AMVER SEAS 2K

**Automated Mutual-Assistance Vessel Rescue System;
Ship and Environmental (Data) Acquisition System**

AMVER SEAS 2K is a Windows based real–time ship and environmental data acquisition and transmission system. The AMVER software creates a series of reports which describe point of departure, route and arrival. These reports, which are transmitted using Standard-C, include ships in a real-time search and rescue database. The SEAS 2K software acquires atmospheric, and oceanographic data and transmits the data real-time for addition to scientific and operational databases. SEAS 2K is employed on volunteer observing ships (VOS) and on NOAA, UNOLS, Coast Guard Vessels.

SEAS 2K provides a mechanism for participation in the United States Coast Guard AMVER Program. AMVER is a computer-based and voluntary global ship reporting system, used worldwide by search and rescue authorities to arrange for assistance to vessels in distress at sea.

SEAS 2K participation includes the recording and transmission of administration reports, sail plans, position and deviation reports, and meteorological (met.) messages. AOML extracts position information from the met. messages for delivery to the AMVER Center. SEAS 2K is installed on 350+ VOS ships and over 200,000 AMVER SEAS met. messages are transmitted per year.
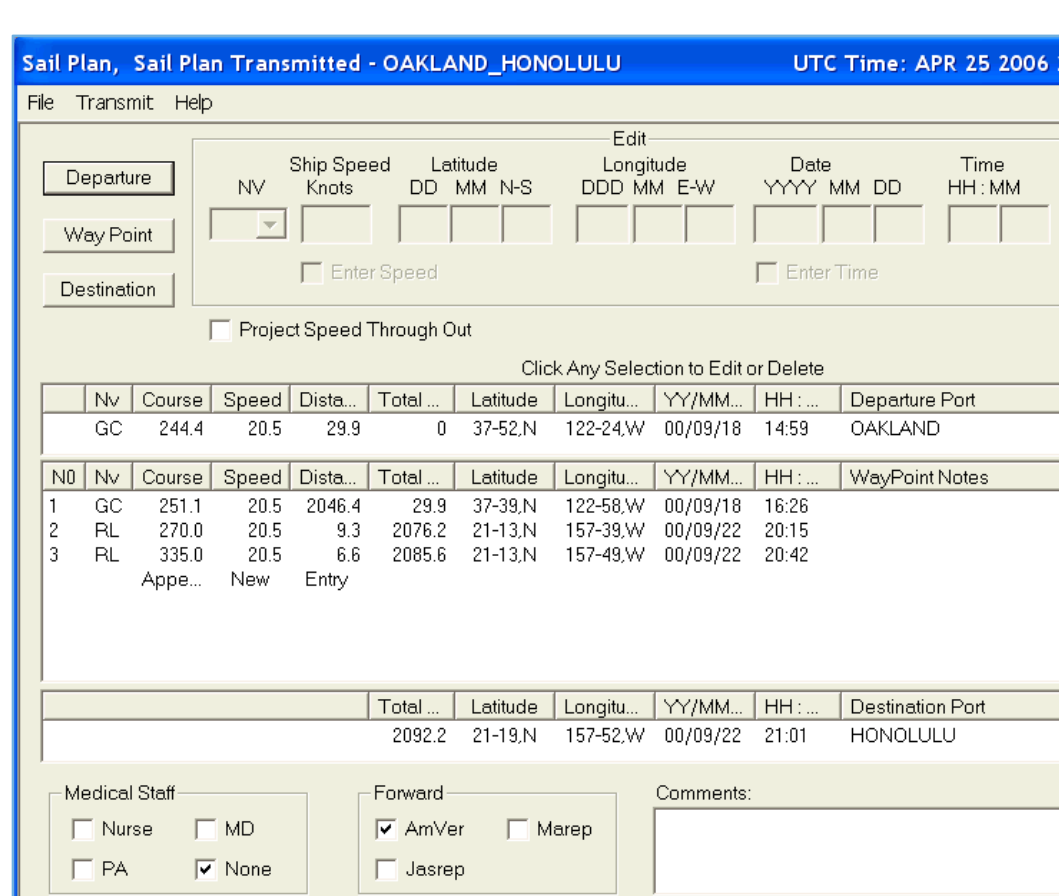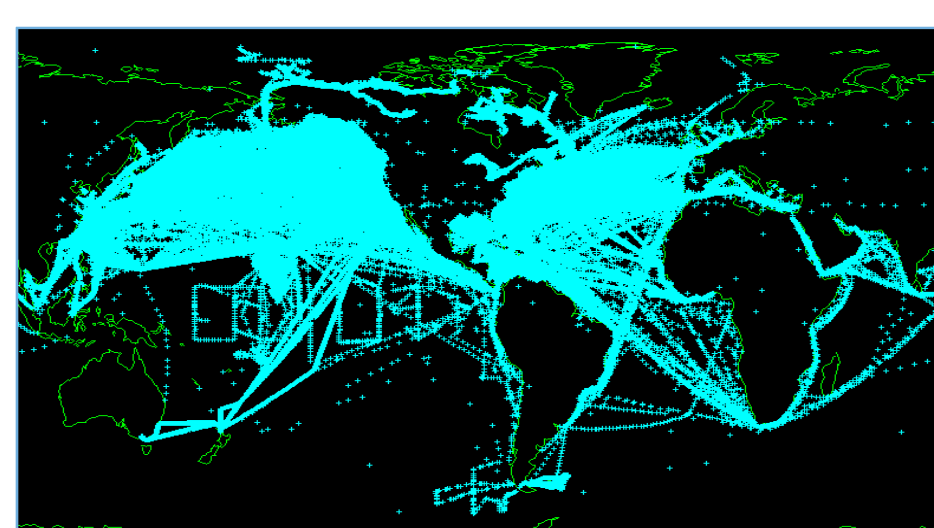

