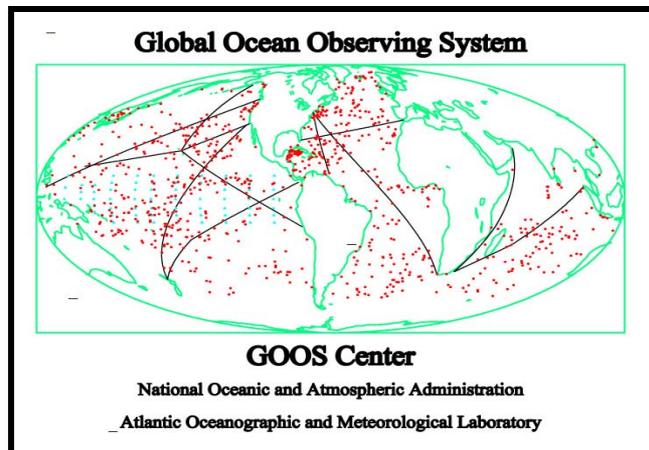




GLOBAL OCEAN OBSERVING SYSTEM (GOOS) CENTER



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GOOS MISSION Statement

To operate and efficiently manage the GOOS Voluntary Observing Ship (VOS), Expendable Bathythermograph (XBT) and Global Drifter (GDP) Programs. To monitor and correct problems with the data flow, from those programs and from the moored Tropical Atmosphere-Ocean (TAO) array, to the National Center for Environmental Prediction (NCEP) on to the Global Telecommunications System (GTS); and to continue the development of Expendable Conductivity/Temperature & depth (XCTD), Thermosalinograph (TSG), and ALACE or P-ALACE float systems with the goal of implementing those systems into the operational structure of the United States GOOS.

OPERATIONAL PROGRAMS

Voluntary Observing Ship (VOS) Program

The GOOS Center presently operates a global fleet of about 400 domestic and foreign commercial vessels. The GOOS global fleet mostly represents a subset of the larger National Weather Service VOS fleet consisting of over 1500 vessels. These vessels voluntarily collect Sea Surface Meteorological, Sub Surface Expendable Bathythermograph, Shipboard Thermosalinograph or atmospheric observations; they deploy Drifting Buoys and highly instrumented P-ALACE type floats and sometimes tow Continuous Plankton Recorders. The GOOS global VOS fleet is the mechanism used to collect observations and deploy instrumentation that transmit, in real-time, data to National Centers such as the National Center for Environmental Prediction. In any given year this network provides the following approximate number of observations:

630,000 Sea Surface Temperature
Observations from
Drifting Buoys

110,000 Meteorological
Observations

30,000 Thermosalinograph
Observations

15,000 Expendable
Bathythermograph
Observations

Global Drifter Program (GDP)

The GOOS Center presently operates a global Drifting Buoy Center that annually deploys, via the Voluntary Observing Ship (VOS) Program, Research Vessels and U.S. Navy aircraft, over 400 Drifters in all three ocean basins. These Drifters are tracked daily via the ARGOS satellite system where their positions and sea surface temperatures (and sometimes other parameters) are processed and inserted on to the Global Telecommunications System (GTS) for global distribution. Approximately 630,000 sea surface temperatures are collected annually via this program. Additionally, the GOOS Center performs the added function of a Data Acquisition Center (DAC) for the Global Drifter Program (GDP). When the deployed Drifters are verified as operational they are reported to the DAC. This effort insures that research quality Drifter data is available from other organizations and countries programs. The Global Drifter Program DAC data is current (within 3 months) in that the data processing updates are completed quarterly.

The Global Drifter Program is a participating member of the Intergovernmental Oceanographic Commission (IOC) - World Meteorological Organization (WMO), Data Buoy Co-operation Panel (DBCP) and as such represents NOAA in this international forum.

