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The Global Temperature and Salinity Profile Program (GTSPP)
Progress Report 2003-2004

by
Robert Keeley
Marine Environmental Data Service (MEDS), Canada

GTSPP Overview and Future Directions

Introduction

The Global Temperature Salinity Profile Project continues to develop capabilities and deal in greater volumes of data. At the last SOT meeting, the Annual Report for 2002 was presented. The annual report for 2003 has been completed and is posted at http://www.nodc.noaa.gov/GTSPP/document/index.html. The report for 2004 is in preparation and will appear at the same URL in the first half of 2005.

This overview will provide updates of activities of GTSPP and show how it continues to develop in response to evolving needs.

With some financial support from IODE, one meeting of GTSPP participants was held in October 2004 in conjunction with an Argo meeting in Southampton, UK. The report of the meeting is available from the same URL as noted above.

A Review of Statistics

The number of BATHYs and TESACs handled grew from about 178,000 in 2002 to more than 211,000 in 2003. The increase was accountable both by the increased activity of the Argo program but also by increased profile sampling by Triton buoys in the western equatorial Pacific and other moored platforms. Both of these trends continued into 2004. Argo reached the halfway point of 1500 deployed floats in November of 2004. The counts of BATHYs and TESACs from 2004 will exceed 287,000 stations.

Between 2002 and 2003, the number of delayed mode profiles entering the GTSPP archive increased by about 36,000 profiles. The bulk of the data came from the late 1990s and from 2003, but records were added from all years back to 1990.

The GTSPP archive contains a little over 1.7 million stations from 1990 to the end of 2003. Of these, about half are present in real-time forms (the delayed mode versions have not arrived) particularly for data from the more recent years. The differences between real-time and delayed mode differ depending on the instrumentation. In the past, XBT profiles arriving in real-time had been reduced in vertical resolution. This is no longer always the case as more XBT profiles are arriving in real-time at 1 or 2 m vertical resolution. Profiles coming from Argo floats arrive in real-time at the highest vertical resolution that is available. In both these cases, the difference between real-time and delayed mode profiles is attributable to the greater care taken in quality assessments of the data.

Timeliness of real-time data delivery continues to improve. For ships, the growth is slow but nearly 80% of observations from ships arrive and are processed into GTSPP archives within 3 days. Considering that the processing at MEDS is not done daily, and includes a visual assessment of data quality, this is quite a good result.

Data from Argo floats constitute a significant proportion of TESAC messages and it is the goal of Argo to provide these data to the GTS within 24 hours of data collection. By the end of 2002 about 54% of data were meeting the target. By the end of 2003 this had risen to 75% and at the end of 2004 the figure is more than 85%.

The number of real-time stations that have detected problems in position or time continues to drop so that by the end of 2003 these constituted well less than 1% of the stations Problems in data in the profiles showed a significant increase in early 2003 and appeared to be associated with salinity observations from moored buoys. By the end of 2003 this appeared to have been corrected.

Partnerships and Collaborations

GTSPP is an active contributor and partner in a number of other international programs. The monitoring that is done to the real-time GTS data is an important contribution to Argo. In addition, there continue to be some data from profiling floats that do not get delivered directly to the Argo Global Data Assembly Centres (GDACs). For these, the data coming through the GTSPP are forwarded on to the GDACs so that their data set is as complete as possible.

The GTSPP is a contributor to the CLIVAR program. The requirements for CLIVAR are still being defined but it is expected that there will be changes needed in some GTSPP operations in order to meet CLIVAR needs.

GTSPP is also collaborating with the GODAE QC Intercomparison Project along with Coriolis and the GODAE Data Server in Monterey. This project is proceeding slowly but its objective is to compare procedures to identify weaknesses and complementary practices at the three centres.

A Unique Data Identifier

At the last SOT meeting and in the 2002 Annual Report it was noted that a strategy was under development for attaching a single unique identifier to both the real-time and delayed mode versions of XBT data. This project has been implemented by the US SEAS programme in their latest SEAS2000 software and is gradually being deployed on the vessels it supports. The first results started to arrive in mid 2004 and as of December, 2004 there have been roughly 1300 stations coming through the SEAS programme with the identifier attached. Of these there were 60 stations that met position and time criteria to be considered duplicates, but the unique identifiers did not match. In all cases, it was confirmed by manual means that the stations were not duplicates. As of writing there were 5 stations that appeared to be duplicates, but had identifiers that failed to match. One of these was resolved as being a result of a software error. The other 4 instances were noted in late December and are under investigation.

