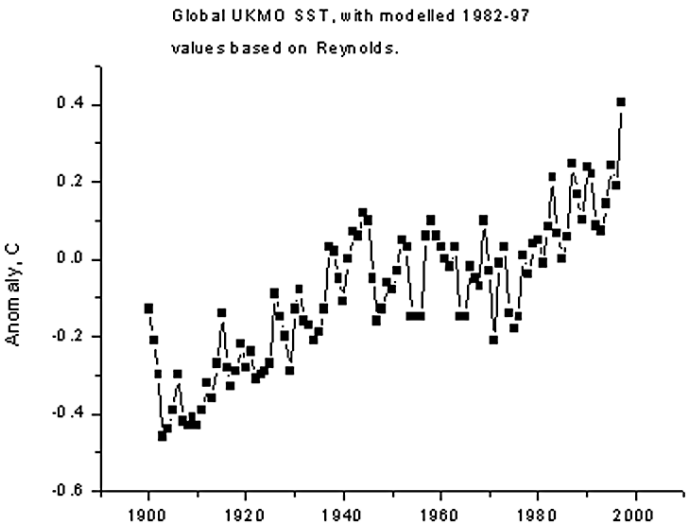


▲ **Figure 4.** The combined land-air surface temperatures and sea surface temperatures global climatological index; the data indicates that 1997 was probably the warmest year of the century.



▲ **Figure 5.** The trends demonstrated by this United Kingdom product for global temperatures were in agreement with the NCDC's global climatological index (Figure 4).

Global Climate, *from page 7*
(since about 30% of the surface of the Earth is land) and the SST with 0.7 (as the globe is about 70% ocean). It is called an index since it is a combination of air and sea temperatures, and ignores ice-covered sea. Although this has the effect of counting the grid boxes twice when both LAT and SST were available for the same box, it was believed this would not bias the results inordinately because the residual errors are basically random. (This remains to be seen and will be a topic of future research). When comparing the resulting index (Figure 4) to Hansen's data (*www.giss.nasa.gov*, documented in Hansen and Lebedeff, 1987; Reynolds and Smith, 1994; Smith *et al*., 1996), the match was very good (r=0.95) for the period for which Hansen has a land-ocean product (1950 to the present, also using NCEP OI SST). Work began on news release, emphasizing the GHCN results, and also stating that the preliminary global temperature results were in agreement with the U.K. (Figure 5)—that 1997 was likely the warmest year this century.

On January 8,1998, when the final numbers were produced and NOAA public affairs completed their work on a press release, Joe Friday, Tom Karl, Tom Peterson, and Jim Laver held a press briefing at the National Press Club in Washington, D.C. The Global Index proved to be very popular and press coverage was at saturation levels. The President and Vice President used the data in policy briefings and all major networks and newspapers covered the story.

NCDC gained the following learning experiences: Get everything you can onto the web as soon as you can, including small downloadable datafiles and Celsius - Fahrenheit conversions. When displaying global absolute data values (which many clients insist on) rather than anomalies, use 14C (57F) as a global base temperature for everything. Changing the base for the index (which has a warmer base temperature than the globe as a whole, partly because ice areas are omitted) only confused people. NCDC felt a little uncomfortable with all this, knowing that numbers tell only a tiny part of a very big, complex climate story. However, the climate issue is an important issue and it is very rare that a government agency can bring the matter to the forefront of the news.

In conclusion, NCDC would like to emphasize that the relative ranking of the year's temperature (in this case the warmest) is not as important as the fact that the warming trend is continuing. The trend is probably real, as there are several other independent indicators that are consistent with the observed trends (sea level rise, glacier retreat). There is a plausible physical mechanism (enhanced greenhouse gas concentrations in the atmosphere), and there are numerical models that indicate the enhanced greenhouse gas concentrations are at least partly responsible for the observed trend. There are other explanations as well (solar variability, natural climatic variability, etc.), but at least a part of the recent climatic warming is likely inducedby an enhanced greenhouse effect resulting from increases in anthropogenic greenhouse gas concentrations. NCDC states that one thing is obvious: the need to do what can be done to convince the policy makers that, at the very least, we need to continue monitoring the climate and need to be able to provide more reliable data for future insertion into these time series.