OPERATIONAL PROGRAMS

Expendable Bathythermograph (XBT) Program

The GOOS Center operates a global XBT Program that utilizes approximately 70 Voluntary Observing Ships (VOS) to monitor, on a monthly basis, 26 transects in all three ocean basins (see GOOS network plot). The GOOS Center utilizes Shipboard Environmental data Acquisition Systems (SEAS) hardware/software to collect, quality control and transmit in real-time subsurface oceanographic observations (about 15,000 per year) and sea surface meteorological observations (about 110,000 per year). The XBT is an expendable temperature probe that is manually launched from the bridge wings of commercial vessels approximately 4 times per day, along certain scientifically selected shipping lanes. The data transmitted via the wire link from the XBT probe is stored on the SEAS computer where it is processed and formatted for satellite message transmission. The transmitted data is routed to the GOOS Center where it is further quality controlled and then inserted on to the Global Telecommunication System (GTS) for global distribution. The National Center for Environmental Prediction (NCEP) uses this data for weather and climate forecasting as well as for seasonal, interannual and decadal climate research. The XBT program is a participating member of the Intergovernmental Oceanographic Commission (IOC) - World Meteorological Organization (WMO), Ship of Opportunity Program Implementation Panel (SOOPIP) and as such represents NOAA in this international forum.



Expendable Bathythermograph
(XBT) Probe

RESEARCH/DEVELOPMENTAL PROGRAMS

Palace Float Program

AOML has been funded by the National Oceanographic Partnership Program (NOPP) as part of a larger group to develop the infrastructure for the ARGO experiment. Specifically, AOML is to develop the information management methodology for the profiling float experiment. This methodology will take the data from sensor through a real-time quality control to submission onto the GTS for dissemination to the user community. In addition, delayed mode quality control, data accessibility and network evaluation issues will be addressed and procedures developed and implemented.

The principle NOAA user for the float data is the climate forecast group of NCEP. AOML is working with NCEP to develop and implement real-time quality control procedures for the profile data. To satisfy a diverse group of users, data must be provided within 12 hours of collection, 24 hours a day, 7 days a week. Automatic quality control procedures are being developed to meet these requirements.

High Density XBT/Autolauncher Program

AOML presently operates a research and developmental High Density XBT/Autolauncher Program utilizing the Voluntary Observing Ship (VOS) Program. Two routes (Mediterranean Sea to Miami, FL and New York, NY to San Juan, Puerto Rico) are sampled four times per year by placing ship riders on board to collect XBT temperature data. The XBT probe observations are collected at closely spaced intervals. To enable the ship riders to conduct their operations continuously for the duration of a cruise, Engineers at AOML designed an XBT Autolauncher which allows the XBT probes to be launched automatically at preset times and/or positions. In addition to allowing around the clock operations, by deploying XBT probes off the fan tail we reduce potential XBT probe failures.

The mission is to measure the seasonal to inter annual temperature variability in the upper ocean heat content and transport in the center of the subtropical gyre. This effort will improve our ability to predict important climatic fluctuations illustrated by the North Atlantic Oscillation. Plans are to integrate the Autolauncher System with SEAS 2000 to improve positioning via GPS and facilitate the real-time transmission of this data to the GOOS Center.

RESEARCH/DEVELOPMENTAL PROGRAMS

TSG Program

The GOOS Center presently operates a developmental TSG Program utilizing the Voluntary Observing Ship (VOS) Program and oceanographic research vessels in cooperation with our French colleagues in Noumea, New Caledonia and Brest, France. Presently there are 15 participating vessels (3 Research and 12 VOS) providing accurate and timely Sea Surface Temperature and Sea Surface Salinity. The data collected are transmitted in real-time via the Geostationary Orbiting Environmental Satellite (GOES) system. In 1999 more than 30,000 TSG observations were collected and transmitted.

Quality control methods continue to help monitor the data stream for such problems as sensor drift, sensor fouling and hardware failure. As the data are monitored each day, problems are identified and quickly resolved using existing satellite communications systems. Delayed mode data are removed from the vessels by participating scientists during normal port calls and are then sent to the GOOS Center for processing, quality control and archiving.

