Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies

Joint IODE-JCOMM Steering Group for the Global Temperature-Salinity Profile Programme (SG-GTSPP)

First Session
IOC Project Office for IODE, Ostend, Belgium
16−20 April 2012

UNESCO

Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies

Joint IODE-JCOMM Steering Group for the Global Temperature-Salinity Profile Programme (SG-GTSPP)

First Session
IOC Project Office for IODE, Ostend, Belgium
16−20 April 2012

UNESCO 2012

IODE-JCOMM/SG-GTSPP-I/3
Ostend, 8 May 2012
English only

ABSTRACT

At JCOMM-I (2001) it was decided that the former WMO-IOC GTSPP Programme would become part of JCOMM. As such the Steering Group is now called the IODE-JCOMM Steering Group for the GTSPP. The First Session of the Joint IODE-JCOMM Steering Group for the Temperature-Salinity Profile Programme (GTSPP) was held at the IODE project office for IODE in Oostende, Belgium, 16 – 20 April 2012. The meeting was attended by nine (9) participants in Oostende, while five (5) participated by Webex and 19 were able to view the meeting by Livestream.

The objectives of the meeting were to: (i) review GTSPP data flow and operations; (ii) report on the status of the XBT BAHY to BUFR migration; (iii) revive the GTSPP infrastructure, the terms of reference and composition of the Steering Group of GTSPP; (v) develop a strategic frame work of the next generation of the GTSPP netCDF format revision; (v) report on interaction with other projects; and (vi) adopt the work plan for 2012–2013.

The document summarizes meeting discussion points, presentations given by both local participants in Ostend and remote participants via Webex and the GTSPP Steering Group's response to the U.S. National Oceanographic Data Center proposed changes in the GTSPP Continuously Managed Database support. The GTSPP work plan for 2012–2013 is shown in Annex III of the meeting report.

The participants planned for the next meeting to be held in the first quarter of 2014.

For bibliographic purposes this document should be cited as follows:

First Session of the Joint IODE-JCOMM Steering Group for the Global Temperature-Salinity Profile Programme (SG-GTSPP), 16–20 April 2012. Ostend, Belgium. Reports of Meetings of Experts and Equivalent Bodies, N° 235. 52 pp. English. UNESCO/IOC

TABLE OF CONTENTS

ANNEXES

1. OPENING OF THE MEETING

Mr Charles Sun, Chair, opened meeting at 09:30 on 16 April, 2012. He welcomed nine (9) participants who were in attendance at the IODE Project Office in Ostend, Belgium. He also noted that budget reductions were forcing creative solutions to meeting attendance. So, in addition to the nine people present there were some twenty more who would join online through Webex or Livestream services. He also noted that all of the presentations made at the meeting were available from the meeting web site at http://www.iode.org/index.php?option=com_oe&task=viewEventAgenda&eventID=1023.

Mr Peter Pissierssens also noted that it had been some time since the last formal meeting of the GTSPP Steering Group. During the World Ocean Circulation Experiment (WOCE) and later Argo development, *ad hoc* meetings had been organized in conjunction with those meetings. While these were effective ways to continue operation, visibility of GTSPP was reduced. The holding of a formal meeting would once again raise visibility of the Programme.

Meeting participants in person introduced themselves. A complete list of the meeting participants is shown in Annex II. No changes were noted in the agenda (Annex I) at this time, but changes could be made as the necessity arises. It was agreed that Mr Bob Keeley would be rapporteur for the meeting with assistance from Ms Ann Gronell Thresher. Mr Sun noted that action identified during each day would be reported at the beginning of the next day for revision if necessary. At the end of the meeting these would be reviewed to set the final list of actions, the parties involved in carrying them out and target dates for each. The final list, including a review and carry-over of tasks as necessary from the last meeting is shown in Annex III.

Mr Sun noted that GTSPP was an important partner in a number of activities. Formal reporting of GTSPP accomplishments was through the JCOMM/IODE Expert Team on Data Management Practices (ETDMP), but GTSPP representatives also reported at meetings of SOOP (Ship Of Opportunity Programme), Argo, and DBCP (Data Buoy Cooperation Panel). GTSPP was also a recognized project within the Global Climate Observing System (GCOS) Implementation Plan. Data handled through the GTSPP were routinely downloaded by a number of organizations including the European Centre for Medium-Range Weather Forecasts (ECMWF), the Australian Bureau of Meteorology (BOM) and others. Knowing who the users of GTSPP data were was not always easy, and this is addressed later in the meeting.

2. REVIEW OF THE GOVERNANCE OF GTSPP

Mr Charles Sun reminded the meeting that the parent bodies of GTSPP were the IODE and JCOMM. Reporting was formally through the JCOMM/IODE ETDMP. He also noted that the Terms of Reference (ToR) for GTSPP had not been revised in some time and so this meeting would need to propose the necessary revisions. Besides describing the objectives of the GTSPP Programme, the ToR also address the composition of the Steering Group, terms of the Chair as well as meeting participants. A draft version was presented by Mr Sun and discussed.

Participants noted that the various terms employed (e.g. real-time, non real-time, core members, etc.) needed to be clearly defined to eliminate confusion. There was also the suggestion to use “delayed mode” rather than “non real-time”. The term “assembly” was suggested to replace “collection” to be clear that GTSPP was not involved directly in the acquisition (collection) of data. The meeting agreed that it was worthwhile to invite experts to meetings who had no direct involvement in GTSPP but for whom the operations were of interest or value. The meeting also agreed on the principle that it should select its own Chair.

Mr Sun agreed to redraft the ToR and this was revisited at the end of the meeting. The final form (action 14) is presented in Annex IV.

3. DATA FLOWS AND OPERATIONS

3.1 SHIP OF OPPORTUNITY PROGRAMME OVERVIEW

Mr Francis Bringas made a presentation on behalf of the Chair of SOOP, Gustavo Goni. Among other details he noted that about 2/3 of the XBT and TSG transects recommended by OceanObs'09 were in operation. The remaining were still being pursued but were difficult because of ship availability. He also noted that about 60% of the transects were implemented by more than one country. An XBT Science Team was initiated in 2011 at the First XBT Science Workshop. This team was working with Sippican to explore the incorporation of pressure switches on XBTs to assist in calibration of time to depth conversion based on fall rate equations. He remarked that including two such switches would imply significant cost increases for an XBT, but one seemed feasible. Prototypes with one switch were now in preparation by Sippican and these would be tested by AOML, hopefully in 2012.

3.2 DATA FLOWS FROM OBSERVATION TO ARCHIVE

3.2.1 AOML – REAL-TIME

Mr Francis Bringas informed the meeting that Frequently Repeated transects will be changed to High Density lines. He mentioned that the present version of SEAS software supported some 15 different probe types, 3 auto-launcher types and a variety of transceiver systems. He also remarked that the SEAS binary format (used to log data on board ship) did not yet carry all of the metadata that was included in the latest BUFR template for XBTs, but that this was being addressed.

Charles Sun noted that there was a problem reading the latest data set of XBT data sent to NODC by AOML. Joaquin Trinanes responded that AOML would work with NODC to sort this out.

3.2.2 AOML – DELAYED MODE

Mr Joaquin Trinanes described the processing of the full resolution XBT data that is delivered to AOML when the ship reaches port.

Mr Charles Sun informed the meeting that the Ship-of-Opportunity Programme Implementation Panel (SOOPIP) has updated the section of WMO Guide to Meteorological Instruments and Methods of Observations concerning XBTs which should detail the process of data acquisition for XBTs. Ms Gronell Thresher noted that she would want to read this to be sure it had all of the necessary information. Any comments on the content would be provided to the SOOPIP Chair (action 15). Charles Sun also suggested that these practices should also be brought forward to the Ocean Data Standards (ODS) process for consideration.

3.2.3 ISDM – REAL-TIME AND DELAYED MODE

Mr Mathieu Ouellet described operations at ISDM for observation year 2011. Among other things he noted that their operations currently decode surface drifter and Argo profilers reporting in BUFR, in addition to a suite of alphanumeric codes (BUOY, BATHY, TESAC, TRACKOB). BATHY and TESAC messages come from four different GTS nodes whereas BUOY messages are only received from one GTS node. Data from BATHY and TESAC messages, as well as from BUOY messages with more than one depth, are sent to US-NODC and four other users, three times a week.

Statistics were broken down by platform type in eight categories: drifting buoys, fixed buoys, moored buoys, Argo, ice-thethered profilers, gliders, ships, aircrafts and animals (mammals). International numbering conventions for platforms are not always adhered to, and ISDM took steps to get corrections when feasible. A number of other similar issues were under review (actions 3, 4, 23). Joaquin Trinanes suggested that these statistics be further broken down according to instrument type.

Mr Ouellet noted that the total number of decoded messages keeps increasing (~40 000 increase between 2010 and 2011), however, the increase is mainly within observations by automated buoys. The bulk of messages come from moored buoys, many of which are from US coastal moorings with only one single temperature measurement (no profile). The number of unique call signs belonging to ships reporting BATHYs and TESACs on the GTS has been decreasing for the third consecutive year. The number of BATHY and TESAC messages from ships and mammals also decreased compared to observation year 2010.

When questioned, he confirmed that Canadian XBTs are sent on the GTS, particularly by the Royal Canadian Navy whose unclassified profiles are inserted on the GTS by ISDM if they arrive within 30 days of collection. If any data prepared as TESAC or BATHY arrive later than 30 days at ISDM, ISDM still delivers it to the CMD but not on the GTS. He referred to these as "near-real time" during his presentation. ISDM uses the same processing system for delayed mode data (full resolution, recalibrated, etc.) as well and these too are sent to the CMD, though once a year. The meeting asked if he could initiate a monthly report to show the time delay between observation date and data reaching the GTSPP archives (action 29).

Questions were raised about the users of TSG/TRACKOB data, but he could not respond. This could be directed to the GOSUD project. Joaquin Trinanes noted that TSG data would be much more valuable with calibration information (dates, methods) but that even the BUFR template does not contain this. Such information would enhance the usability of these data.