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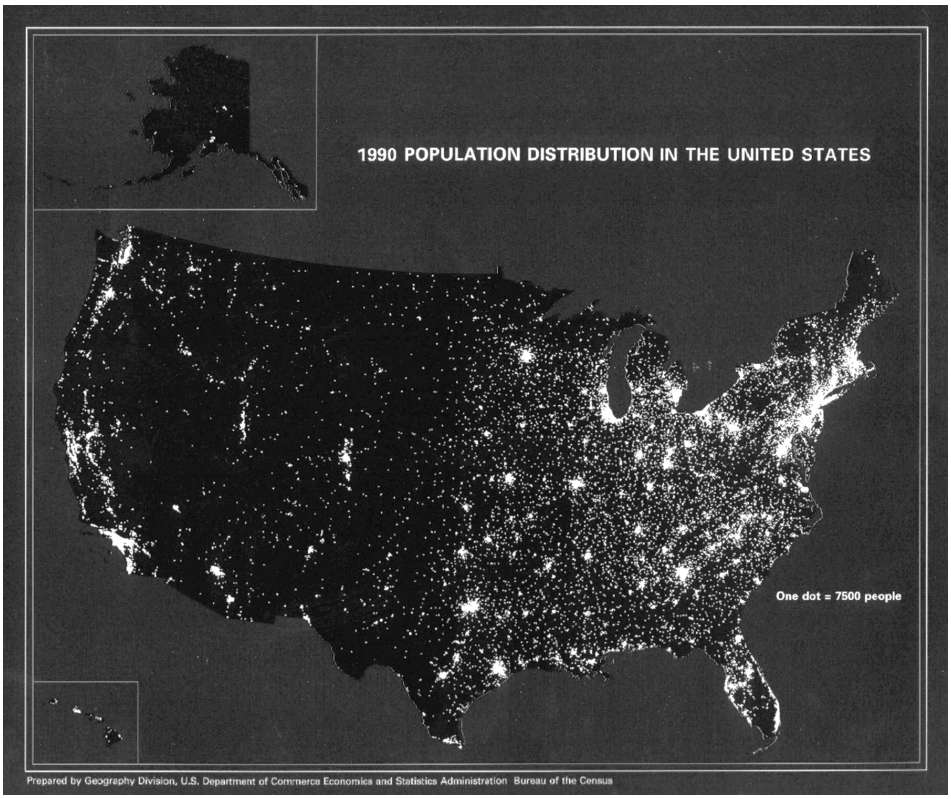
LOICZ and NODC share common waters

LOICZ program and National Oceanographic Data Center add to knowledge of coastal processes



▲ **Figure 1.** The "Nighttime Map" as prepared by the U.S. Bureau of the Census clearly shows the large concentration of population along the U.S. coasts.

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The Land-Ocean Interactions in the Coastal Zone (LOICZ) program and the National Oceanographic Data Center (NODC) synergistically are opening the ports to a greater understanding of our planet's coastal regime. Global-scale investigations of the open oceans and atmosphere have been given high priority by the international scientific community over the past two decades. The Tropical-Ocean Global-Atmosphere (TOGA) program laid the observational ground work and initiated an immense increase of our understanding of large-scale ocean-atmosphere interaction. While TOGA focused primarily on the tropical oceans, the World Ocean Circulation Experiment (WOCE) spread the observational network throughout the global oceans and has provided an extraordinary snapshot of the behavior of the oceans during the 1990s through a vast variety of measuring and modelling schemes. The TOGA and WOCE programs have concentrated mostly on physical characteristics of the oceans.

Contemporaneous with WOCE, the Joint Global Ocean Flux Study (JGOFS), has focused on biological and geochemical components of ocean-atmosphere interaction. JGOFS has demonstrated the colossal role of the oceans in maintaining Earth's balance of geochemical properties through dynamical and biological interactions and has given us clues to the extent of potential greenhouse warming by means of a better understanding of the ocean's role in carbon cycling. It is inherently obvious that the next logical domain of study be focused on the coastal regimes to quantify the significance of the fluxes of properties from land into the open waters. This, of course, is the region of the world ocean most affected by both immediate human activities at the coast (Figure 1) and by the hydrological "signal amplification" as land-based climate changes are imposed on the coast. Dealing with this region is the primary goal of LOICZ.

Since the beginning of 1997, the NODC has aimed significant attention to the task of identifying and acquiring data from the coastal regimes, building the framework for efficient management and distribution of a long-term central archive, and ensuring the approval of the scientific, educational, commercial, and public coastal ocean communities through a series of workshops. One of the conclusions of these workshops was the need for cooperation and collaboration with large scientific research programs.

What is LOICZ?

The Land-Ocean Interactions in the Coastal Zone is the core project of the International Geosphere-Biosphere Programme (IGBP) of the International Council of Scientific Unions (ICSU) that focuses on the area of the earth's surface where land, ocean, and atmosphere meet and interact (Pernetta and Milliman, 1995). The general goals of this multinational and multidisciplinary project are to determine at regional and global scales: 1) the nature of the dynamical interaction of the land-air-ocean interface; 2) how these interactions affect the coastal zones and the role of the effects on global cycles; 3) to assess the anthropogenic influence; and 4) to provide a sound scientific basis for sustainability of the coastal regimes.

This ten-year project commenced in 1993 with the establishment of the International Project Office (IPO) at the Netherlands Institute for Sea Research (NIOZ), Texel. The IPO, through guidance of the LOICZ Scientific Steering Committee (SSC), coordinates over 2000 nationally-funded scientists in 130 countries by providing a central

