

Meeting U.S. Navy's Need for Real-Time Modeling Data

Introduction

Each year the Southeast Fisheries Science Center (SEFSC) in Pascagoula, Mississippi conducts several fishery monitoring survey cruises throughout the northern Gulf of Mexico and southeast Atlantic seaboard of the United States. SEFSC conducts these surveys primarily to measure the relative abundance and distribution of important marine species, including groundfish, reef fish, sharks, marine mammals and plankton.

Part of each survey entails the collection of marine environmental data—temperature, salinity, dissolved oxygen, turbidity—from the surface to the bottom. This environmental data collection is achieved through the use of a CTD (Conductivity-Temperature-Depth) device. These devices return high-resolution depth profiles of physical and chemical ocean properties.

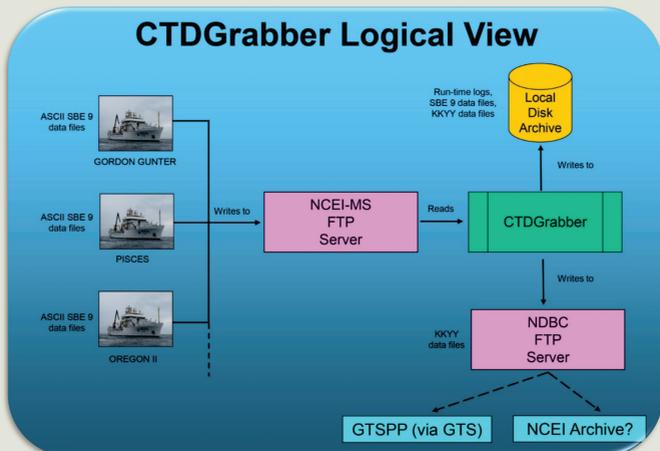
During a single cruise season thousands of these CTD casts are performed. Heretofore, these data eventually would be submitted to the NODC archive and from there make their way into the World Ocean Database. But these data were not shared with anyone at the time they were collected.

Meanwhile, the U.S. Navy operates several global and regional ocean prediction models, based on the Navy Coastal Ocean Model, which consume quality-controlled observations including temperature and salinity profiles. These models produce predictions of the physical ocean (temperature/salinity structure, currents, sea surface elevation) which are of great value to the Navy's operations. From a modeling perspective, the more *in situ* observations one has, the better. NMFS researchers use these models as part of their own work.

Most importantly, these are time-sensitive models. For *in situ* observations to be useful, they must have been collected within 72 hours of a model run. One such source of timely, quality-controlled temperature and salinity data is the Global Temperature and Salinity Profile Program (GTSP), an international, interdisciplinary cooperative effort to maintain a reliable, high-quality, up-to-date temperature-salinity resource for both operational and research purposes.

In 2013 NCEI (then NCDDC) and SEFSC began cooperation in a project whereby SEFSC would transmit their CTD casts to NCEI and, via the magic of software and networked communications, contribute the temperature and salinity profiles to GTSP. The intent is to provide more *in situ* observations to the Navy models, thereby improving their predictions, and in turn providing better modeling data to NMFS research scientists.

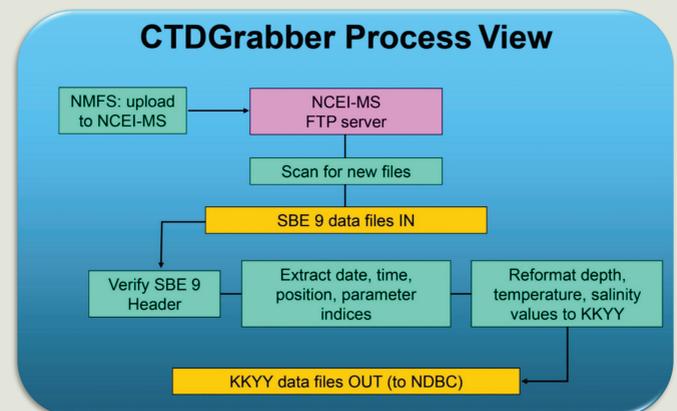
In May of that year the first CTD casts began trickling into NCEI.



CTDGrabber Logical View. SEFSC vessels in the Gulf of Mexico transmit CTD cast data to NCEI in near real time. *CTDGrabber* processes each cast into a format accepted by GTSP and uploads the results to NDBC.

Enter *CTDGrabber*

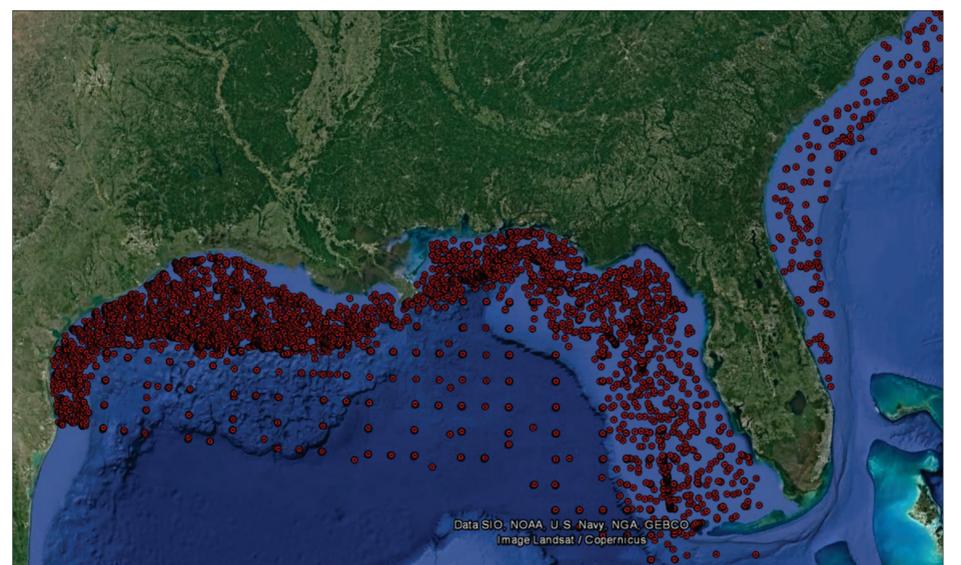
During the cruise season SEFSC vessels upload their CTD casts in near-real-time to the NCEI FTP server. On an hourly basis, *CTDGrabber*, a Python application running at NCEI, scans the NCEI FTP server for new CTD cast files. For each new file found, *CTDGrabber* verifies that the header is valid, then extracts the location, date, time, and parameter indices. Finally, *CTDGrabber* encodes the temperature and salinity profile into a complete World Meteorological Organization (WMO) KKKY message and uploads that message to NDBC.



CTDGrabber Process View. Hourly, *CTDGrabber* scans the FTP server for any new files. For each file, *CTDGrabber* verifies the file, extracts temperature and salinity data, and reformats the data for ingestion by GTSP.

Results

Since its inception in 2013 this project has contributed over 4500 profiles to GTSP, from just three survey vessels: *PISCES*, *OREGON II*, and *GORDON GUNTER*.



Coverage map of CTD profiles delivered to GTSP by *CTDGrabber* since project inception. N=4565

Partners

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