3.2.4 CSIRO – DELAYED MODE

Ms Ann Gronell Thresher noted that the Bureau of Meteorology inserts all data from Australia onto the GTS, that QC of all Australian navy data is handled by CSIRO and that all delayed mode CTD data are sent to CCHDO and NODC usually in about 6 months after observation.

Mr Sun asked about processing and Thresher remarked that on-board QC is totally automated. The CRC is calculated immediately after creation of the BATHY message. She noted that there was a problem for a while with the computation due to ambiguity in the description detailing what to do. Corrective steps have been taken but the updated program has not rolled out to all ships (action 16). Delayed mode processing goes through the Mquest system and every profile is viewed and assessed. Mr Keeley asked about what the IMOS delivers and she informed him that all information in the GTSPP format is available in the IMOS data.

3.2.5 SISMER – DELAYED MODE

Mr Thierry Carval noted that his presentation covered the past 2 years since he had missed the last meeting. He noted that SISMER are feeding data from gliders onto the GTS. Their software creates a new "profile" each time the glider switches from descent to ascent and vice versa. So, a single descent from surface to deepest depth can sometime produce a number of TESAC messages with fragments of the complete profile. He noted that sea lions instrumented with CTDs all come through processing at SMRU in real-time; delayed mode data from French sea-mammals are provided by MNHN through IFREMER. He also described the

QC operations of XBT data, and stated that they handle European data including CTDs and XBTs as well.

Mr Ouellet noted that a few mammal derived profiles were reporting with “IF” prefixed call signs. Mr Carval remarked that these were an error and he would need to look into this (action 23). Thresher wondered about where the XBTs data from the Indian Ocean go and he replied that they are all sent to the CMD.

3.2.6 TOHOKU UNIVERSITY – REAL-TIME

This presentation was given by Mr Charles Sun on behalf of Mr Shoichi Kizu. He described operation of the PX40 line (Japan to Hawaii) and noted some problems encountered lately due to funding. It was also noted that in some reports PX40 was documented as a Frequently Repeated transect, but it should be noted as High Density.

The meeting briefly discussed some of the problems in finding ships or funding for certain lines. These are rightly the responsibility of the SOOP Panel to address and so the issue was referred to them (action 21). Charles Sun noted that there seemed to be some differences between the volume of data reported in the presentation and those counted by NODC. He would be pursuing this matter.

3.3 GTS DATA TRANSMISSIONS AND DATA DROPS

Mr Joaquin Trinanes described operations that took place to support the response to the “Deep Water Horizon” oil spill that took place in 2010. In particular AOML upgraded its data tracking tools such as monitoring what they pushed to the GTS and what actually was returned to them from the GTS.

3.4 QUALITY CONTROL PROCEDURES

3.4.1 ISDM

Mr Mathieu Ouellet presented a review of operations and practices at ISDM. He noted that a flag of “2” is not used in GTS data quality control. In the past, only failures of climatology would set this flag. However, that flag setting was turned off a number of years ago even though profiles are still tested against climatology (Levitus 5x5 degree seasonal version). A flag of “3” is set both by automatic and by manual tests. A flag of “5” is set only manually to reflect that an original value has been changed. Profiles from moored platforms do not pass through visual QC if they do not fail any automatic tests. The test inversion problem in QCP$ and QCF$ values, which were reported at the 2011 GTSPP Data Workshop (Silver Spring), were since fixed. An investigation also revealed that bit 31 is always set to 1 in QCP$ even though no test corresponds to it; correcting this in the archives would entail rewriting every record and it is not clear the work is worth the effort. He suggested that bit 31 be reserved in the QCP$ table so that no confusion ever arises about its meaning; in the meanwhile ISDM will rectify the program so it is no longer set.

There was some discussion about the actual list of tests in the QC Manual (IOC Manuals and Guides No. 22). There was agreement with Charles Sun that the concept of identifying tests performed (encoded in the parameter QCP$), and tests failed (encoded in QCF$) was important and valuable. The list is meant to list all tests that could be performed, not a list of mandatory ones. Its purpose is to inform users about how the data have been tested. Ann Gronell Thresher noted that with better climatologies, setting flag “2” when climatology test is failed could become meaningful. It was agreed that documentation should be written to assist users in understanding how to interpret quality control information contained in the GTSPP records and this should be inserted into the Manual. This is written into the QCP$

and QCF$ variables, appears in history records as well as in the quality flags themselves (action 17).

3.4.2 AOML

Mr Francis Bringas discussed quality control operations at AOML. He remarked that they carry out a subset of the tests described in the QC Manual but, of course, their intent was to provide on output the highest quality scientific data. One of the tests they use is to compare data against NCEP values.

This generated more discussion that is included in the next agenda item.

3.4.3 CSIRO

Ms Ann Gronell Thresher presented a description of quality control procedures conducted at CSIRO. She explained that no profiles automatically fail a test; all are viewed to verify what problems, if any, are present. They also use a climatology covering the Indian Ocean and parts of the Pacific that they have compiled, called CARS. Their software, Mquest, allows them to record not only if a test is failed, but the apparent cause of the failure. Sometimes this is a result of an instrument malfunction, such as a wire break, but there are some 'features" in profiles that, with consideration, are deemed legitimate and so the data should be considered good. Adding an indicator that identifies an "accepted feature" in profiles is useful so that someone else does not down grade the quality flags later on. She suggested this should be considered for inclusion in a new GTSPP exchange format to be discussed later. She also noted that it is becoming more prevalent that users want to know estimated errors on observed values. This was raised at OceanObs'09.

The meeting agreed that consideration needs to be given to including a way to mark accepted features in a profile, and to accommodate estimations of errors when available in a new GTSPP data exchange format. The meeting then commented that some of the documentation of QC procedures has not been updated recently and that this should be done (action 18). There was discussion about whether the list of tests in the Manual should be extended to include all tests conducted anywhere by GTSPP participants. It was remarked that this could become a very long list if all versions of tests (as they are upgraded) need to be included. To illustrate this question, should the list as example the 1990, the 1995 and the 2000 version of a particular climatology, or simply list the generic test and direct readers to the appropriate documentation that describes the details. In the end it was decided that the more generic listing is appropriate, but that since the suite of tests that would be present in the Manual would now include those used for data that has not circulated on the GTS as well as scientific QC procedures, the title of the Manual (GTSPP Real-Time Quality Control Manual) is no longer correct and will need changing (actions 1, 7, 13, 19)

3.4.4 SISMER

Mr Thierry Carval described operations at IFREMER. Among other matters he noted that they only use flags "1" and "4". He also raised the issue of providing estimated errors with the data since one of their procedures is statistical and would allow this to be included. He also described the climatology that they use and update, called CORA. This is a global climatology.

Ms Gronell Thresher was interested to see how the CSIRO and CORA climatologies compared in identifying problem profiles (action 33).

3.4.5 NMDIS

Ms Fengying Ji described operations in China. She explained that they downloaded data from US NODC and ISDM and applied GTSPP tests. She remarked that they sometimes encounter difficulties in processing the data and wanted to know where they might get help to resolve these.

She was asked if any of the data from either ISDM or US NODC fail tests and she replied that they rarely do. However, she mentioned that sometimes the instrument information which is very helpful in the process of QC is hardly found in the data file

Mr Carval noted that the scientific QC does change flags set by the data centres of GTSPP but as a first level of QC, what was done by data centres, was valuable especially for real-time data distribution.

3.4.6 US NODC

Mr Norm Hall, through Webex, described operations at US NODC. Besides tests already described, they used a “buddy test” to see if the target profile was similar to others that were close in both space and time or from the same cruise.

Charles Sun raised the idea of developing a standard suite of software tools that implemented GTSPP tests and that could be distributed to anyone interested. This would help build a base of data processing systems using the same procedures and move towards a standardization of tests. Although this is an attractive idea, participants were concerned that maintaining and upgrading the tools to operate on different operating systems, and a pool of users may exceed the capacity of authors of the tools.

3.5 CRC IMPLEMENTATION

Mr Charles Sun provided statistics on the effectiveness of the use of a CRC calculation to identify duplicate profiles between real-time and delayed mode versions of original data. He showed that conventional duplicate tests (examining other stations within 5 km and 15 minutes of the target station) were effective in finding duplicates about 99% of the time. Mr Sun expressed the desire to extend the use of a unique identifier to all data, real-time and delayed mode.

Mr Keeley remarked that the gains made by using the CRC were small compared to the work needed to reliably implement the software. Ms Gronell Thresher noted that the small gains could be the result of improvements in technology over the course of testing the CRC (started in about 2005). Whatever the reason, a strong case needs to be made why a unique identifier is needed. Mr Ouellet noted that a unique identifier comes up in the context of data publishing and this would constitute a reason to have one. Mr Sun agreed to write a document that makes the case (action 20).

4. XBT BATHY TO BUFR MIGRATION

4.1 STATUS REPORT OF THE MIGRATION

4.1.1 AOML

Mr Joaquin Trinanes described the work carried out at AOML to validate the XBT template V9.3 that is currently available from the WMO web site. He explained that certain elements of the template stepped outside unwritten rules about the use or implementation of BUFR. These were debated by members of the IPET-DRC, the WMO committee responsible for maintaining BUFR, and resulted in some changes being required. As an example, one field was 33 bits long. Since many computer systems are based on 32 bit operations, this likely would crash systems. Revisions were made and these were validated as individual descriptors and as a sequence. Testing was also performed to ensure that data encoded into BUFR, produced identical results on decoding. He also noted that the SEAS software needed some changes to capture all of the metadata that the BUFR template can handle.

Mr Keeley noted that he was completing a document for the IODE OceanTeacher digital library that explained in detail how to encode data into the existing template. With the revisions made, he needed to revise his documentation as well and he was asked to distribute this to the Steering Group (action 24). Mr Trinanes was asked to ensure that the V9.3 revision is sent to WMO and appears as soon as possible on the WMO web site describing the templates (action 22). See notes under agenda item 4.2 as well.

4.1.2 ISDM

Mr Mathieu Ouellet explained that ISDM had written and tested a BUFR encoder and decoder based on the V9.3 template. In light of the information provided in agenda item 4.1.1, this would need to be changed. He noted that they also have decoders for surface drifters and for Argo (an encoder as well for Argo). He wondered if the revised template had fields for explaining surface temperatures were collected by sampling engine intake water and if sounding information could be handled. He was informed that the template has fields for both.