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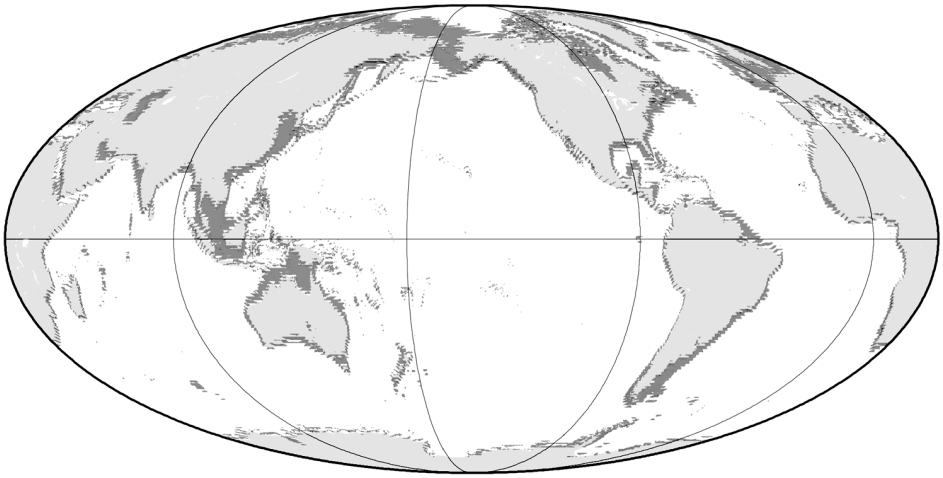
LOICZ, *from page 9*

World Wide Web page (*http://www.noicz.nl/loicz*) and the publication of a quarterly newsletter, which can be downloaded from their web site.

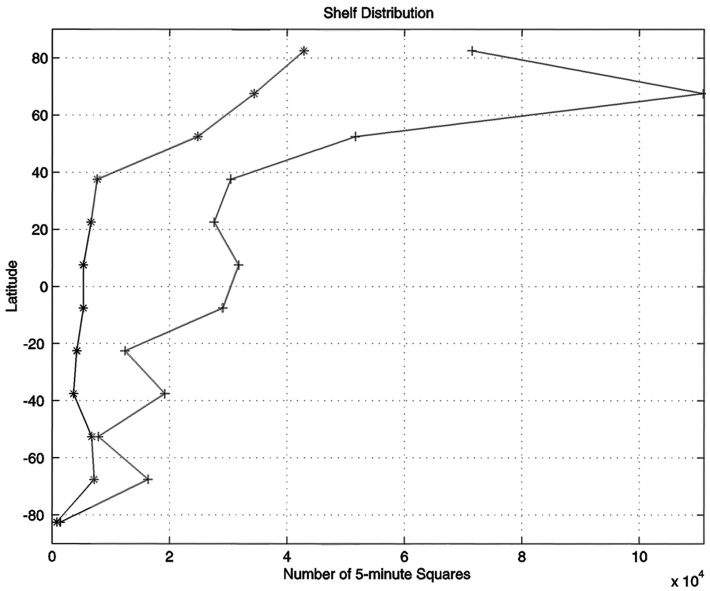
Much of the LOICZ research is being carried out by a distributed network of coastal zone researchers. National LOICZ contacts have been identified in many countries to provide a linkage between national and international LOICZ research activities. These people provide a first point of contact for persons interested in getting additional information on local and national LOICZ research.

One of the principal oceanographic elements of LOICZ is the joint JGOFS/LOICZ Continental Margins Task Team (CMTT) which has been established to promote and coordinate research on fluxes across the continental margins (Figures 2 and 3) from land to the open ocean. One of the necessary steps of this objective is to develop a typology of coastal regimes to quantify parameters for models. This involves selecting regions with adequate observational information that have common characteristics with other locations that do not. For each type, geochemical property budgets within adjacent estuaries are defined and fluxes into the coastal waters are estimated to determine the resulting flux across the shelf and into the open ocean. These, in turn, will support global modeling efforts of various parameters, such as the highly important carbon cycle.



▲ **Figure 2.** Coastal shelf regions are highlighted for depths less than 100 m (grey) and between 100 and 200 m (black) as derived from the ETOPO5 data set (National Geophysical Data Center). The depths less than 200 m represent roughly 7.6% of the global ocean, while depths less than 100 m have about 6.5%. These considerations are important in defining the boundaries of the coastal regime.

The success of this task requires the direct availability of and ready access to data and data products derived from a vast spectrum of measurements and model output. Since the LOICZ program does not have a specific observational component, the program requires access to existing data sets, such as from the coastal modules of the Global Ocean Observing System (GOOS) or the Global Oceans Ecosystems Dynamics (GLOBEC) experiment. The cooperation of various national and international data centers and research agencies as well as the open exchange among individual scientists are crucial considerations of LOICZ scientists. The LOICZ IPO has initially approached this task by creating a web page with links to online data sets. However, the program would benefit greatly if a more unified effort was undertaken for centralizing or linking distributed coastal data systems.



▲ **Figure 3.** The distribution of shelf depths as a function of latitude also shows the depths less than 100 m (+) to represent a much greater area than depths between 100 and 200 m (*). About 67% of the world's shelf lies north of the Equator and 86% lies north of 30 S, coinciding closely with the distribution of human populations.

The NODC coastal data initiative

NODC holds a variety of coastal ocean data sets (Hamilton, 1997), although primarily of the physical oceanographic type. Several of these have overlap with the open ocean such as the Profile Database (temperature, salinity, nutrients, and other parameters measured in the water column at a specific site and time), the Marine Environmental Buoy Data set, current motion sets as measured at fixed locations and from shipboard Acoustic Doppler Current Profilers, and remote sensing archives, such as CoastWatch.