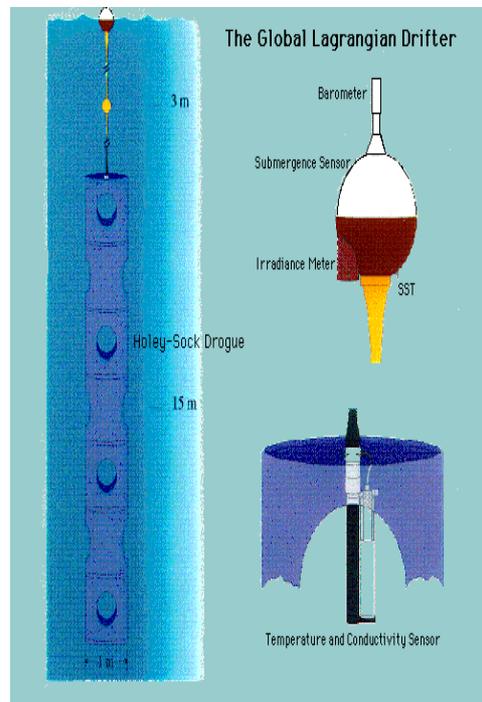


Figure 1. Diagram displaying the low-cost Global Lagrangian Drifter on the left hand side, and the schematics of the sensor attachments (barometer, submergence, SST, irradiance and sea cat), on the right hand side. Most drifters are also equipped with drogue sensors that indicate drogue loss.