4.1.3 SISMER

Mr Carval described capabilities for handling BUFR in IFREMER. At present the only data they deal with in BUFR is from Argo floats. Any profile data they push to the GTS is encoded in TESAC and BATHY code forms.

Mr Trinanes cautioned that although the Argo BUFR template appears as if it could hold XBT data, the metadata required to properly describe XBT observations cannot be reported in the Argo template and so only the XBT template should be used for XBT data. Ms Gronell Thresher noted that a new GTSPP format in netCDF is needed to better handle increased requirements for metadata. A new format would also act as a way to encourage contributors to standardize reporting of metadata with the data. Mr Trinanes remarked that AOML has encoders and decoders and these can be made available to others if that would be a help.

4.2 BUFR TEMPLATE

Mr Trinanes added to the information that he discussed in agenda item 4.1.1. He described some basic information about BUFR and some of the interoperability projects such as in IOOS. He noted that there is a useful library of BUFR routines available from US NRL, but these had not been updated to BUFR edition 4 yet. The BUFR tables are available from WMO in either csv or xml formats.

4.3 REPORT ON THE RESULTS OF RECEPTION OF DATA

Mr Joaquin Trinanes presented this item. He reported that he had carried out validations on the TRACKOB template as well. It works perfectly well, but it violates an unwritten rule for BUFR that each measurement should be referenced by a location and time. The TRACKOB template violates this by treating position as a reported variable. He noted that they use a BUFR dump application from MEL. There is still work to be done to convert from BUFR to netCDF.

Mr Sun asked if there was a preferred UFR library to use, but Mr Trinanes replied that the appropriate library depends on what are your current operations. Mr Keeley informed the meeting that he would be preparing a document for OceanTeacher digital library similar to what he did for the XBT template, but for TRACKOB and all of the other ocean related templates.

4.4 LESSONS LEARNED AND FUTURE PLAN FOR BUFR MIGRATION

Mr Trinanes explained that in the course of validating both the XBT and TRACKOB template he had excellent help from, and discussions with the WMO IPET-DRC. Some of the members of this group worked closely with him to verify that they could successfully decode BUFR messages encoded by AOML. He also received valuable assistance from staff of the US Weather Service. His one comment was that he would like to see templates where the use of "missing" was minimized.

A question about Master Table 10 (MT10) was raised by Ms Sissy Iona. Mr Keeley replied that this had been brought up to date to meet present BUFR rules but, to his knowledge, was not yet in use anywhere. He explained that MT10 was created a number of years ago. In BUFR Master Table 0, the table used to report meteorological data, virtually all of the oceanographic observations are placed in a single Table B class (number 22). MT10 was built to distribute observations from different oceanographic disciplines into different classes in Table B. Mr Trinanes remarked that he would like to look at this because if this could be represented in UML, a BUFR - netCDF model would be much easier to produce. Mr Keeley agreed to provide this information (action 25). Mr Trinanes agreed to contact Unidata with the information to see what interest they would have in such a UML representation (action 26).

Mr Keeley also noted that just before he retired he had almost completed a modular formulation of BUFR templates for all marine data. This had been passed to Mr Bill Burnett, but with his moving to a different job, it seemed that this effort had been suspended. It was agreed to ask Ms Kelly Stroker (JCOMMOPS) if she can follow up this action. Mr Trinanes was also interested to see this, and Mr Keeley agreed to send the necessary information to him (action 25).

5. GTSPP INFRASTRUCTURE

5.1 LONG TERM ARCHIVE (CONTINUOUSLY MANAGED DATABASE)

Mr Sun presented this item. He noted that US NODC was looking for ways to improve how they handled ocean data in general. They were looking at streamlining operations through changes in how both real-time and delayed mode data are handled. He presented a proposed set of changes that US NODC is considering and asked the meeting for comments. He remarked that handling the GTSPP CMD (continuously managed database) took significant resources. He also remarked that although it is easy to monitor data downloads, because of US policy, he cannot ask users to identify themselves. Knowing who the users are would be helpful in explaining to management the importance of GTSPP. He asked participants to provide him with knowledge that they have of users (action 27). Mr Sun also noted that GTSPP web pages at US NODC had not been updated for some time and suspected this may also be true for pages of other GTSPP partners.

Mr Peter Pissierssens remarked that the main GTSPP pages, hosted by US NODC only had a NOAA label/identity and that the home page of an international programme such as GTSPP should have a more international identity. Recognizing that using the NOAA logo is a requirement for US NODC it was agreed that the IODE Project Office would host the home page for GTSPP, and provide links to partner pages. The IODE Project Office also offered to host meeting documents and other GTSPP materials. At the same time, participants agreed to review their web pages and to bring them up to date as required (action 28). Mr Carval agreed to re-register the existing domain name (www.gtspp.org) (action 35).

See also agenda item 8.4.

5.2 REAL-TIME DATA ASSEMBLY

Mr Mathieu Ouellet reviewed these operations at ISDM. From the start of GTSPP, ISDM has been decoding 4 independent GTS streams, one from the Canadian Weather Centre, one from the US, one from Japan, and one from Germany. He showed that there were still data found exclusively in data streaMs other than the Canadian one. This is a consequence of the store-and-forward mechanism of GTS distribution where each node keeps tables of who should be forwarded data. These tables must be well coordinated across the many connections of the GTS in order that all desired data reach a particular node.

Mr Trinanes remarked that the same would be true when data begin to flow in BUFR. This will only change with a change in routing organization on the GTS. Mr Carval explained that they receive data updates three times a week from Canada and this is very important for French operations.

5.3 DELAYED MODE DATA ASSEMBLY

5.3.1 ISDM

Mr Ouellet explained the delayed mode processing system at ISDM. Quality control flags included in the incoming data, as set by scientific operators, are retained. If an apparent problem is found, then the data providers are consulted. Updates are sent to the CMD once a year.

He explained that separate from delayed mode processing in GTSPP file structures, another system called BioChem also exists in Canada. This was designed to handle biogeochemical data better, by storing more metadata and preserving individual values from replicates. The conversion for BioChem to GTSPP loses some of those metadata and information.

5.3.2 CSIRO

Ms Ann Gronell Thresher described operations at CSIRO. She described the climatology that they use against which incoming data are assessed (see also agenda item 3.4.3). She showed some statistics that indicate that GTSPP data having only passed through data centre QC shows a warm tail in an expected gaussian distribution of temperature. This results from missed flagging of warm biases of XBT data. Such bias is removed by scientific QC. CSIRO continues to do scientific QC, for a large part of the Indian Ocean data and to return these data to the CMD. Such actions for the other oceans ceased at the end of WOCE because funding ceased. She also talked about looking at scattergrams to identify outliers. She noted that the use of the Q_Record flag in GTSPP was a problem. At present this flag is defined to be the value of the worst flag assigned to any observation at a station. But CSIRO always consider the upper 3.6m of an XBT profile as bad, and they replace the values with a missing value; in addition, almost every profile has a wire break at the end that is flagged 4 so every one of their profiles gets the same flag. They would prefer that Q_Record (or equivalent) record the best flag attained in any station data. This is further discussed in agenda item 7.

Mr Carval remarked that Coriolis also has a climatology called CORA that is global. CSIRO expressed interest in exploring if that climatology was as effective as that of CSIRO in finding anomalies. They agreed to collaborate on such a study (action 33). Mr Keeley described some work he had done a number of years ago characterizing profiles by vertical EOFs, rewriting all profiles in terms of the EOF coefficients and then looking at scattergrams of the coefficients of the different EOFs. Ms Gronell Thresher expressed interest in considering this (action 30). Mr Gronell Thresher noted that nowadays there was no reason for archive centres to be storing only data with a decimated set of levels. Rather they should be asking providers to supply instrument level resolution data. Mr Sun agreed to prepare a document for the upcoming IODE Session (March 2013) to consider this (action 32).

5.3.3 SISMER

Mr Thierry Carval described IFREMER operations. He noted that some of the historical data that they receive are not returned to the CMD because in their annual submissions they only send data from the previous observation year. Thus data received and processed from older observation years were not sent. He agreed to work on this (action 31). Documentation of the QC procedures they use on delayed mode data are available on-line.

Mr Keeley asked whether the scientifically QC'ed data had fall-rate corrections applied. He reminded the meeting that in 1995, IODE NODCs had agreed to ask for probe and fall-rate equations whenever XBT data were received. The intention was that the archives should store the information about the instrumentation and time to depth conversions used, but not to undertake mass conversions of values by consistent use of a conversion formula. Of course, users often want all data converted to a consistent depth and so some work is required. The GTSPP CMD conforms with the principle of storing appropriate metadata but not converting all XBT data to a common set of fall-rate equations.

Mr Carval answered that the SISMER scientific QC'ed data do not have a fall-rate correction applied, following the IODE recommendation. However, a global fall-rate correction for XBTs is performed in the CORA data set. This correction is available as temperature and depth adjusted variables (an offset on temperature, depending on time, region and depth, an offset and parabolic correction on depth, depending on time, region, and depth).

5.3.4 NMDIS

Ms Fengying Ji described operations at NMDIS. She noted that at the invitation of Charles Sun, they were developing software so that they can operate as a Data Products Centre for GTSPP.

Mr Bringas attempted to access the NMDIS web site and download data but he was blocked by not having a password. Ms Ji will look into this. Ms Ji also informed the meeting that the English version of the NMDIS GTSPP website is under maintenance to fix the problem of access limits. In the near future, global monthly temperature and salinity isoclines at standard levels together with the updated data will be provided on the website.

5.3.5 INIDEP

Mr Sun made this presentation on behalf on the Argentine centre. NODC provided processing software to them and this was in the final stages of becoming operational. Some work still remains to customize the profile editor software. He also noted that there were some discussions on connecting GTSPP data files and TSG data to an Aquarius (the surface salinity satellite of NASA) project.