Other data sets are exclusively coastal, such as the real-time online beach temperature reports, the Coastal Environmental Assessment Data (a selection of multi-disciplinary data collected in the 1970s and 1980s at a few specific sites), and the Joint Archive for Sea Level (JASL), a collaboration of NODC with the University of Hawaii Sea Level Center through the support of the regional NODC liaison. The JASL is the largest collection of research quality hourly, daily, and monthly values from

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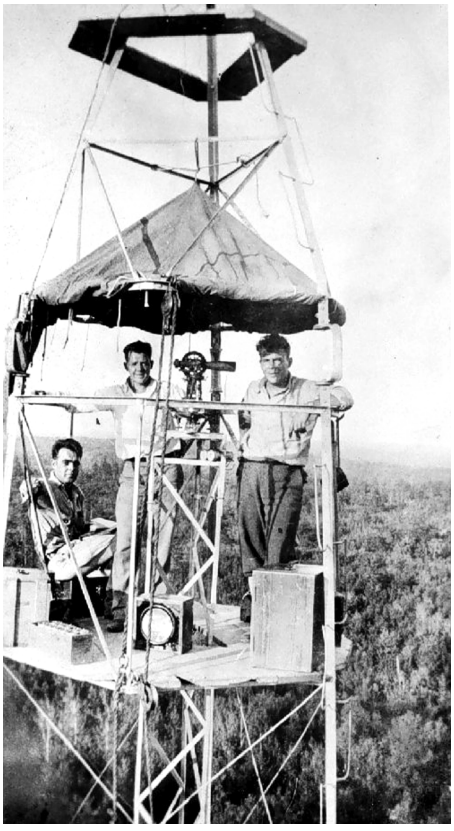
The Coast and Geodetic Survey Album

Library presents images in time of the first science agency

Albert E. Theberge
NOAA Central Library
NOAA/NESDIS/NODC
Silver Spring, MD

The NOAA Library, in cooperation with the NOAA Home Page Design and Construction Team, is developing a Web site devoted to historic photographs of the predecessor agencies of the National Oceanic and Atmospheric Administration. These agencies were the Coast Survey, the Weather Bureau, and the Bureau of Commercial Fisheries in their various forms and names. They were instrumental in helping develop the infrastructure of modern American science. For instance, the Coast Survey is the oldest physical science agency in the United States, having been authorized by Congress in 1807. The Coast Survey and its descendants, which include NOAA's Office of Coast Survey, the Office of NOAA Corps Operations, and many other elements of NOAA, helped in the formation of the Smithsonian Institution, National Institutes of Standards and Technology, the American Association for the Advancement of Science, the National Academy of Sciences, and the American Geophysical Union.



▲ **Figure 1.** A group of Coast and Geodetic surveyors ready to observe angles from a 100' portable Bilby steel tower in the Missouri Ozarks, 1934.

The goal of this project is to develop three separate family albums chronicling the accomplishments, instrumentation, methodology, and personnel of these organizations. The Coast and Geodetic Survey Album is the prototype album and has over 3,000 images on line, some of which date back to the 1830s. These images are organized by major topics such as Geodesy or Charting and then further organized by category. By clicking on a category, a page of ~20 "thumbnails" will be accessed; a patron can click on a thumbnail to access a larger image.

Although captions are not presently available for the larger images, a database is being built that will provide information such as photograph source, personnel names if identified, ship names, and descriptions of activities. The individual images are in .JPEG file format and occupy ~50 kilobytes. Much higher resolution .JPEG files will be available in the future.

The "bread and butter" of the Coast Survey and Coast and Geodetic Survey were geodetic operations and nautical charting. The geodetic operations were the foundation of the nautical chart and also much of the civil surveying conducted in the United States. As such, Geodesy is the first section in the album. Geodetic operations were multifaceted and included: astronomic latitude and longitude observations, triangulation work with tower building (Figure 1), base line measurements and observing angles (Figure 2), topographic work and photogrammetry,

▲ **Figure 2.** Unconventional means were sometimes used to determine elevations. Here a coast surveyor keeps a tape vertical while being hoisted by a U.S. Coast Guard crane at Anacapa Island, California.

and geodetic leveling (Figure 3), which established mean sea level as the accepted datum for elevations throughout the United States and its territories.

Intrinsic to all of these operations were "Getting There" and "Camping Out." "Getting There" involved walking, climbing, packing, driving a variety of mechanically-powered vehicles, sledding, riding horses and mules, taking oxcarts, and in general making use of most means of conveyance known to humankind. Particularly interesting are

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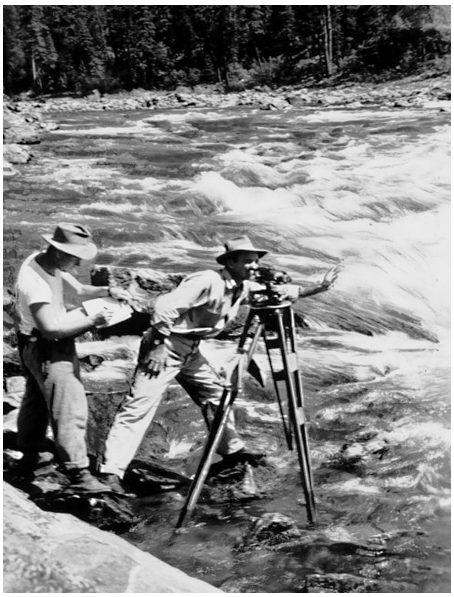
National Oceanographic Data Center
NOAA/NESDIS, E/OC4
1315 East-West HIghway
Silver Spring, MD 20910
E-mail: stheberge@nodc.noaa.gov



▲ **Figure 3.** The Coast and Geodetic Survey ran thousands of miles of levels throughout the United States to establish elevations relative to sea level. Here a crew is working in a canyon of the Salmon River, Idaho in 1945.