SEAS 2K Sail Plan: Oakland to Honolulu.
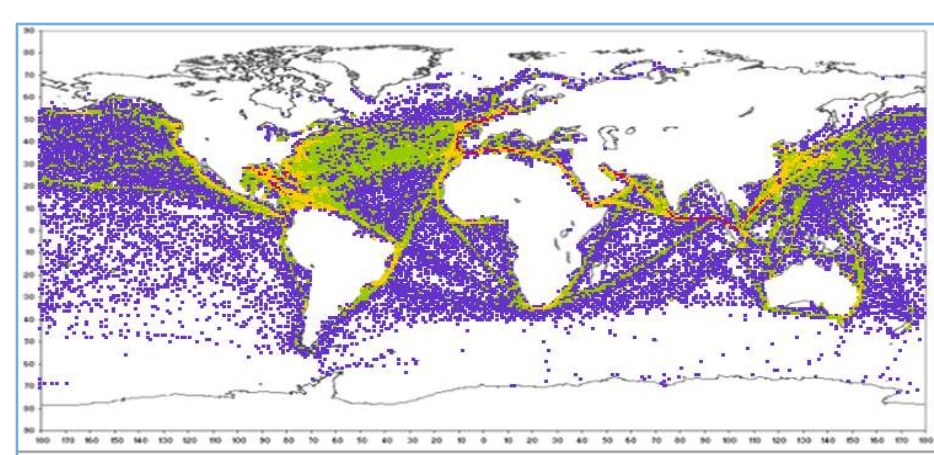
All AMVER msg density plot, month of 3/06

SEAS 2K met. msgs from 4/05 to 4/06

Crew of M/V Cape Nelson and survivors from the Fishing Vessel Abound, that sank 625 miles off the coast of San Francisco.

SEAS 2K was produced in 3 phases. It was developed, and tested in all the worlds oceans, and particularly by NOAA's Atlantic Oceanographic and Meteorological Laboratories (AOML) and SCRIPPS Institution of Oceanography (SIO), the National Weather Service and Woods Hole Oceanographic Institution (WHOI). The SEAS2K software was developed in C++.

• **Phase I:** Development of AMVER reports and meteorological (met.) reports. Transmission began in 2000. Available from SEAS website in early 2001. It is currently installed on 350+ vessels.

Cloud Dialog from SEAS 2K Met Report

SEAS 2K Iceberg Report

• **Phase II:** Hand Launching of Expendable Bathythermographs (XBT's). New developments include Windows interface, Mark21 USB, and direct connection to transmitter. Implemented in 2003.

VOS Container Ship

Hand Launcher on VOS bridge

• **Phase III:** Integration of SEAS 2K with: AOML and SIO auto-launchers and the Mark 21; Automatic met. acquisition; and thermosalinograph.

SEAS 2K auto-launcher test in June 2004. Fully deployed by 2005 on all high density cruises in the Atlantic (AOML) and Pacific (SIO and AOML).

SEAS 2K Computer controlling XBT Auto Launcher

XBT drops displayed on SEAS 2K XBT Program

AOML XBT Auto Launcher

AutoIMET installed in 2002 on the CSX Enterprise. A joint venture between AOML and WHOI, the AutoIMET automatically acquires climate quality met. data for hourly transmission.

SIO XBT Auto Launcher

Shipboard TSG scheduled for test June 2006.

Seabird TSG and SST sensors

WHOI AutoIMET Installation, CSX Enterprise 2002, Oakland CA.

SEAS data is used in a variety of applications by diverse public and private organizations.
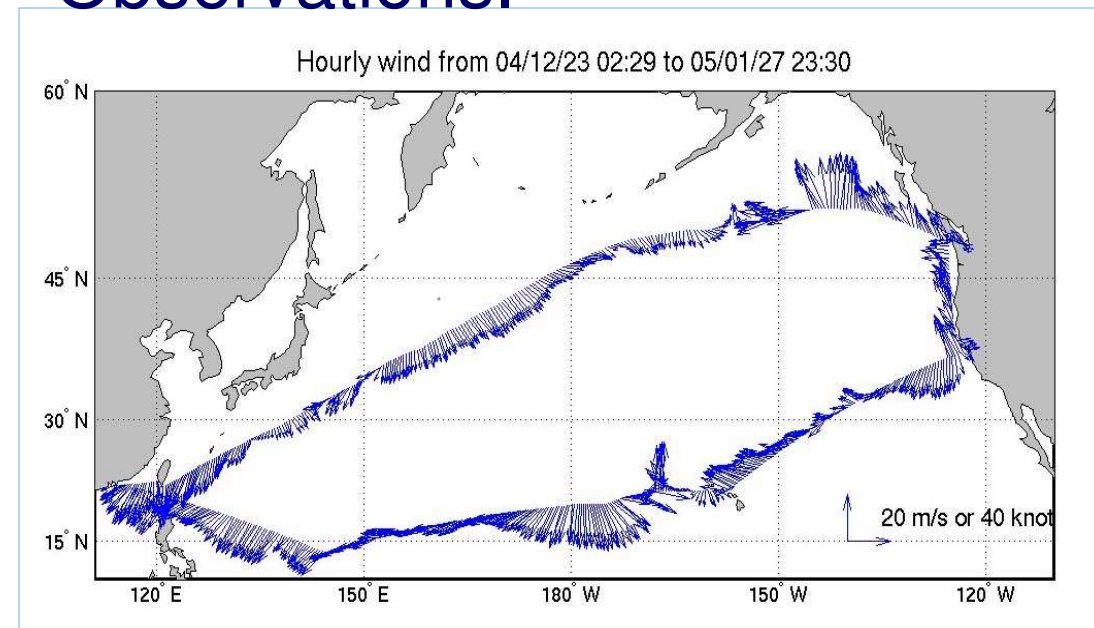
Meteorological data is used for model development of forecasts by national centers and among other things, provides data that can help correct existing climatologies.