5.4 DATA PRODUCT CENTER

Mr Wataru Ito of JMA made this presentation by Webex. They had developed software to operate a Data Product Centre for GTSPP. This has been operating in a prototype mode, but plans are to move to regular operations by June of 2012. Products will be created monthly. They are concentrating on SOOP lines in the Pacific, using BATHY and TESAC data and producing the results from a data assimilation model (½ by ½ deg resolution) from the surface to 6000m. They show animations of T, S fields at 100 m and map differences between observations and the model. He showed a draft of monthly report and asked steering group members for some comments.

Mr Sun remarked that this was an important development and thanked JMA for their efforts. He suggested results of quality assessments on the data should also go to the SOOP Chair as well as the Chair of GTSPP (action 36).

6. GTSPP ACTIVITIES REVIEW: 2010 - 2011

Mr Sun provided short updates on agenda items 6.1 to 6.6. These are all combined in this part of the summary report.

He reported on activities of the US NODC to support monitoring of the "Deep Water Horizon" oil spill in the Gulf of Mexico (22 April to 15 June 2010). Here the real-time data of GTSPP was valuable and was provided to the Deepwater Horizon Incident Support web site weekly (http://www.nodc.noaa.gov/General/DeepwaterHorizon/support.html).

Mr Sun reported that he had convened an *ad hoc* Workshop in Germany in conjunction with an Argo meeting (Hamburg, Germany, 25 October 2010). GTSPP had prepared a paper describing GTSPP and presented at OceanObs'09. One reviewer noted how valuable GTSPP was. He was also informed by John Gunn that GTSPP data were being used in an Aquarius validation study.

Charles Sun informed the meeting that the "GTSPP Real-time Quality Control Manual" (IODE Manuals and Guides No. 22) had been updated and published in December 2010 (http://www.iode.org/mg22).

Mr Sun also presented a report on GTSPP activities at IODE-XXI in Liege in 2011, at the JCOMM/SOT-VI Session (Hobart, Australia, 11–15 April 2011) and organized an *ad hoc* GTSPP data workshop in 2011 (Silver Spring, USA, 7–9 June 2011). There were a number of actions coming out of the *ad hoc* workshop and those for which work has not been completed were included in the action list from this meeting as shown in Annex III.

Discussions were wide-ranging under this item. Mr Sun asked for the opinion of the meeting on whether the CRC document that he had prepared should be formulated to go to the Ocean Data Standards process. See agenda item 3.5 for related discussions.

Mr Sun stated the interest of GTSPP collaborating with SeaDataNet in the proposal of standards on CF and netCDF structures for profile data. Mr Carval noted that there were a number of reference code tables, such as for institutions, that SeaDataNet maintains and these might also be a consideration for use by GTSPP and for proposed standards.

Mr Keeley asked the meeting if GTSPP considered single point measurements, such as produced by the US coastal moorings, to be suitable for inclusion in GTSPP. Mr Sun replied that he thinks such data should stay in the real-time data stream from Canada if the effort to remove them was too high.

Mr Carval also asked if the profiles from European coastal moorings, received by IFREMER from MyOcean project, should go to GTSPP.

7. GTSPP DATA FORMAT REVISION

7.1 REVIEW OF THE EXISTING GTSPP NETCDF CONVENTIONS 4.0

7.1.1 GTSPP NETCDF V4

Mr Sun talked about the use of netCDF in the ocean community and the importance to GTSPP. He noted that more and more software is being produced that accepts data files in netCDF structures. But it is important to include fields and use attribute definitions that conform to commonly used conventions such as COARDS (http://ferret.wrc.noaa.gov/noaa_coop/coop_cdf_profile.html) and CF (Climate and Forecast). He also noted that by inserting ACDD (Attribute Convention for Dataset Discovery) fields, it permits data discovery by THREDDS (Thematic Realtime Environmental Distributed Data Services). The latest version of netCDF, Version 4, has advantages in that it allows for more than 1 unlimited dimension and this can be particularly useful in more efficient data structures to hold ocean data. But files created in V4 are unlikely to be readable by software written for V3, although software for V4 likely will handle V3 data files. He expressed the view that GTSPP data should be as widely readable as possible and this would appear to dictate that they be in V3.

Mr Sun provided a detailed examination of the attributes of the GTSPP netCDF format. There were a number of comments made, as well as others in agenda item 7.2. All of these are collected together in Annex VII, including ones that appear in the text under the other agenda item (so that all are in one place).

7.1.2 ARGO FLOAT FORMAT

Mr Carval explained the versions of netCDF employed in the Argo programme. He explained that there are four (4) different netCDF files used one for the profiles, one for the surface trajectory, one for metadata and one for technical information. The Argo files are CF and UDUNITS (software that supports conversion of unit specifications between formatted and binary forms, arithmetic manipulation of units, and conversion of values between compatible scales of measurement) compatible but not ACDD. He expressed the view that a netCDF format for GTSPP should combine all of this information into a single file. He noted that the netCDF files constructed for OceanSITES and for MyOcean adopted an organization of one file per platform. Such a structure would be something for GTSPP to consider. The SeaDataNet project is working on a netCDF structure for CTD data (lead by Roy Lowry) and again GTSPP should keep informed.

Mr Sun noted that the GTSPP Data User's Manual (http://www.iode.org/index.php?option=com_oe&task=viewDocumentRecord&docID=8205) did use Argo's as a guide to content. He also informed the meeting that NODC plans to extend the Argo format to make it ACDD compliant. Mr Carval suggested that this should be done more generally, not exclusively for Argo.

7.2 FUTURE DATA EXCHANGE FORMAT DESIGN

7.2.1 FORMAT COMPATIBILITY ISSUES

Mr Sun re-iterated some of the comments made in 7.1.1. He noted the importance of being compliant with as many of the commonly used conventions as possible.

Ms Gronell Thresher remarked that the exchange format needs to contain everything that is known about the data. This should also be what is delivered to users. Mr Ouellet remarked that the current GTSPP files constructed by US NODC are only for 3 oceans –

Atlantic, Pacific, and Indian. But he wondered where the Arctic data can be found and asked whether a file could be created for the Arctic (which is well defined in a geographical sense) rather than having these data split over three files. Mr Sun responded saying he would like the format be able to expose individual stations to a THREDDS server.

7.2.2 REAL-TIME DATA FORMAT PERSPECTIVES

Mr Ouellet examined attributes of the MEDS ASCII file and exposed weaknesses so that these could be addressed in a new netCDF file structure. He noted that there were a few fields used by GTSPP (Stream_Ident, Source_ID, Data_Type, etc)) where multiple concepts had been mixed and that these should be separated. He remarked that the cruise identifier used was rooted in history at ISDM and was not a good choice as a unique identifier. He stated that a distinction was needed between the data centre of institution that made the observations and the one which assembled and processed them. Data provenance, knowing the collecting institute, ship, WMO insertion point, and through whose hands the data passed on the way to the user, is important. Ship identity information is important but this can appear as a ship name, a call sign, an IMO number, and/or a ship code. There is a need to distinguish a platform type, from the instrument making the measurement, and from the method of deployment of the instrument.

Mr Keeley noted that fields with controlled content (such as code tables) are important for fields that are intended to be searched. It was also important to distinguish mandatory fields, those essential to using the data, from optional fields. Ms Gronell Thresher suggested that one solution to the multiple unique identifiers from the various sources that handled the data would be to group the various possibilities into an array with a generic name “unique identifier” and elements of the array being the different identifiers applied to the data through its lifetime. This strategy might be useful for other metadata as well. It would be mandatory to have at least one entry in the array.

7.2.3 CSIRO DELAYED-MODE DATA FORMAT PERSPECTIVES

Ms Ann Gronell Thresher presented her perspective at a more abstract level than Mathieu Ouellet. She considered sections for metadata, for calibrations, for observed data, for corrected data and for processing history were necessary in a new netCDF structure. Quality flags (assessment of the reliability of the values) were needed on all variables but wanted just a single flag at a level, not a list of the tests that were failed by that value at that level. The “best copy” of a field should be given the name of the variable it contains so that it is the field that would be most easily identified by a user. For example, the best copy of temperature would be labelled “temperature”, whereas the original temperatures as delivered could be called “original_temperature”. Original (raw) values should not be buried in a processing history section. Indicators of acceptable (but perhaps unusual) features could be marked. Perhaps a field to record comments would be useful? She would like a more transparent way to explain tests performed and failed than the present QCP, QCF scheme.

Mr Carval noted the need for a field to indicate the best quality found in the station (see agenda item 5.3.2). He also stated that observations such as surface meteorological measurements should be recorded in the netCDF file. Mr Keeley advocated a controlled list of all the quality control tests performed by GTSPP partners processing data. He also wanted to see vector quantities, such as wind velocity, be explicitly indicated as vectors rather than 2 related scalars.

7.2.4 SISMER DELAYED-MODE DATA FORMAT PERSPECTIVES

Mr Thierry Carval repeated some of the information presented in 7.1.2. He added that in MyOcean usage, there was a wide variety of data represented in the same file structure.

7.2.5 AOML DELAYED-MODE DATA FORMAT PERSPECTIVES

Mr Francis Bringas discussed these issues from the AOML perspective. They want to be able to identify good data quickly. They want metadata such as transect number for XBTs in the files, as well as date of manufacture of probe and serial number. They prefer to see the fall rate coefficients explicitly rather than presented through a code table. They are developing a new database schema to capture all of the needed metadata that is fully compatible with new XBT BUFR template. They agreed to share this schema (action 37).

7.2.6 BUFR AND NETCDF COMPARISON

Mr Joaquin Trinanes presented this item. He reviewed attributes of netCDF V4 relative to V3. V4 has ability to read V3 files but reverse is not true. He thought that V4 files are not compatible with distribution software such as OPeNDAP and THREDDS. He also stated that although a BUFR to netCDF conversion is quite feasible, going from netCDF to BUFR would result in loss of information.