Images in time, *from page 11*
the truck photos beginning in 1913 (Figure 4) when there were few gravel roads and fewer paved roads, few adequate bridges for automobiles, and few to no service stations and automobile mechanics. Once the surveyors got to their destinations, there were usually no hotels or restaurants for miles, so they had to be expert campers. Coast surveyors (Figure 5) lived primarily in tent camps well into the 1930s in the lower 48 states and made use of large tent camps in Alaska well into the 1950s.

Nautical Charting encompasses "Ships", "Boats", "Soundings", "Navigation", "Tides" and other aspects of the background work necessary to produce a nautical chart. "Ships" includes over 250 images of Coast Survey ships dating back to the 1830s (Figure 6) and extends up to modern vessels that are still active in the NOAA Fleet. The "Boats" photos contain images of sounding boats and work boats, including many late nineteenth century and early twentieth century work vessels used by the Survey.

"Soundings" includes images of instrumentation and the resulting charts and maps from the time of the leadline, through single-beam electronic sounding, to the modern multi-beam deepwater systems that were used in offshore surveys within the past ten years. A highlight of this collection is the earliest known depiction of a Coast hydrographic survey crew conducting sounding operations at Strawberry Harbor in Rosario Straits, Washington, in 1857.

▲ **Figure 4.** "Getting There": a one-and-a-half ton truck outside Denver, Colorado in 1913.

Besides Geodesy and Nautical Charting, other major topics within the Coast and Geodetic Survey album are Geophysics, Oceanography, Who Was Who, War Service, and Coast and Geodetic Sights and Views. Concerning oceanography, the Coast Survey was perhaps the first organization in the world to conduct systematic oceanographic operations beginning with Gulf Stream studies in 1845. It was also the first Federal agency to conduct large-scale geophysical operations beginning with magnetic observations in the 1840s, to work on the development of gravity studies beginning in the 1870s, and finally was involved in the accretion of further geophysical functions including seismological observatories and field operations in the early 1900s.

In the realm of Who Was Who, many prominent Federal scientists and science administrators are found as well as many lesser known officers and employees of the Survey. Leaders of the Survey found in this collection include nineteenth century personalities such as Ferdinand Hassler, Alexander Dallas Bache, and Benjamin Peirce. Great scientists and engineers whose portraits are included in the Coast Survey album include George Davidson, Charles Schott, Henry Mitchell, Charles Sanders Peirce, Rollin Harris, William Bowie, and Charles Whitten.

Surprisingly, many of the military leaders of the Civil War served with the Survey in the ante-bellum years. On the Union side these included Andrew Atkins Humphreys, E. O. C. Ord, John Dahlgren, and David Dixon Porter. Confederate officers who served with the Survey prior to the war included Joseph Johnston, Ambrose P. Hill, Richard Ewell, and the "Prince of the Privateers," John Maffitt. In the first two-thirds of the twentieth century, the Survey was led by a number of strong personalities such as Ernest Lester Jones, Raymond Stanton Patton, Leo Otis Colbert, and H. Arnold Karo, whose portraits are all found in the Coast Survey album.

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▲ **Figure 5.** "Getting There": triangulation party of William Scaife headed to boundary markers on the Alaska-Canada border at Twin Glacier, southeast Alaska in 1929.

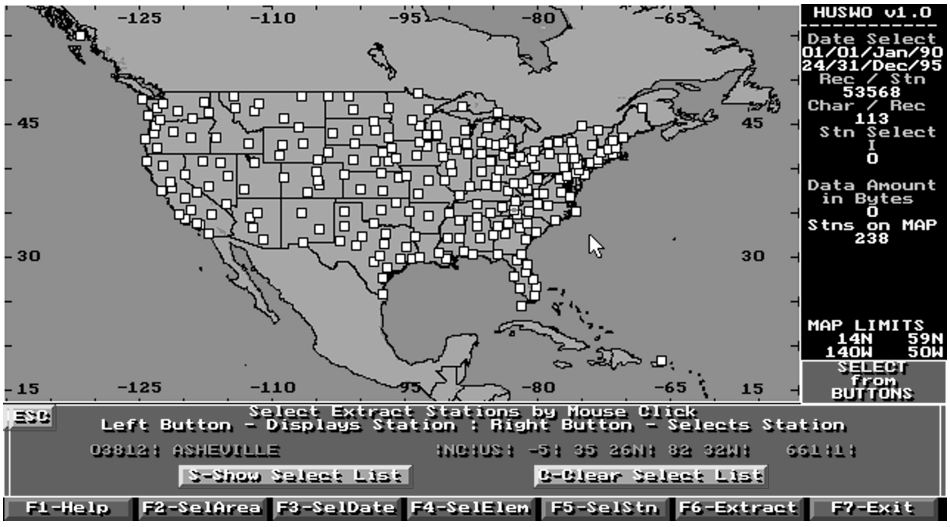
NCDC releases Hourly U.S. Weather Observations and International Station Weather Observations on CD-ROM