Surface analysis, National Center for Environmental Predication.
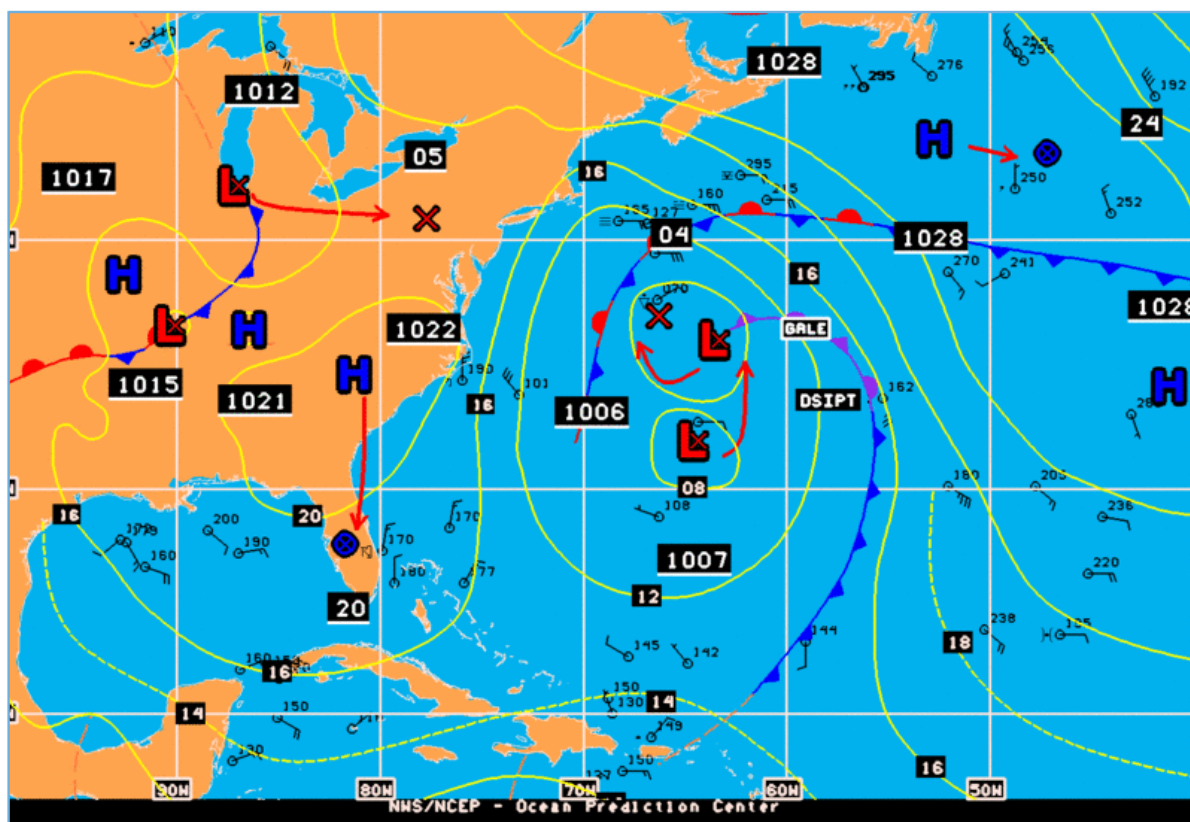
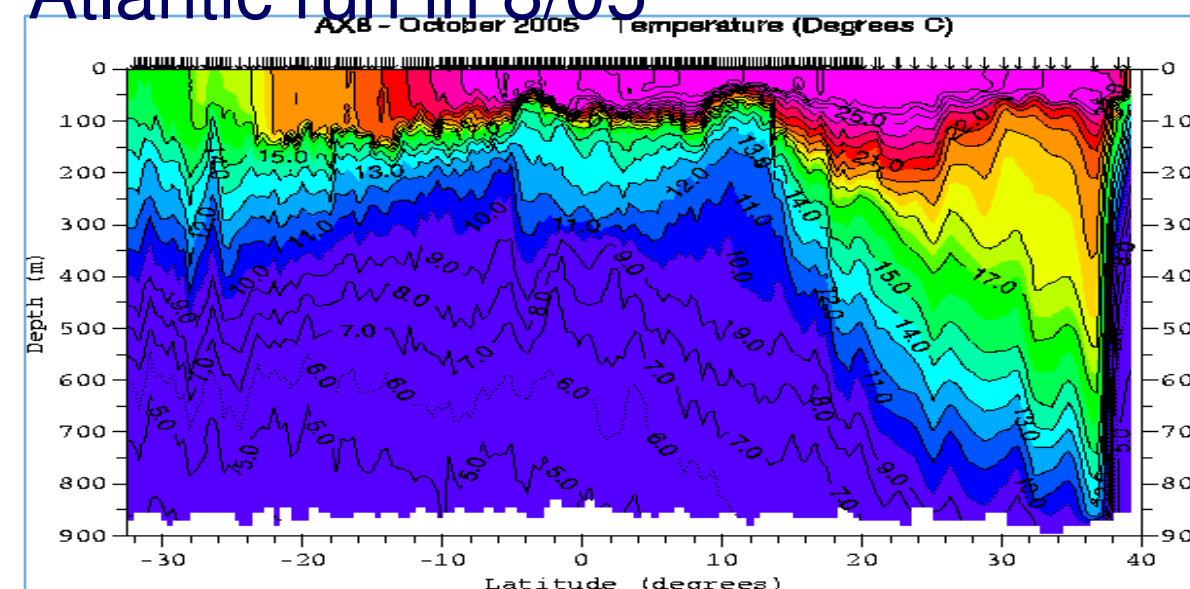Courtesy NCEP - Valid 12 UTC 02 5/06 Sources OPC, TPC, HPC; FCSTR: Rowland.