At this point there was a general wrap up of the conversations on netCDF with the following points made:

- There is a need for a Working Group to write a GTSPP netCDF Users Manual that describes the format and all of the fields (such as Argo has) (action 39). It was decided the Working Group members are the members of the Steering Group.
- There is a need for some sample files to illustrate netCDF use and in both V3 and V4 (action 40).
- The Working Group needs to create tables of the controlled lists and show mapping from MEDS ASCII to the lists (action 38)
- There is a need for a workspace for comments and drafts to be recorded (action 41)

8. INTERACTION WITH OTHER PROJECTS

8.1 OCEAN DATA VIEW

Mr Reiner Schlitzer provided a presentation on Ocean Data View (ODV) through Webex. He noted there were currently some 25,000 registered users. He remarked that having the GTSPP files in a multi-station format would make importation of data significantly faster. He also remarked that the volume of coastal moorings data was so large that it overwhelmed open ocean data and perhaps should be in a separate file(s). He also noted that the scattergrams that can be displayed by ODV can be a useful tool for identifying outliers and so data that need attention. This might be something for GTSPP to incorporate into operations.

Mr Ouellet asked if it was possible to subtract climatology and simply display anomalies. Mr Schlitzer replied that this is under development. Mr Ouellet described a strategy he uses. He produces anomalies from climatology at every depth level, then sums these absolute values over the water column to produce a single integrated display. This is a quick way to identify strong anomalies at locations without needing to view every level separately. Mr Schlitzer remarked that such a function existed in DIVA. Mr Sun remarked that in an upcoming GTSPP training course he was planning to use ODV and invited Mr Schlitzer to take part in the course. Mr Schlitzer agreed. Mr Sun also noted that US NODC had rebuilt the contents of the WOCE current meter archives and these files were now available to test. Mr Schlitzer expressed interest in carrying out this test.

8.2 IODE OCEAN TEACHER TRAINING PROGRAMME

Mr Sun explained that he was planning a training course on GTSPP for OceanTeacher (OT). It had been delayed because of budget restrictions but he expected it would get done in 2013. He informed the meeting that he was currently working with the IODE Project Office to prepare the material.

Ms Claudia Delgado, the Training Coordinator at the IODE Project Office noted that the university curriculum component in OceanTeacher makes significant use of GTSPP data and this could be drawn on for the training course.

8.3 NOAA ENVIRONMENTAL RESEARCH DIVISION'S DATA ACCESS PROGRAM (ERDDAP)

Mr Sun briefly described the cooperation between GTSPP and NOAA Environmental Research Division's Data Access Program (ERDDAP). The ERDDAP downloads the GTSPP best copy data sets on a monthly basis and reports problems found in the data sets back to the GTSPP data manager for corrections.

8.4 WORLD OCEAN DATABASE (WOD) / US NODC GTSPP LEGACY PLAN

Mr Sun revisited a number of the points discussed under agenda item 5.1. He re-iterated that the goals were to:

- Remain synchronized with the data coming from Canada although the data from programs that maintain data systems external to GTSPP would be excluded

- Provide QC'ed delayed mode, “best copy” data by aggregating data extracted from WOD and from files assembled from externally managed data sources (such as Argo, tropical moorings, NDBC, etc.). These aggregate files would be produced at least quarterly and perhaps more frequently

- Provide data through a single interface.

He remarked that the US NODC GTSPP legacy plan had been the subject of extensive discussion at US NODC but the purpose of the presentation here was to solicit opinions from the SG-GTSPP since decisions of the US NODC were not final yet.

Further discussions related to the future of the GTSPP at US NODC resulted in the “GTSPP SG RESPONSE TO US NODC PROPOSED CHANGES IN GTSPP CMD SUPPORT” attached Annex VI.

8.5 JCOMM-IODE OCEAN DATA STANDARDS PILOT PROJECT

Mr Sun presented this item. He focused on the proposed standard for quality control flags that was under review by the JCOMM/IODE Ocean Data Standards pilot project. The original submission had undergone two revisions during the course of its review. The most recent version proposed a simple set of flags to indicate reliability of observations. These were widely received by major international oceanographic programs as acceptable for use in data exchange and interoperability. There was no onus on existing data systems to change internal operations, rather simply to provide a mapping of local quality flags to this standard when exchanging data. A second level of quality indicators to provide additional information about attributes of the observations (such as tests that they had undergone, whether values were within instrument detection limits, reasons for test failures, etc.) was foreseen as desirable, but there was not yet agreement on how this should be handled. He noted that the proposed scheme used flag values of 1, 2, 3, 4, 9 only.

Ms Gronell Thresher noted that GTSPP could meet this scheme. Mr Carval expressed some concern over the term “secondary flag scheme” in that the information contained in the secondary level did not really address data quality, but rather processing and additional information about the observations. He also raised the issue of bringing together documentation of the various quality control procedures into a single place such as OceanTeacher digital Library or through a DOI reference. This is related to the discussion of agenda item 3.4.1.

8.6 JCOMM New Marine Climate Data System

Ms Iona presented (through Webex) a review of the Marine Climate Data System (MCDS). She explained that the MCDS had origins in the modernization of the Marine Climatology Summary Scheme (MCSS), but now has wider implications because of the recognition of the need for more metadata and incorporation of new instruments and standardization of methods. Development of the MCDS will become a core activity of ETMC in cooperation with IODE. The system is expected to be in place by 2020 with a small number of centres, designated as Centres for Marine-Meteorological and Oceanographic Climate data (CMOCs), providing MCDS services. A workshop held in Germany in late 2011 provided a draft vision, strategy and implementation plan that will form the basis for ETMC in its work. These drafts will go to IODE for consideration since IODE is referenced as an important partner in the envisioned activities and is expected to lead activities related to sub-surface ocean observations.

Mr Sun remarked that as Chair of the SG-GTSPP he was happy to contribute to this development. Mr Pissierssens noted that the upcoming JCOMM-IV Session will discuss this mater under agenda 7.2 and it is expected there will be a clear timeline and process for the assessment of candidate centres, evaluation criteria, and certification. He suggested that it appeared that there would be a two-year period needed to put all of the necessary processes into operations.

8.7 ODP / Promotion of GTSPP at JCOMM

Mr Nick Mikhailov and Mr Sergey Belov presented a status report on the IODE Ocean Data Portal (ODP) through Webex. Mr Mikhailov explained that ODP was currently operating in version 1 (V1) but that version 2 (V2) would be coming into production during the second semester of 2012 or early 2013. Presently there are ten operating data providers with some 62 resources of mixed types (object files, remote files, and structured files). Obninsk is setting up an ODP Support Centre to assist with the operations at the IODE Project Office. V2 will use a network based model. Interoperability of data sets requires standard parameter names, similar data granularity, rules for metadata attributes and syntactic rules. Mr Belov noted that GTSPP is the most successful example of a data contributor using the “light data provider” software. He confirmed that V2 is OpeNDAP and THREDDS compatible.

8.8 OceanSITES

Mr Carval presented information about the OceanSITES Programme: a worldwide system of long-term, deep-water reference stations measuring dozens of variables and monitoring the full depth of the ocean, from air-sea interactions down to 5,000 meters. Co-Chairs of OceanSITES are Mr Bob Weller and Mr Uwe Send. OceanSITES maintains a number of open ocean moorings that record observations from surface to bottom including air-sea interactions, profiles of physical and chemical variables. The programme also includes data from transport sections. The programme produces data on about 55 different variables. France’s IFREMER and US NDBC operate the GDACs for this. The meeting agreed that collaboration with OceanSITES should be pursued (action 34).

8.9 PRESENTATION TO JCOMM-4

This item was presented by Mr Sun. He expressed the view that it was important for GTSPP to have some visibility at the upcoming JCOMM meeting and that this could be achieved through the preparation and distribution of a leaflet to delegates.

Mr Pissierssens stated that the content of the leaflet should be targeted at the JCOMM audience and therefore emphasize the real-time components. It should also show how the data can be used and perhaps indicate current users. Mr Keeley suggested that the countries that are actively involved should also be given credit on the leaflet. Mr Sun agreed to prepare this with review and suggestions from the Steering Group (action 42).

9. ADOPTION OF THE WORKPLAN (2012–2013)

See agenda item 10.

10. REVIEW OF ACTION ITEMS FROM THE MEETING

Action items were reviewed and are presented in Annex III of this meeting report.

11. CLOSING OF THE MEETING

The participants planned for the next meeting to be held in the first quarter of 2014. The meeting was closed at 15:00 on 20 April 2012.

ANNEX I

AGENDA

1. OPENING OF THE MEETING

1.1 Welcome
1.2 Meeting arrangements
1.3 Adoption of the agenda
1.4 Designation of rapporteur

2. REVIEW OF THE GOVERANCE OF GTSPP

2.1 Parent Bodies: IODE and JCOMM
2.2 Terms of Reference
2.3 Composition of the Steering Group

3. DATA FLOWS AND OPERATIONS

3.1 Ship of Opportunity Program Overview
3.2 Data Flows from Observation to Archive
3.2.1 AOML – RT
3.2.2 AOML – DM
3.2.3 ISDM – RT and DM
3.2.4 CSIRO – DM
3.2.5 SISMER – DM
3.2.6 Tohoku Univ. – RT
3.3 GTS Data Transmissions and Data Drops
3.4 Quality Control Procedures
3.4.1 ISDM
3.4.2 AOML
3.4.3 CSIRO
3.4.4 SISMER
3.4.5 NMDIS
3.4.6 US-NODC
3.5 CRC Implementation

4. XBT BATHY TO BUFR MIGRATION

4.1 Status Report of the Migration
4.1.1 AOML
4.1.2 ISDM
4.1.3 SISMER
4.2 BUFR Template
4.3 Report on the Results of Reception of Data
4.4 Lessons Learned and future plan for BUFR migration

5. GTSPP INFRASTRUCTURE

5.1 Long Term Archive – US NODC
5.2 Real-Time Data Assembly - ISDM
5.3 Delayed Mode Data Assembly
5.3.1 ISDM
5.3.2 CSIRO

5.3.3 SISMER
5.3.4 NMDIS
5.3.5 INDIP
5.4 Data Product Center

6. GTSPP Activities Review: 2010 – 2011

7. GTSPP DATA FORMAT REVISION

7.1 Review of the existing netCDF conventions
7.1.1 GTSPP NetCDF Ver. 4
7.1.2 Argo float formats
7.2 Next Data Exchange Format Design
7.2.1 Format Compatibility Issues
7.2.2 Real-Time Data Format Perspectives
7.2.3 CSIRO Delayed-Mode Data Format Perspectives
7.2.4 SISMER Delayed-Mode Data Format Perspectives
7.2.5 AOML Delayed-Mode Data Format Perspectives
7.2.6 BUFR and NetCDF Comparison