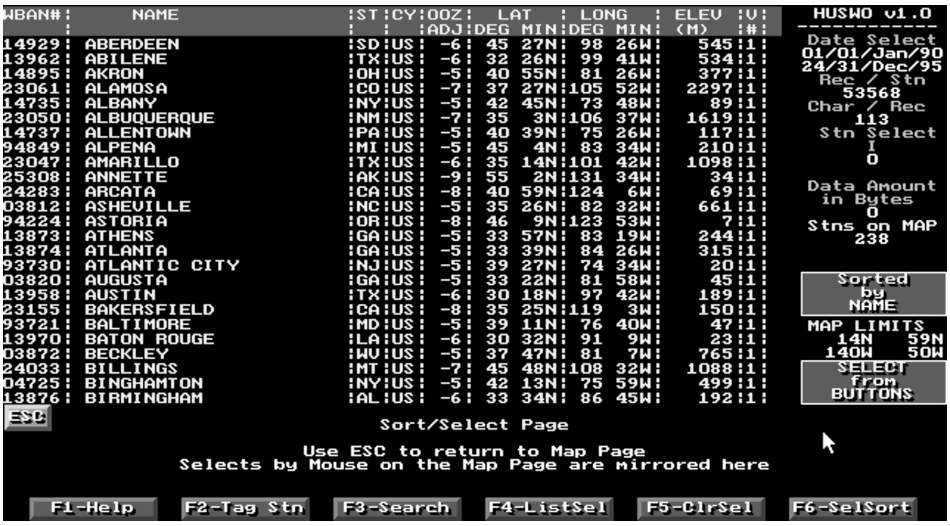
The National Climatic Data Center (NCDC) has released the Hourly U.S. Weather Observations (HUSWO) CD-ROM, which contains 1990-95 hourly weather data for 262 National Weather Service locations. It has a map interface and station list for data selection, or you can copy the data files directly from the CD (without using the interface). The elements included are: total and opaque sky cover; temperature and dew point; relative humidity; station pressure; wind direction and speed; visibility; ceiling height; present weather; ASOS cloud layer data; snow depth; and hourly precipitation. Data can be output in either English or Metric units. A complete user help system is included, with data format information and details on usage of the system.

The interface, although not Windows-95 based, is quite easy to use. Windows-95 users may need to reboot in DOS mode to have full usage of the CD software. Also, any user may access the data directly from the CD-ROM without using the software if they prefer. We included a booklet with the CD to provide these and other instructions. The map interface and first page/screen of the station list interface are shown in Figure 1.

You may order this CD-ROM through the NCDC web interface at URL: *http://www.ncdc.noaa.gov/ol/climate/climateproducts.html*; via e-mail to *orders@ncdc.noaa.gov*; or phone NCDC at 704-271-4800.

This was a joint project by NCDC and the Environmental Protection Agency (EPA). The data will be used by the EPA in numerous models and research projects. It serves as a follow-on to the Solar and Meteorological Surface Observing Network (SAMSON) CD-ROM set, which contained 1961-1990 data. (Note that HUSWO does not include solar radiation data.)





▲ **Figure 1.** Map interface and first screen of station list contained on NCDC's newly-released Hourly U.S. Weather Observations (HUSWO) CD-ROM.

INSWO CD-ROM

NCDC has scheduled a spring 1998 release for the International Station Weather Observations (INSWO) CD-ROM set (six CDs). This CD-ROM will be Windows-95 based, using a world wide web-type map interface. The dataset includes hourly and/or synoptic (every three hours) climatic data for 1500 international stations for 1982-1997. It provides excellent worldwide coverage of city locations, including U.S. stations. The dataset was designed and stations selected for the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). The 1982-1993 version was used to develop the climatological tables for the 1997 ASHRAE Handbook of Fundamentals.

The elements included are: total sky cover; cloud types by layer; lowest cloud height; ceiling height; temperature and dew point; sea level pressure; altimeter setting; wind direction, speed, and gust; visibility; three-hour pressure change; present weather; and past weather. You can check on availability of the CD-ROM set at the web address shown above, by e-mail to *orders@ncdc.noaa.gov*, or by calling 704-271-4800—during or after April 1998.

—Neal Lott
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LOICZ, *from page 10*

over 350 sites globally (Caldwell and Merrifield, 1997).

Although the NODC's holdings are significant, a large number of coastal data sets remain at large within the control of other national, state, and local agencies as well as various research organizations affiliated with universities, beneficiary arrangements, or private consulting firms. These represent a diverse collection of information on a variety of temporal and spatial scales and among the various disciplines. The NODC director, Dr. Henry Frey, has given very high priority to resolving how best to approach the coastal oceanographic data management issue.

One of his first steps was to listen to the needs of the coastal oceanographic community. In March of 1997, over 100 scientists attended the first NODC Coastal Data Workshop (NOAA, 1997) to share experience pertinent to the NODC's approach to the prioritization, archival, and management of coastal data and information. The response was tremendous and a list of recommendations was compiled for various aspects related to data acquisition, quality control, management, products, and distribution. As a follow-up, working groups were assembled in October 1997 (NODC, 1997) to focus on these recommendations. One of the conclusions of this workshop was the need to collaborate with large research programs.