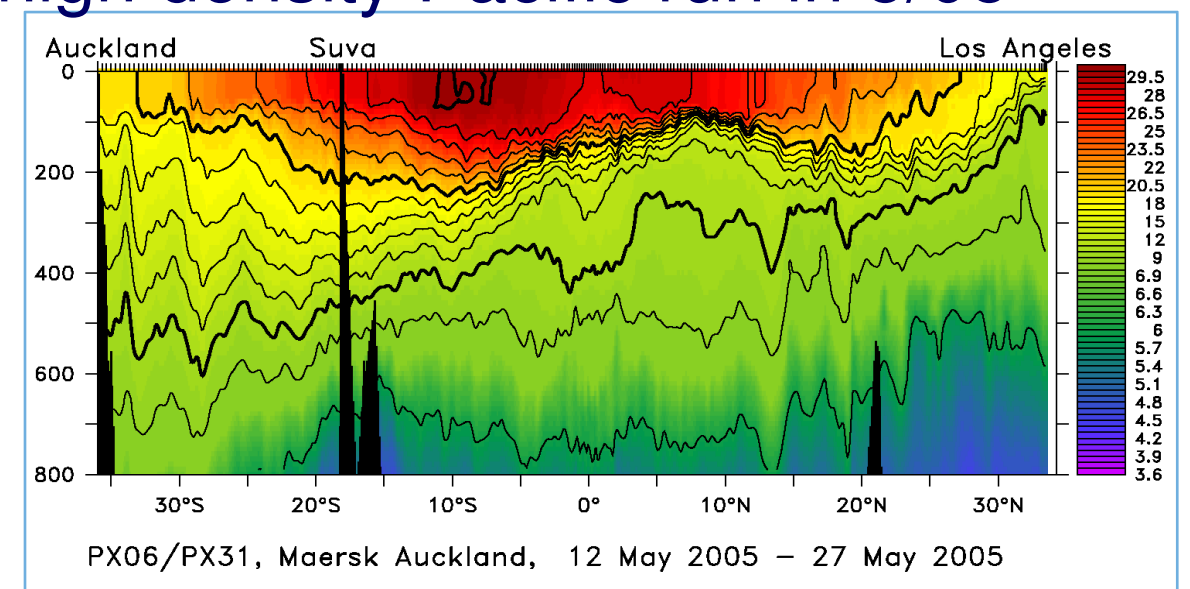WHOI AutoIMET, hourly wind Observations.

Courtesy WHOI

XBT data is used at national centers, including the "National Center for Environmental Prediction" (NCEP) at Camp Springs, MD. and by scientists at laboratories, universities, national forecast centers world wide.

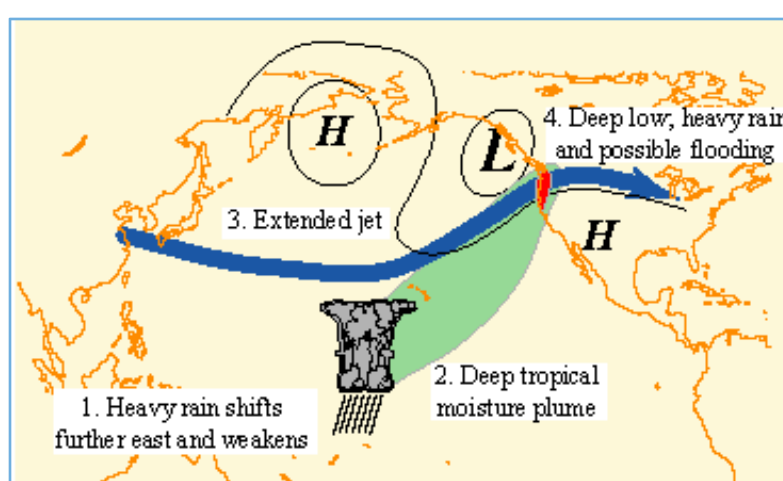AOML temperature/depth cross-section created from SEAS 2K high density Atlantic run in 8/05

Newark to Puerto Rico section plot, courtesy AOML.