8. INTERACTION WITH OTHER PROJECTS

8.1 Ocean Data View
8.2 IODE Ocean Teacher Training Programme
8.3 NOAA Environmental Research Division's Data Access Program (ERDDAP)
8.4 World Ocean Database (WOD) / NODC GTSPP Legacy Plan
8.5 JCOMM-IODE Ocean Data Standards Pilot Project
8.6 JCOMM New Marine Climate Data System
8.7 Cooperation with the IODE OceanDataPortal
8.8 OceanSITES
8.9 GTSPP Publicity: handout

9. ADOPTION OF THE WORKPLAN (2012– 2013)

10. REVIEW OF ACTION ITEMS FROM THE MEETING

11. CLOSING OF THE MEETING

ANNEX II

LIST OF PARTICIPANTS

SG members in Ostend

Mr Thierry CARVAL
Global Data Manager
French Institute for the Exploitation of the Sea, IFREMER Centre de Brest
IFREMER (French Institute for Sea Research and Exploitation) Centre de Brest,
BP70 29280 Plouzané, France
France
Email: Thierry.Carval@ifremer.fr

Dr Ann GRONELL THRESHER
Scientist-in-Charge of Operations Argo/SOOP
CSIRO Marine and Atmospheric Research, Tasmania
Marine Laboratories
Castray Esplanade
GPO BOX 1538
Hobart Tasmania 7001
Australia
Tel: +61 3 62 325 419
Fax: +61 3 62 325 123
Email: Ann.Thresher@csiro.au

Mr Mathieu OUELLET
Senior Policy and Technical Advisor, Oceanographic Data and Products Manager
Fisheries and Oceans Canada, Ottawa, Integrated Science Data Management (ISDM)
Department of Fisheries and Oceans
12W - 200 Kent St
Ottawa K1A 0E6
Ontario
Canada
Tel: +1 (613) 990-8570
Fax: +1 (613) 990-8570
Email: mathieu.ouellet@dfo-mpo.gc.ca

Dr Charles SUN
NOAA, National Oceanographic Data Centre, Silver Spring
National Oceanographic Data Center
NOAA/NESDIS E/OC1
SSMC3, 4th Floor
1315 East-West Highway
Silver Spring MD 20910-3282
United States
Tel: +1 (301)713-3272 x111
Fax: +1(301)713-3302
Email: charles.sun@noaa.gov

Invited experts in Ostend

Dr Francis BRINGAS
Oceanographer / SEAS Operations
National Oceanic and Atmospheric Administration,
Atlantic Oceanographic and Meteorological Laboratories,
Physical Oceanography Division
NOAA/AOML/PHOD, 4301 Rickenbacker Causeway,
Miami FL 33149
United States
Tel: +1 (305) 361-4316
Fax: +1 (305) 361-4412
Email: Francis.Bringas@noaa.gov

Dr Fengying JI
Senior Engineer, Marine Data Center
National Marine Data and Information Service
No. 93, Liuwei Road
Hedong District
300171 Tianjin
China
Tel: +86 22 24010834
Fax: +86 22 24010926
Email: jfywork@yahoo.com.cn

Mr Robert KEELEY
Retired
2243 Rembrandt Road
Ottawa K2B 7P8
Ontario
Canada
Tel: +1 613 829 7919
Email: robertkeeley@rogers.com

Dr Joaquin TRINANES
National Oceanic and Atmospheric Administration,
Atlantic Oceanographic and Meteorological Laboratories
4301 Rickenbacker Causeway
Miami Florida FL 33149
United States

Tel: +1 305 361 4435
Fax: +1 305 361 4392
Email: Joaquin.Trinanes@noaa.gov

Ms Ting YU
National Marine Data and Information Service
No. 93, Liuwei Road
Hedong District
300171 Tianjin
China
Tel: +86-22-24010834
Fax: +86 22 24010926
Email: tacula@gmail.com

by Webex

Dr. Norman HALL
Physical Scientist
NOAA, National Oceanographic Data Centre, Silver Spring
8604 La Jolla Shores Drive
La Jolla California 92037
United States
Tel: 00 1* 858 546 7110
Email: norman.hall@noaa.gov

Ms Sissy IONA
Head HNODC
Hellenic Centre for Marine Research, Anavyssos
Institute of Oceanography
46.7 Km, Athens-Sounio Ave.
PO BOX 712 Anavyssos
190 13 Attica
Greece
Tel: +30-22910-76367
Fax: +30-22910-76347
Email: sissy@hnodc.hcmr.gr

Mr Wataru Ito
Scientific Officer
Japan Meteorological Agency
Marine Division
Global Environment and Marine Department
Japan Meteorological Agency
1-3-4, Ote-machi, Chiyoda-ku, Tokyo
100-8122
Japan
Email: w_ito@met.kishou.go.jp

Mr Nikolai MIKHAILOV
Head, Oceanographic Data Centre
All-Russian Research Institute Hydrometeorological Information - World Data Center, Obninsk
6, Koroleva Street
Obninsk
Kaluga region, 249020
Russian Federation
249020
Tel: +7-484 397 49 07
Fax: +7-499 795 22 25
Email: nodc@meteo.ru

Mr Reiner SCHLITZER
Alfred Wegener Institute for Polar and Marine Research, Bremerhaven
Am Handelshafen 12
P.O. Box 12 01 61
27515 Bremerhaven
Germany
Email: rschlitzer@awi-bremerhaven.de

by Livestream

Dr. Krisa ARZAYUS
Chief, Marine Data Stewardship Division
NOAA, National Oceanographic Data Centre, Silver Spring
National Oceanographic Data Center
NOAA/NESDIS E/OC1
SSMC3, 4th Floor
1315 East-West Highway
Silver Spring MD 20910-3282
United States
Email: krisa.arzayus@noaa.gov

Ms Mei-Lin CHEN
Physical Oceanographer
NOAA, National Oceanographic Data Centre, Silver Spring
National Oceanographic Data Center
NOAA/NESDIS E/OC1
SSMC3, 4th Floor
1315 East-West Highway
Silver Spring MD 20910-3282
United States
Email: Meilin.Chen@noaa.gov

Dr Gustavo J. GONI
Oceanographer
National Oceanic and Atmospheric Administration, Atlantic Oceanographic and Meteorological Laboratories; OAR
Physical Oceanography Division

USDC/NOAA/AOML/PHOD 4301
Rickenbacker Causeway
Miami FL 33149
United States
Tel: +1 305-361-4339
Fax: +1 305-361-4412
Email: gustavo.goni@noaa.gov

Mr Raul GUERRERO
Head of Physical Oceanography Program
Instituto Nacional de Investigacion y Desarrollo Pesquero
Victoria Ocampo # 1, 7600 Mar del Plata, ARGENTINA
Argentina
Tel: 0054 223 486 2586
Fax: 0054 223 486 1830
Email: raul.guerrero@inidep.edu.ar

Ms Melanie HAMILTON
Ocean Data Manager, GTSPP
NOAA, National Oceanographic Data Centre
NOAA/NESDIS E/OC1
SSMC3, 4th Floor
1315 East-West Highway
Silver Spring MD 20910-3282
United States
Tel: 1-301-713-3281
Fax: 1-301-713-3302
Email: melanie.hamilton@noaa.gov

Mr Stephan HECKENDORFF
Software Developer
Alfred Wegener Institute for Polar and Marine Research, Bremerhaven
Germany
Tel: 004947148311574
Email: Stephan.Heckendorff@awi.de

Ms. Mizuho HOSHIMOTO
Forecaster
Japan Meteorological Agency, Tokyo
1-3-4 Otemachi Chiyoda-ku
100-8122
Tokyo
Japan
Tel: +81-3-3212-8341
Fax: +81-3-3211-3047
Email:
mizuho_hoshimoto@met.kishou.go.jp

Shiro ISHIZAKI
Scientific Officer
Japan Meteorological Agency, Tokyo
Office of Marine Prediction
Japan Meteorological Agency
1-3-4 Otemachi Chiyoda-ku
Tokyo
100-8122
Japan
Email: s_ishizaki@met.kishou.go.jp

Dr Shoichi KIZU
Associate Professor
6-3 Aza Aoba, Aramaki, Aoba-ku, Sendai 980-8578
Japan
Tel: +81-22-795-6528
Fax: +81-22-795-6530
Email: kizu@pol.gp.tohoku.ac.jp

Ms Lisa LEHMANN
Programmer, Data Manager
University of California San Diego, Scripps Institution of Oceanography
9500 Gilman Dr.
La Jolla CA 92093-0230
United States
Tel: 858-534-6756
Fax: 858-534-9820
Email: llehmann@ucsd.edu

Mr Satoshi OGAWA
Senior Scientific Officer
Japan Meteorological Agency, Tokyo
Marine Division
Global Environment and Marine Department
Japan Meteorological Agency
1-3-4, Ote-machi, Chiyoda-ku,
Tokyo
100-8122
Japan
Tel: +81 3 3211 6909
Fax: +81 3 3211 6908
Email: s.ogawa@met.kishou.go.jp

Mr Loic PETIT DE LA VILLEON
Chef du SISMER
French Institute for the Exploitation of the Sea, IFREMER Centre de Brest
France
Tel: +33-2-98 22 49 13
Fax: +33-2-98 22 46 44
Email:
loic.petit.de.la.villeon@ifremer.fr

Mr Greg REED
Executive Officer
Australian Ocean Data Centre Joint Facility,
Fleet Headquarters, Wylde Street
Building 89
Garden Island, Potts Point NSW 2011
Australia
Tel: +61 2 9359 3141
Fax: +61 2 9359 3120
Email: greg@metoc.gov.au

Mr Akihiro SETA
Oceanographic Data and Information Officer
Japan Oceanographic Data Center
2-5-18, Aomi
Koto-ku
135-0064
Tokyo
Japan
Tel: +81-3-3541-4295
Fax: +81-3-3545-2885
Email: jodcint@jodc.go.jp

IODE Secretariat (Ostend)

Mr Peter PISSIERSSENS
Head, IOC Project Office for IODE, Ostend, Belgium
Intergovernmental Oceanographic Commission of UNESCO (IOC)
Wandelaarkaai 7 - Pakhuis 61
B-8400 Ostend
Belgium
Tel: +32-59-340158
Fax: +32-59-79 5220
Email: p.pissierssens@unesco.org

ANNEX III

ACTION LIST

Numbers in () are the action item's number from the previous meeting, which was held in June 2011, Silver Spring, Maryland, US.