Mutual support

The cooperation between LOICZ and NODC provides great benefit to each. NODC has offered help with three primary activities: 1) exposure of the LOICZ program through publications such as the Earth System Monitor; 2) links to the LOICZ web site from the NODC home page (under construction); and 3) acquisition, management, and distribution of global multidisciplinary coastal data.

Assistance is also being provided by the NODC Hawaii-based liaison, Mr. Patrick Caldwell, through collaboration with Dr. Stephen V. Smith, who is co-chairman of the LOICZ CMTT, a member of the LOICZ SSC, and a professor within the School of Ocean and Earth Science and Technology at the University of Hawaii. The NODC presently serves LOICZ as a resource of data and information through the existing archive and as a link to the other NOAA national data centers.

NODC's initiative of coastal data management can be greatly supplemented through the scientific guidance of the LOICZ. Scientific overview in the development of an archive system is essential for many reasons, such as the determination of which data and metadata are critical for saving, the maintenance of sufficient significant figures of the values, guidelines for quality control, the organization of this information in the most logical way for efficient storage and retrieval, and suggestions of desirable products. The LOICZ scientist can also be a valuable resources for contributions of data to the NODC or for referrals to other data holders.

By the year 2010, of the 20 predicted megacities, all but one will be in the coastal regime. The increased population will create greater stress on the environment and require definitive scientific guidance if sustainable development is to be a priority. Moreover, scientists are struggling to understand the important role of the ocean as a carbon sink for estimating global climate change. The LOICZ program and the NODC are both striving to support these tremendously important challenges, and by working together, have a much greater chance of success.

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Acknowledgments

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SXI data meeting with SEC

The National Geophysical Data Center's (NGDC) Dr. Herbert W. Kroehl and Mr. Daniel C. Wilkinson met with Environmental Research Laboratory/Space Environment Center's (SEC) staff to initiate a cooperative plan for the archival, processing, and dissemination of data from the Solar X-ray Imager (SXI) instrument to be flown on GOES (Geosynchronous Operational Environmental Satellite) in the near future. SXI data will record both the spatial and time series evolution of solar activity such as coronal holes, coronal mass ejections, and solar flares. SEC will use these data in real-time to facilitate space weather alerts and warnings. NGDC will maintain the long-term archive of these data for research and modeling purposes. Issues of storage media, formats, products, and calibration were discussed.
Contact: NGDC

Bathymetric data provided to NOAA Tsunami Group

The National Geophysical Data Center (NGDC) has provided the office of Tsunami Inundation Mapping Effort (TIME) with several important bathymetric data sets. A research component of the NOAA Pacific Marine Environmental Lab (PMEL), TIME is a relatively new office, officially dedicated in May 1997. The main purpose of the office is to assist the U.S. Pacific States in the development of maps identifying areas of potential tsunami flooding. The high resolution multibeam data sets, the National Ocean Survey Hydrographic Surveys on CD-ROM and the Marine Trackline Geophysics CD-ROMs will be used to construct both unstructured (finite element) and structured (finite difference) grids, which will be used in computer models. Accurate bathymetry data are essential to the success of this project, and NGDC has provided TIME with the highest quality data available for the majority of the coast of the U.S. Pacific States.
Contact: NGDC

NCDC Products and Services Guide updated

The National Climatic Data Center (NCDC) has updated its Products and Services Guide. This update is rather extensive, especially for the World Wide Web portion, and now includes highlighted sections of all NCDC on-line systems. The new guide is 103 pages long vs. 60 pages for the previous version.
Contact: NCDC

Data products and services

Global Tropical Cyclone Climatology Data Base

The Global Tropical Cyclone Climatology data base, has been updated through 1996 for the four Northern Hemisphere Tropical Storm Basins and through 1996-1997 for the two Southern Hemisphere Basins. The data can be obtained from the National Climatic Data Center.
Contact: NCDC

Greenland Digital SAR Mosaic and Elevation Map available

The National Snow and Ice Data Center (NSIDC) has announced the availability of the Digital SAR Mosaic and Elevation Map of the Greenland Ice Sheet. This CD-ROM combines the most detailed synthetic aperture radar (SAR) image mosaic available with the best current digital elevation model (DEM) of the ice sheet. Further, the CD-ROM comes with software to enable quick viewing of the data. This characterization of the ice sheet provides a reference against which future change can be measured. Changing conditions resulting from climatic variation should show up as changes in the ice margin and shifts in the hydrologic zones. It is hoped that the standard reference provided by this data can facilitate activities aimed at change detection and promote other work aimed at understanding the processes operating on the ice sheet.