Measuring the seasonal to inter-annual variability in upper ocean heat content and transport is important for monitoring and understanding how the ocean responds to changes in surface temperature and improves our ability to predict important climatic fluctuations like the North Atlantic Oscillation.

SIO along track temperature/depth cross-section created from SEAS 2K high density Pacific run in 5/05
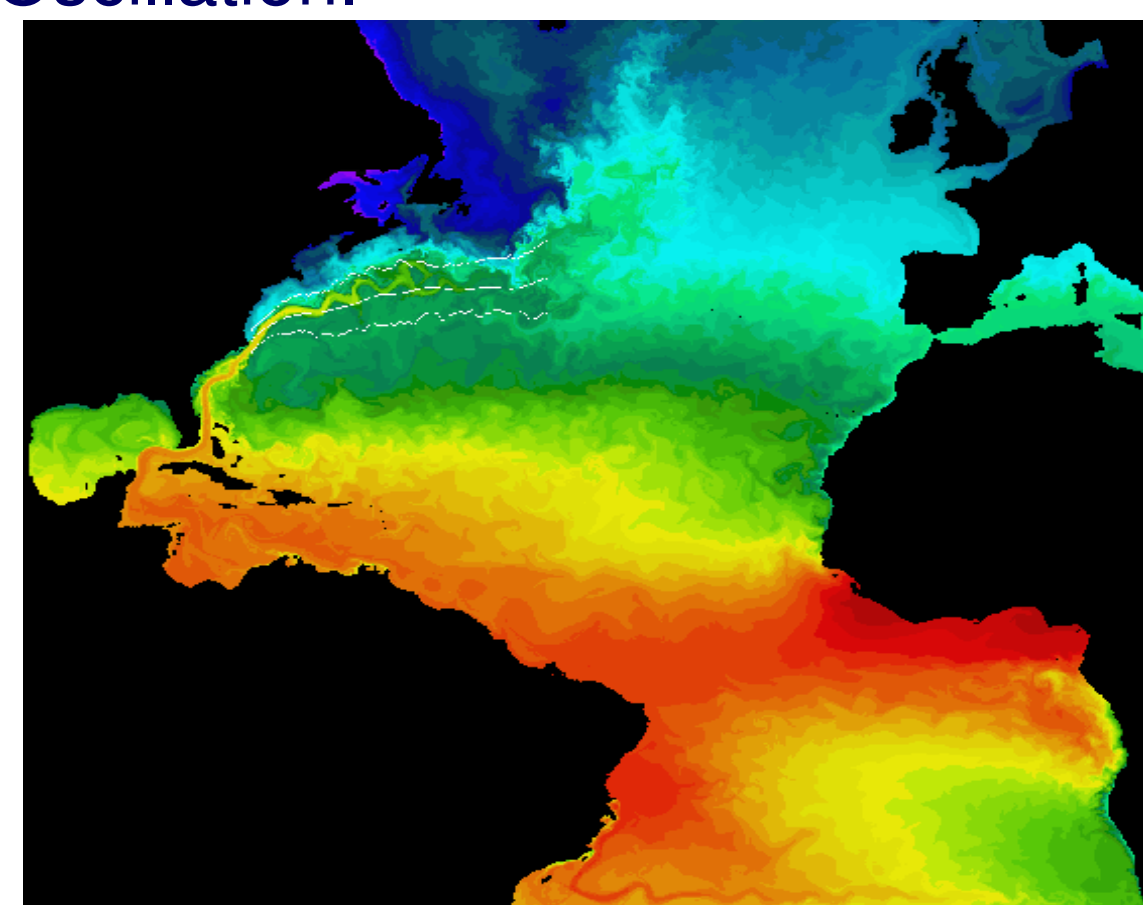

New Zealand to LA section plot, courtesy SIO.