No.	Action	Who	Target Date
1 (1)	Discuss standardized scientific QC of all data by largest groups. (Carried forward -)	NODC, ISDM, AOML, CSIRO, U Tohoku	Next meeting
2 (4)	Prepare data training program for review next year at GTSPP meeting in 1st quarter 2012 (Carried forward -)	NODC	Next meeting
3 (5)	Send list of platforms to NODC for double checking that IDs as platform type is correct. (Carried forward -)	ISDM	Next meeting
4 (6)	Recover / refresh TAO and buoy data since August 2010 and send to NODC. (Carried forward -)	ISDM	Next meeting
5 (12)	Generate new surface code so QCP and QCF codes not used for Canadian Argo TESAC message. The Argo data in the CMD will also need to be changed to use the correct surface code. (Carried forward -)	ISDM	Next meeting
6 (13)	Ensure SOOP line numbers are included in ISDM ASCII files. (Carried forward -)	CSIRO	Next meeting
7 (15)	Inform ISDM when Cookbook changes so they can point to newest version. (Carried forward – no changes since last meeting)	CSIRO	Next meeting
8 (19)	Create new variables for depth/pres, temp, psal called <PARM>_raw. (Carried forward -)	NODC	Next meeting
9 (20)	Consider making another temp attribute for temp bias correction. (Carried forward -)	Steering Group	Next meeting
10	Add new history groups to NetCDF template	NODC	Next meeting

No.	Action	Who	Target Date
(21)	(see new data user manual). (Carried forward -)		
11 (22)	Create history group to hold additional information for meta data changes. (Carried forward -)	NODC	Next meeting
12 (23)	Create a unique surface code list to populate new variable list in the data user guide. (Carried forward -)	NODC	Next meeting
13 (24)	Review CSIRO's GTSPP data user manual and provide comments for improvement of the manual. (Carried forward -)	Steering Group	Next meeting
14	Finalize ToR and composition of Steering Group. Include needed definitions of terms (real-time, near real-time, non real-time, etc.) to ensure clarity.	Chair	Done (see Annex IV)
15	Review the WMO Manual on Meteorological Instruments and Methods of Observation that discusses XBT operations. If changes are needed refer changes to SOOP Chair. If appropriate, GTSPP Chair will refer these practices to IODE ODS.	Chair, (lead) CSIRO, AOML	30 Sep 2012
16	Some past CRC values were calculated incorrectly by Australia. Identify their impact on GTSPP operations and determine what are appropriate corrective measures. Produce a plan that includes identification of times and sources where incorrect CRC was / is used, consider how to bring CRCs into alignment across organizations, rewrite CRC calculation document to clarify exactly what should be included. Implement the plan.	CSIRO (lead), ISDM, NODC	30 Jun 2012
17	Add to content of GTSPP data manual to provide guidance to data users on how to use flags, QCP, history information.	Chair	31 Dec 2012
18	Update QC documentation (as required) and provide copy to Chair.	CSIRO, ISDM, AOML, NODC, IFREMER	31 Aug 2012
19	Update list of QC tests in GTSPP manual.	Chair	31 Oct 2012
20	Provide a written justification of what “problem” a unique data identifier will solve beyond matching RT to DM.	Chair	31 May 2012
21	Refer problem of maintaining observations along PX40 to SOOP.	AOML	31 May 2012

No.	Action	Who	Target Date
22	Publish newest version of XBT BUFR template and ask WMO to update their website.	AOML	Done (see Annex V)
23	Make suitable corrections to IF profiles (from sea mammals) and help ISDM to correct their real-time archives.	IFREMER (lead), ISDM	31 Oct 2012
24	Distribute to Steering Group the OceanTeacher document explaining how to encode data in the revised XBT template (Annex V).	Keeley	30 Jun 2012
25	Provide information to AOML and Chair on Master Table 10 (MT10) and work carried out by JCOMM Task Team on Table Driven Codes	Keeley	30 Jun 2012
26	Contact Unidata to ascertain their interest in transforming MT10 to a UML compliant form.	AOML	31 Jul 2012
27	Request information from Steering Group members about GTSPP data users.	Chair	31 Dec 2012
28	Revise GTSPP web pages offered by SG members and create a home page at IODE-PO considering suggestions and comments from SG members.	Chair (lead), IODE-PO, CSIRO, ISDM	31 Dec 2012
29	Run monitoring software on a monthly schedule to show time delay from observation to availability in CMD and send to chair.	ISDM	Start 31 Oct 2012
30	Consider the use of EOFs as a way to identify suspect profiles.	CSIRO	Next meeting
31	Plan how to get delayed mode data after scientific QC operations to update contents in GTSPP CMD.	IFREMER (lead), ISDM, NODC	31 Dec 2012
32	Ask IODE to consider recommendation to national data centres to ask for and store profiles at instrument resolution rather than a decimated version.	Chair	For IODE-22 (Mar 2013)
33	Investigate the suitability of CORA as a global reference data set.	CSIRO (lead), IFREMER	31 Oct 2012
34	Pursue inclusion of OceanSITES profile data into GTSPP.	IFREMER, Chair	31 May 2012
35	Renew www.gtspp.org.	IFREMER	Next meeting
36	QC results of JMA monthly analyses to go to Chairs of both GTSPP and SOOP and provide draft monthly report for review and comments for improvement.	JMA, and SG-GTSPP	Jun 2012
37	Share database development with SG to ensure all their needed attributes are also appearing in GTSPP exchange format (see action 38).	AOML	30 Sep 2012
38	Begin task of identifying the mapping between existing pcodes and other coded fields to (new)	ISDM (lead),	31 Jul 2012

No.	Action	Who	Target Date
	netCDF variables and consider using more descriptive names and clear definitions.	NODC	
39	Begin preparation of a GTSPP Manual for Data Exchange by developing a Table of Contents. Fill in sections with text as possible.	CSIRO (lead), IFREMER, NODC	31 May 2012
40	Write a netCDF V4 primer that explains advantages of V4 over V3 and prepare a sample data file structure that handles a mix of profile stations, with variable levels of obs, some surface weather obs, surface trajectories (such as Argo has), and variable history record.	AOML	30 Sep 2012
41	Establish a discussion group mailing list and an issue tracker for GTSPP.	IFREMER	15 May 2012
42	Prepare leaflet for JCOMM-4 with review by Steering Group	Chair (lead), Steering Group, IODE-PO, Keeley	Completed by 17 May 2012

ANNEX IV

REVISED TERMS OF REFERENCE AND COMPOSITION FOR THE STEERING GROUP ON THE GLOBAL TEMPERATURE AND SALINITY PROFILE PROGRAMME (GTSPP)

The Steering Group shall conduct the program for the collection and management of temperature and salinity data sets to support IODE (International Oceanographic Data and Information Exchange) and JCOMM (Joint Technical Commission for Oceanography and Marine Meteorology) requirements with the following Terms of Reference and general membership.

Terms of Reference

1. Provide scientific and technical guidance for the program in the implementation and enhancement of the GTSPP including:
    1.1. Near real time data (observations within 30 days) acquisition;
    1.2. Non real time data (observations older than 30 days or data never circulated on the Global Telecommunication System) acquisition;
    1.3. Communications infrastructures;
    1.4. Quality control and analysis procedures;
    1.5. Continuously managed database;
    1.6. Ocean data and meta data standards; and
    1.7. Data and information products.
2. In conjunction with user groups and data collectors, design and implement data flow monitoring systems to ensure that the data are collected, processed and distributed according to agreed schedules and responsibilities.
3. Collaborate with international projects and global scientific programs such as GCOS (Global Climate Observing System) and GOOS (Global Ocean Observing System) to assemble process and disseminate data managed by GTSPP.
4. Actively promote the GTSPP and provide information to the users of GTSPP services, such as the planners of international science programs.
5. Provide GTSPP status reports and other requested material to the IODE committee and JCOMM ETDMP, to international programs in which GTSPP is a participant.

General Membership

(i) One representative from each of the core participating countries (initially Australia, Canada, France, Japan, and USA) as identified by the countries. The core participating countries are the IOC Member States and WMO Members actively engaged in data and information exchanges with the long term archive centre of GTSPP.

(ii) Experts from one or more Member / Member States of other programs/projects that are of relevance to GTSPP may accompany these representatives.

(iii) Representatives invited by the SG from Member States of the IODE and JCOMM and representatives of oceanographic projects those are important to GTSPP operations.

(iv) The Chair will be selected by the Steering Group and will be reviewed by them every two sessions.

(v) Funding for participants and sessions of the SG will be provided by Members/Member States.

ANNEX V

XBT BUFR Template V9.3 rev.