GTSPP will continue to monitor these results to test how well the unique identification scheme performs in allowing an unequivocal match of real-time to delayed mode profiles even when the profiles appear to be different. We will continue to accumulate the statistics and investigate discrepancies until we are certain that problems have been removed.

At the last GTSPP meeting both France and Australia expressed interest in implementing the same scheme for data originating from their platforms. This will be pursued.

Data Dictionary

The GTSPP uses extensions to the original GF3 data coding scheme to identify both data and metadata handled in the project. The small number of partners allowed this to function on a fairly informal level. However, in the last year it was decided to use internet technologies to formalize the maintenance of the data dictionary. At present, the dictionary is hosted by MEDS (see http://www.meds-sdmm.dfo-mpo.gc.ca/meds/About_MEDS/standards/login_e.asp) Contributors to the data dictionary include major oceanographic institutes of Canada and the US NODC. As of writing, we have agreement with BODC to link to their data dictionary but this has not yet been implemented. Other contributors are welcome.

The objective of the data dictionary is really two fold. In the first instance it provides a formal way for participants to register the codes they use to identify data and metadata and allows anyone to see what is being used. In the second instance, it is the initial step towards a common dictionary that may be used by everyone.

JCOMM Metrics

The Operations Program Area of JCOMM is developing a set of metrics to portray in a concise way how well it is able to meet objectives for data collection. These results are intended to be updated quarterly starting with the last quarter of 2004. GTSPP is contributing to this effort through the production of the metrics for temperature and salinity profile sampling. As of writing, the first edition of these metrics will be produced and made available early in 2005.

Future Directions

At present the real-time data gathered by GTSPP circulate on the GTS in BATHY and TESAC code forms. It is the intention of WMO to convert eventually to sending all data in BUFR code form. When ocean profile data are sent in BUFR there will be an immediate opportunity to send other kinds of data than just temperature and salinity. There is no question that Argo will take advantage of this since it will permit sending in real-time the data collected by oxygen sensors currently operating on some profiling floats. GTSPP has focused on temperature and salinity but always carried along other kinds of data that were accompanying these T and S measurements. MEDS, being responsible for the real-time data gathering for GTSPP, is developing software for both reading and writing BUFR so that GTSPP will be ready when profile data begin circulation in this code form on the GTS.

At the last GTSPP meeting NODC and Coriolis agreed to make regular reconciliations between their archives. This work is planned to take place in 2005.

In collaborating with Argo, GTSPP is making available all of the ocean profile data that exist in its archive. As a first step we will be providing data in an Argo GDAC-like format that is conforming to Argo data appear at the GDACs. This will make it easier for participants of Argo to combine data from other sources to observations made with profiling floats.

During the WOCE program, GTSPP operated as part of the Upper Ocean Thermal Data Assembly Centre. As such, all of the data collected through GTSPP appeared on the different

versions of the WOCE Data Resource. With the end of WOCE there is no vehicle by which GTSPP data can be readily provided in hard copy form to our clients. It was decided at the last GTSPP meeting to build a CD or DVD that will provide a hard copy source of GTSPP data that can be sent to interested clients. And the monthly updates of the GTSPP CD or DVD will be available online.

As noted above, GTSPP will continue to assess the usefulness of a unique data identifier to link real-time and delayed mode versions of data. We expect to extend the use of this particular scheme to other participants in GTSPP which will mean a significant fraction of profile data will be covered.

Also, as noted above, GTSPP will extend the links of its data dictionary to that maintained by the BODC. This is a significant development because BODC has had good collaboration with other groups in Europe who use their own dictionaries. By making this link, the usefulness of the GTSPP data dictionary will grow beyond GTSPP to something more global. There are also plans within the data dictionary to be able automatically to create metadata records to describe data holdings so that metadata catalogues that presently exist could receive updated records much more easily than is common now. This will enhance the exposure of the existing, extensive international oceanographic archives to a broader client community.

Finally, collaborations with CLIVAR and GODAE, among others, are expected to have impacts on how GTSPP manages the data in its purview. It is through such collaborations that GTSPP continues to develop and evolve to meet changing requirements for ocean data.