National Center for Environmental Prediction uses XBT data to develop the seasonal to inter-annual El Nino Southern Oscillation analysis.
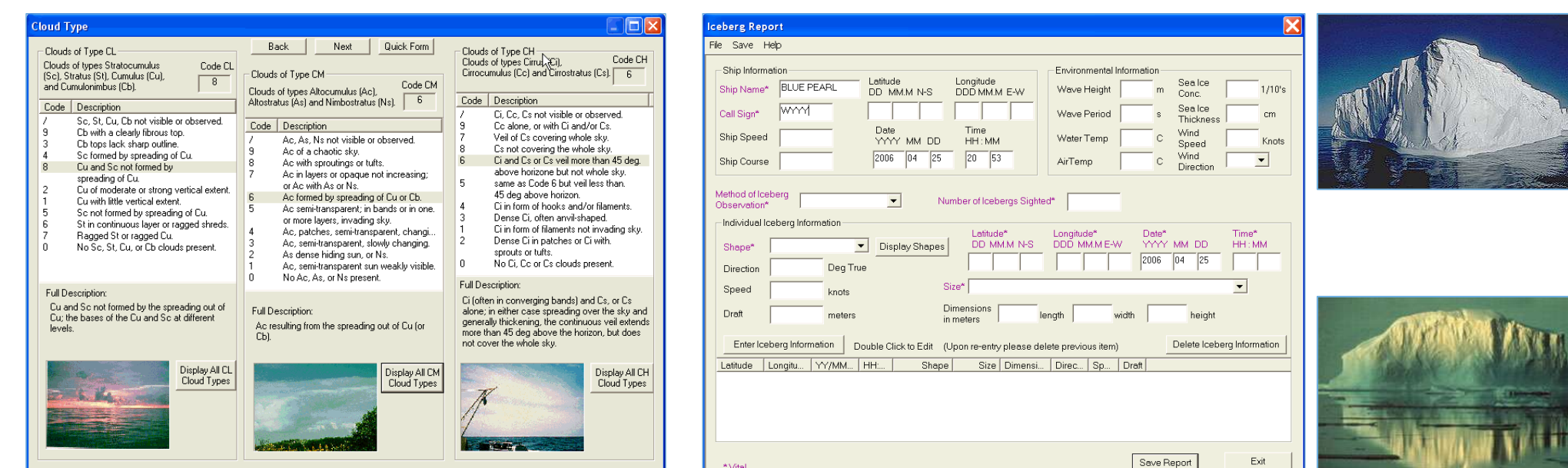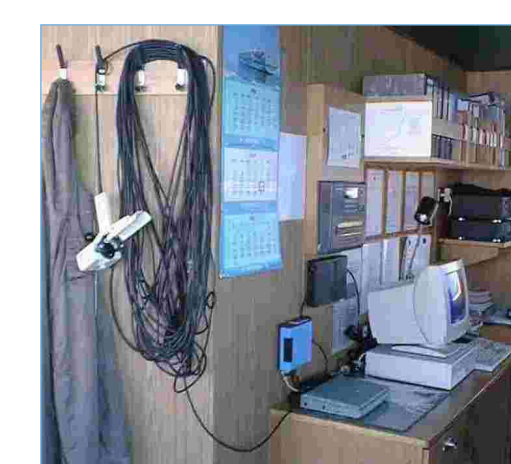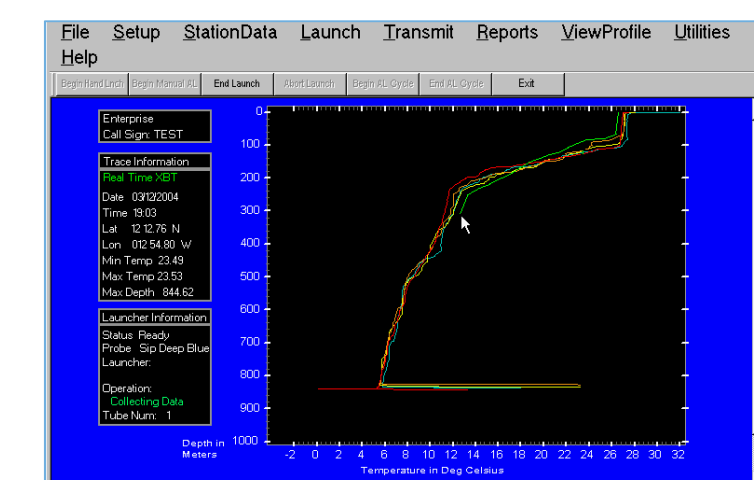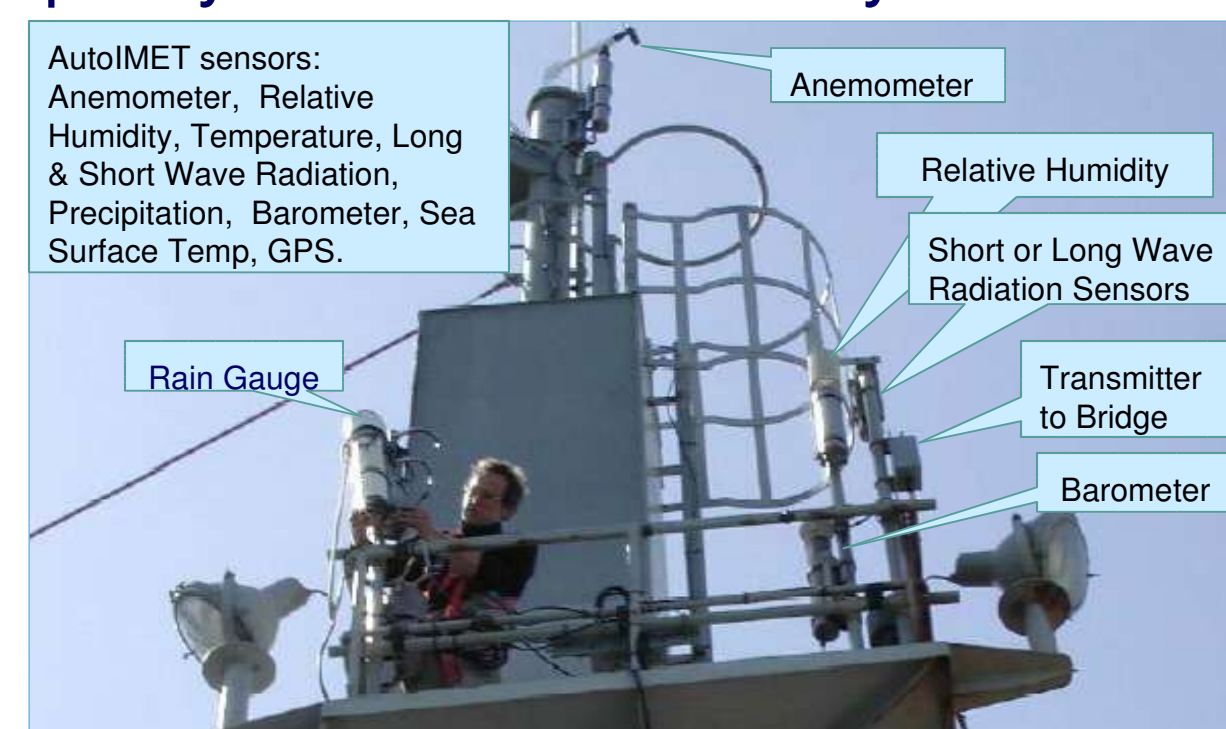