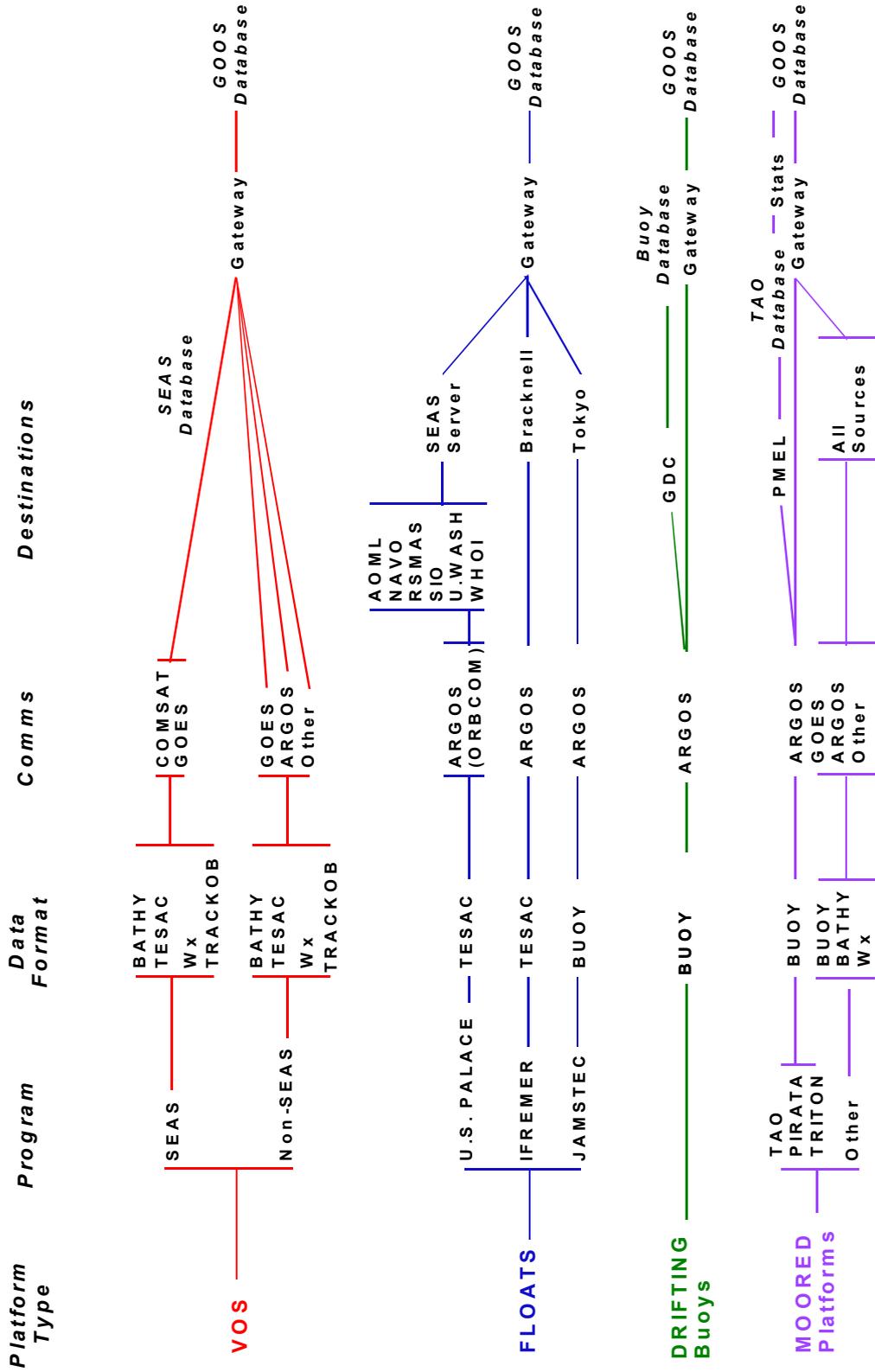
DATA TRACKING AND QUALITY ASSURANCE

Data Tracking

The data tracking effort of the GOOS Center has grown from monitoring of a few dozen SEAS equipped vessels transmitting via GOES satellites to monitoring an expanding suite of in-situ ocean observing platforms composed of all VOS, TAO/PIRATA and TRITON equatorial buoys, drifting buoys, and profiling float (PALACE) data. There are over 6,000 platforms transmitting data via three, soon to be four, satellite systems as well as other conventional modes of transmission into the GOOS database.

The challenge in tracking these observations, as opposed to tidal data for example, are that arrival and volume are not easily predicted. To effectively track observations the user must be familiar with World Meteorological Organization (WMO) code forms, Global Telecommunications System (GTS) characteristics, and GTS bulletin header concepts. However there are only two absolutely essential skills to successfully tracking observations. The first is the ability to recognize patterns in the data, the second is an understanding of how the collection and transmission systems operate. All

observations currently monitored fall into five data formats. These formats are known as WMO Code Forms to the GTS community. The chart on the right show the five code forms currently loaded into the GOOS database. Other code forms will be added as the database evolves.



GOOS Center GOALS:

- Complete and implement automated quality control procedures.
- Merge Drifting Buoy and SEAS Data Bases into single GOOS Data Base.
- Increase network evaluation activities through development of products and analyses and interactions with NCEP and other users.
- Complete Ocean System Implementation Plan and present to Strategic Planning Teams and NOAA management for inclusion in FY2002 budget.
- Improve data access and products generated for the GOOS Center Web site.
- Implement SEAS 2000 shipboard software.

Related web sites:

<http://www.dbcp.nos.noaa.gov/seas/met.html>
<http://www.dbcp.nos.noaa.gov/seas/xbt.html>
<http://seas.nos.noaa.gov/seas/goosplots/GDCSST.jpg>
<http://seas.nos.noaa.gov/seas/goosplots/2twinds.html>
<http://seas.nos.noaa.gov/seas/goosplots/2shipobs.htm>

ACCOMPLISHMENTS:

- Organization of the Global Ocean Observing System Center.
- Merging of Voluntary Observing Ship, Global Drifting Buoy and Expendable Bathythermograph Program operations into single cohesive function.
- Began development of automated quality control procedures with the NCEP for Profiling Float and Expendable Bathythermograph data prior to distribution on the GTS.
- Began development of an Ocean System Implementation Plan for NOAA.
- Performed network evaluation of the Expendable Bathythermograph Network.
- Established Task Order Contract for the long term purchase of Expendable Bathythermograph probes.
- Commenced re-write of SEAS shipboard software to SEAS 2000.
- Marketed GOOS Center activities through articles, presentations and meetings.