The data set is available at no charge, but for research-oriented purposes only. A signed research agreement must be received before the data can be shipped. A copy of the research agreement is available on the WWW from the NSIDC data catalog at URL: *http://www.nsidc.colorado.edu/NSIDC/CATALOG/ENTRIES/nsi-0052.html* under "data documentation".
Contact: NSIDC

NCDC announces new products available online

The National Climatic Data Center (NCDC) has recently released several new or updated climatological products. All are accessible via the NCDC home page (*http://www.ncdc.noaa.gov*) or at the specific addresses shown below:

- Web page describing the January 6-9 eastern U.S./Canada ice storm and flooding. Includes short narrative, radar/satellite images, and other pertinent information, and can be accessed directly via: *http://www.ncdc.noaa.gov/ol/reports/weather-events.html*
- Version 5 of the Global Summary of Day (1994-present) Dataset. Includes 18 daily climatic elements for about 8000 stations; accessible via: *http://www.ncdc.noaa.gov/ol/climate/online/gsod.html*
- SSM/I monthly image products, for surface wetness, surface temperature, and snow cover, derived/modeled from DMSP data. Accessible via: *http://www5.ncdc.noaa.gov/plwebapps/plsql/ssmimain*
- Complete review of the global climate of 1997, one of the warmest years of the century, accessible via: *http://www.ncdc.noaa.gov/ol/climate/research/1997/climate97.html*
- "Climate Change and Weather Extremes" web page which includes links to related reports, data, images, and natural disaster information and bulletins. Accessible via: *http://www.ncdc.noaa.gov/ol/climate/climateextremes.html*

Contact: NCDC

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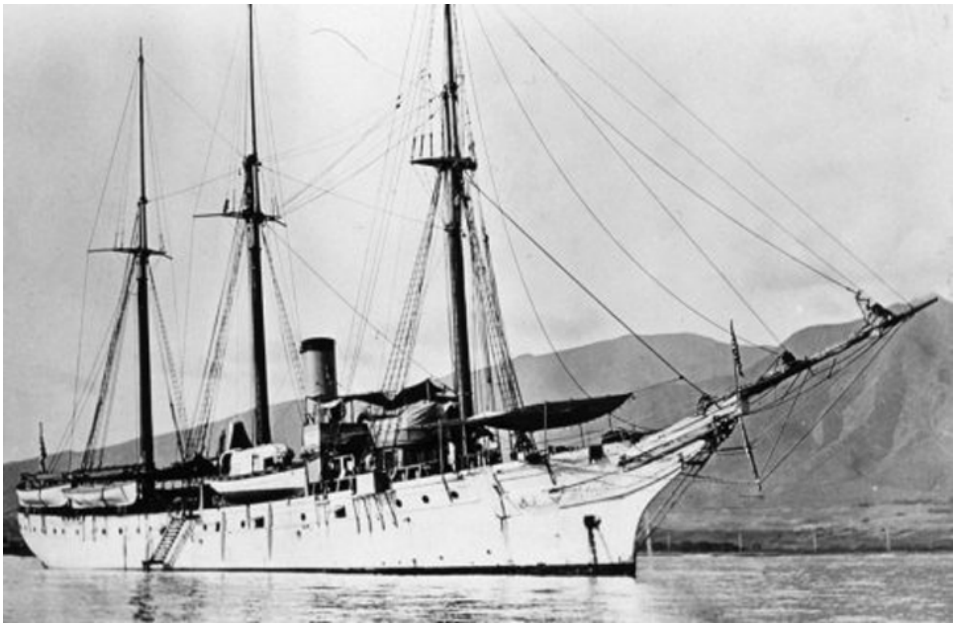

▲ **Figure 6.** The "Ships" section of the Coast Geodetic Survey Album includes over 250 images of Coast Survey ships dating back to the 1830s.

Images in time, *from page 12*

War Service photos are also of historic interest insomuch as the role of the Coast Survey and Coast and Geodetic Survey was very important in the major wars of the United States, beginning with the Civil War. The World War II collection is particularly interesting with pictures of artillery survey operations and pictures of the major Coast and Geodetic Survey vessels that saw wartime service. Survey work accomplished by Coast and Geodetic Survey officers was a major factor in U.S. Army and Marine artillery success during World War II.

Of those Coast and Geodetic Survey vessels serving with the armed forces, the *Hydrographer* was the first United States vessel to enter Massacre Bay on Attu and led the transports and major combatant vessels into the harbor; the *Oceanographer* saw service in the Solomons and hydrographers off this vessel named Ironbottom Sound; and the *Pathfinder* survived over 50 bombing raids between Guadalcanal and Okinawa, was hit by a kamikaze at Okinawa, and conducted postwar surveys of Tokyo Bay. It was said that the "road to Tokyo was paved with *Pathfinder* charts."

The album ends with "Coast and Geodetic Sights and Views": images of the coastlines of America; sights at the ports and islands visited by Coast and Geodetic surveyors; humorous views that transcend time including an 1850 cartoon by a brother of Henry Wadsworth Longfellow; and ocean views. The album, taken as a whole gives a view of the life of an organization; the sort of people that comprised its field and office personnel; and its accomplishments. Anyone who peruses this album can only go away with a feeling of respect for those who surveyed America and its waters.

The Coast and Geodetic Survey Album can be accessed through the NOAA Central Library home page at *http://www.lib.noaa.gov/* through the photo collection or directly at *http://www.noaanews.noaa.gov/lb_images/theb/histcoll.htm*. Complementary sites include the NOAA Historical Map and Chart Collection that was developed by the Office of Coast Survey and the Bibliography of the Appendices of the Coast and Geodetic Survey Annual Reports from 1844-1910. Both of these sites are accessible through the NOAA Central Library home page or at *http://chartmaker.ncd.noaa.gov/ocs/text/map-coll.htm* for the maps and charts and at *http://www.lib.noaa.gov/edocs/cgsreports.html* for the bibliography. Future related sites will include Voices from the Past and Tales from the Survey. ■

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