Upper ocean thermal plot, courtesy AOML.

Typical weather anomalies preceding heavy west coast precipitation, courtesy NCEP.


SEAS XBT data is transmitted real-time via Standard-C to the AOML Global Ocean Observing System (GOOS) center in Silver Spring, MD. It goes though extensive automatic and manual quality control before being distributed to the Global Telecommunications Systems (GTS) for scientific and operational uses.

Year	SEAS XBT Obs. In GTS	All XBT Obs. in GTS
2000	2,800	10,400
2001	10,400	20,300
2002	9,200	18,285
2003	12,000	22,100
2004	16,500	25,700
2005	14,100	23,400
2006 to date	3,600	5,275

The table shows the number of XBT drops successfully routed on to GTS, world wide. The SEAS 2K XBT Program accounts for more than half of all XBT drops world wide.
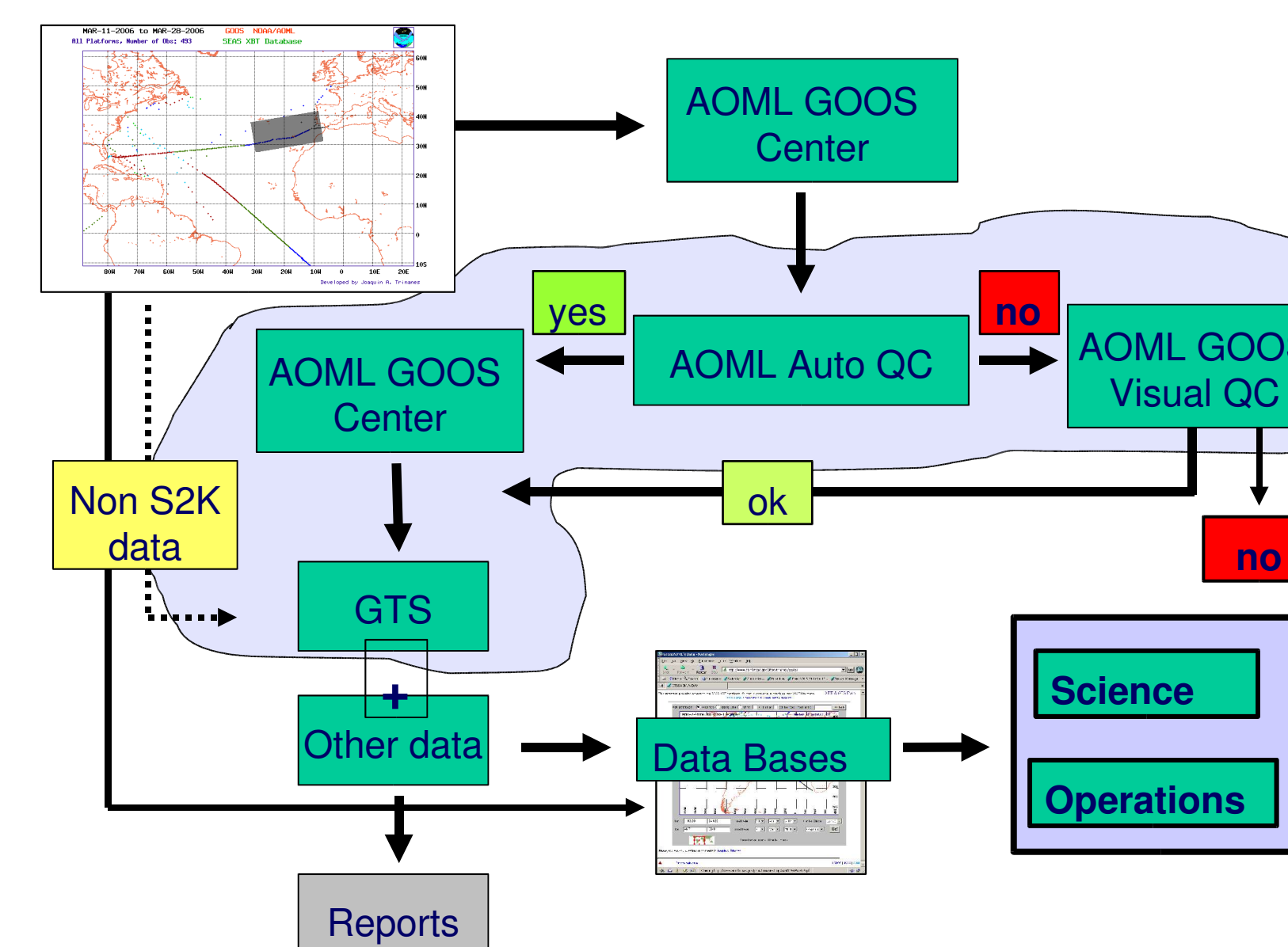
The figure below shows a year (mid 2005-2006) record of XBT's dropped by the SEAS Program. There are 15 VOS ships dropping XBT's using SEAS 2K software. This includes low, mid and high density cruises. AOML and SIO. are the principal users of the software. National Marine Fisheries Service is running an AX22 Antarctic line.
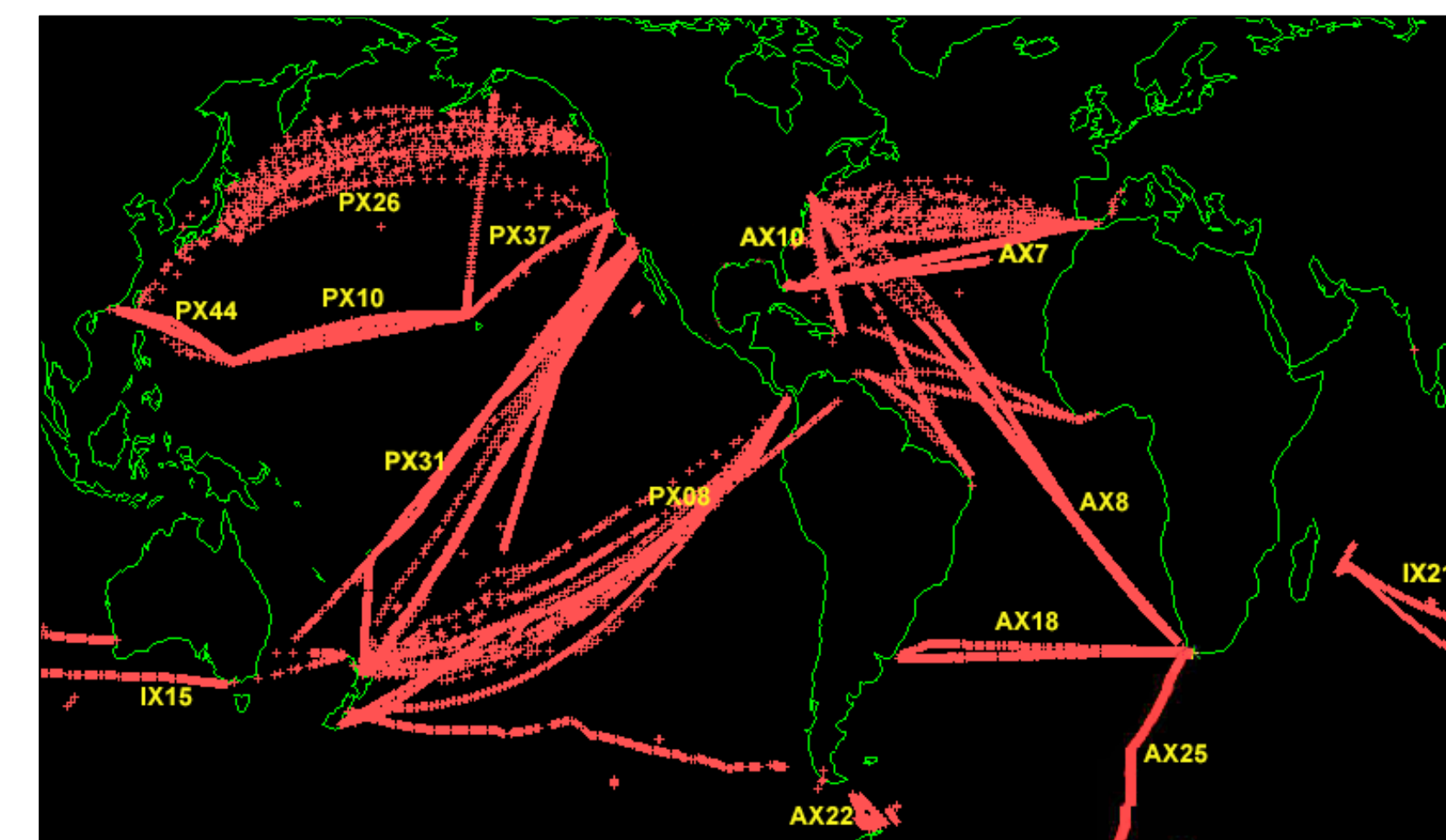
Record of SEAS XBT drops from April 2005- April 2006.

SEAS 2K continues to evolve new functionality. Future programs may include: interfacing with the Scientific Computing System on the NOAA fleet and UNOLS vessels; acquiring data from ocean chemistry sensors; and alternate forms of satellite transmission.

VOS Vessel, Cap Victor, courtesy Hamburg Süd.

NOAA Ship, Ron Brown, courtesy NOAA.

Janet Roseli
janet.brockett@noaa.gov