3-15-004 XBT temperature profile data sequence

F	X	Y	Name	Unit	Scale	Ref Value	Data Width (bits)	Notes
0	01	079	Unique identifier for the profile	CCITT IA5	0	0	64	(1)
0	01	011	Ship or mobile land station identifier	CCITT IA5	0	0	72	(2)
0	01	103	IMO Number. Unique Lloyd's registry.	Numeric	0	0	24	(3)
0	01	087	WMO Marine observing platform extended identifier	Numeric	0	0	23	(4)
0	01	019	Long Station or site name	CCITT IA5	0	0	256	(5)
0	01	080	Ship line number according to SOOP	CCITT IA5	0	1. 0	2. 32	
0	05	036	Ship transect number according to SOOP	Numeric	0	0	7	(6)
0	01	036	Agency in charge of operating the observing platform	code table	0	0	20	
0	01	013	Speed of motion of moving observing platform	m/s	0	0	10	
0	01	012	Direction of motion of moving observing platform	deg true	0	0	9	
3	01	011	Date					
3	01	012	Time					
3	01	021	Latitude and longitude (high accuracy)					
0	07	032	Height of	m	2	0	16	(7)

F	X	Y	Name	Unit	Scale	Ref Value	Data Width (bits)	Notes
			sensor above local ground (or deck of marine platform)					
0	07	033	Height of sensor above water surface	m	1	0	12	(7)
0	02	002	Type of instrumentation for wind measurement	flag table	0	0	4	(8)
0	11	002	Wind speed	m/s	1	0	12	
0	11	001	Wind direction	deg true	0	0	9	
0	07	032	Height of sensor above local ground (or deck of marine platform)	m	2	0	16	(9)
0	07	033	Height of sensor above water surface	m	1	0	12	(9)
0	12	101	Temperature/Dry-bulb temperature	deg K	2	0	16	
0	12	103	Dew-point temperature	deg K	2	0	16	
0	07	032	Height of sensor above local ground (or deck of marine platform) (set to missing to cancel previous value)	m	2	0	16	
0	07	033	Height of sensor above water surface (set to missing to cancel previous value)	m	1	0	12	
3	02	021	Waves					
0	02	031	Duration and time of current measurement	code table	0	0	5	
0	02	030	Method of current measurement	code table	0	0	3	
0	22	005	Direction of	deg true	0	0	9	

F	X	Y	Name	Unit	Scale	Ref Value	Data Width (bits)	Notes
			sea surface current					
0	22	032	Speed of sea surface current	m/s	0	0	13	
0	22	063	Total depth of water	m	0	0	14	
0	08	080	Qualifier for GTSPP quality class	code table	0	0	6	(13)
0	33	050	Global GTSPP quality class	code table	0	0	4	
0	22	178	XBT/XCTD launcher Type	code table	0	0	8	(14)
0	22	177	Height of XBT/XCTD Launcher above sea level	m	0	0	6	(15)
0	22	067	Instrument type for water temperature profile measurement	code table	0	0	10	
0	08	041	Date significance	code table	0	0	5	(17)
0	26	021	Year	year	0	0	12	
0	26	022	Month	month	0	0	4	
0	26	023	Day	day	0	0	6	
0	22	068	Water temperature profile recorder type	code table	0	0	7	
0	25	061	Data acquisition software type (or name) and version number	CCITT IA5	0	0	96	(18)
0	08	041	Date significance (set to missing to cancel previous value)	code table	0	0	5	
0	08	080	Qualifier for GTSPP quality class (set to missing to cancel previous value)	code table	0	0	4	
0	02	171	Instrument serial number	CCITT IA5	0	0	64	(16)

F	X	Y	Name	Unit	Scale	Ref Value	Data Width (bits)	Notes
			for water temperature measurement					
3	02	090	Sea Surface Temperature					(10)
0	02	171	Instrument serial number for water temperature profile measurement	CCITT IA5	0	0	64	(16)
0	02	032	Indicator for digitization	code table	0	0	2	(11)
3	15	005	Water temperature profile (Temperature profile observed by XBT or Buoy)					(12)

Notes:

(1) Currently some countries are using a 32 bit CRC calculation to generate a unique identifier for the individual BATHY messages. This corresponds to a 8-octet long hexadecimal string.

(2) Place the ship call sign here.

(3) Values are restricted to be between 0 and 9999999.

(4) If field 0-01-011 is used, this field will be left missing and vice versa.

(5) Place the ship name here.

(6) Integer, assigned by the operator, incremented for each new transect (i.e. all drops have the same transect number while the ship is moving from one end point of the line to the other end point; as soon as the ship arrived to port and goes back to start a new transect then transect number is incremented). The initial value and subsequent values for transect numbers do not matter provided that each new transect by a ship on a line has a transect number higher than previous transect numbers for the same line and the same ship. In case a single cruise follows more than one SOOP line in a row, then the transect number should be incremented each time the cruise changes line.

(7) This field records the height of the instrument used to make the wind speed and direction measurements.

(8) Introduced to ensure that information about the certification, or not, of the instrument is retained as present in BATHY.

(9) This was added to record the height of the instrument used to make the dry bulb temperature measurement.

(10) This proposed new sequence allows 2 decimal precision on SST with descriptor 0-22-045.

3-02-090: Sea/water temperature high precision

0-02-038 Method of sea/water measurement
0-07-063 Depth below sea surface
0-22-045 Sea/water temperature

(11) This descriptor applies to the method used to select depths for the temperature profile encoded through 3-15-005. If temperatures are reported at significant depths, the values shall: (a) Be sufficient to reproduce basic features of the profile and; (b) Define the top and the bottom of isothermal layers.

(12) Proposed new sequence as follows. Note that temperatures are stored in K.

3-15-005: Water Temperature Profile

1-06-000 Delayed replication of 6 descriptors
0-31-002 Extended delayed descriptor replication factor
0-07-063 Depth below sea surface
0-08-080 Qualifier for quality class. Note: set to qualifier = 13
0-33-050 GTSPP quality class
0-22-043 Subsurface sea temperature
0-08-080 Qualifier for quality class. Note: set to qualifier = 11
0-33-050 GTSPP quality class

With an addition (in yellow) in code table 0-08-080 as follows:

0 08 080 Qualifier for GTSPP quality flag

Code Figure	Meaning
0	Total water pressure profile
1	Total water temperature profile
2	Total water salinity profile
3	Total water conductivity profile
4	Total water depth
5-9	Reserved
10	Water pressure at a level
11	Water temperature at a level
12	Salinity at a level
13	Water depth at a level
14-19	Reserved
20	Position
21-62	Reserved
63	Missing value

And an addition (in yellow) in code table 0-33-050 as follows:

0 33 050 Global GTSPP quality flag

Code Figure	Meaning
0	Unqualified
1	Correct value (all checks passed)

2	Probably good but value inconsistent with statistics (differ from climatology)
3	Probably bad (spike, gradient, … if other tests passed)
4	Bad value, Impossible value (out of scale, vertical instability, constant profile)
5	Value modified during quality control
6-7	Reserved
8	Interpolated value
9	Good for operational use; Caution; check literature for other uses
10-14	Reserved
15	Missing value

(13) We require a new entry in table 0 08 080. This has been inserted as code figure 4 and highlighted in yellow in note 12.

(14) Propose new code table 0-22-178 as follows:

0 22 178 XBT/XCTD Launcher Type

Code Figure	
0	Unknown
1	LM-2A Deck-mounted
2	LM-3A Hand-Held
3	LM-4A Thru-Hull
4-9	Reserved
10	AL-12 TSK Autolauncher (up to 12 Probes)
11-19	Reserved
20	SIO XBT Autolauncher (up to 6 probes)
21-29	Reserved
30	AOML XBT V6 Autolauncher (up to 6 Deep Blue probes)
31	AOML XBT V8.0 Autolauncher (up to 8 Deep Blue probes)
32	AOML XBT V8.1 Autolauncher (up to 8 Deep Blue&Fast Deep probes)
33-89	Reserved
90	CSIRO Devil Autolauncher
91-99	Reserved
100	MFSTEP Autolauncher (Mediterranean)
101-254	Reserved
255	Missing

(15) Values are restricted to 0 to 50m in units of whole m.

(16) New descriptor to record XBT serial number. Allows up to 8 characters.

(17) Set the value for this descriptor to be 8 and we require a new code figure in table 0-08-041:

Code	Meaning
0	Parent site

1 Observation site

2 Balloon manufacture date

3 Balloon launch point

4 Surface observation

5 Surface observation displacement from launch point

6 Flight level observation

7 Flight level termination point

8 Instrument manufacture date

9-30 Reserved

31 Missing value

The subsequent date fields then record year, month and day of the manufacturing date of the instrument.

If 12 characters are insufficient to record both name and version, the field width can be extended with the descriptor 2-08-YYY where YYY is the number of characters of the total extended field. For example, for a name and version number that requires 16 characters, the descriptor would be 2-08-016 and would precede the 0-25-061 descriptor in the message format part of the BUFR message.

ANNEX VI

GTSPP SG RESPONSE TO US NODC PROPOSED CHANGES IN GTSPP CMD SUPPORT

The GTSPP Steering Group wants to take this opportunity to thank the U.S. NODC for its support of the GTSPP since its inception in 1988. In particular, their hosting of the Continuously Managed Database with the work that this entails has been central to the success of the Project and the recognition that it has received. Indeed, GTSPP is well recognized not just in the data management community, but much more widely in the international science community. It is named in the GCOSS Implementation Plan as the global data system to manage temperature and salinity data. It is also a very important contributor to the European MyOcean project. It is the data system that supports the SOOP, and has a role within Argo in delivering real-time data as a verification of timeliness of reporting.

The Steering committee also wishes to thank NODC for the opportunity to comment on the proposed changes that are under consideration to improve the efficiency of operations that support the NODC. This is a common theme in many countries today and GTSPP recognizes that this is necessary.

Following, you will find a synopsis of the discussions that took place at the April, 2012 GTSPP Steering Group meeting. We understand that the document we reviewed is not a final plan and we hope that the concerns noted will be taken into consideration. We also note that since GTSPP is a joint project of both JCOMM and IODE, significant changes in its operation will need to be reported to these committees for their consideration as well. We expect that the plan will still be in an early stage at the time of the upcoming JCOMM-4 meeting at the end of May 2012. However, IODE-22 is in March of 2013 and we hope that the plan will be well developed by that time.

Finally, we hope that NODC can continue to support GTSPP in all of its objectives, and in particular, this includes supporting Charles Sun to continue as chair of the Steering Group.

GTSPP Principles of Operation

- Consistent application of quality control methods and flagging schemes across all partners with documented and readily available manuals to explain what is done to the data.
- Assembly of data from many different sources into a consistent data structure with consistent and well documented processing by all partners.
- Use of a standard format for data exchange among partners, both data centres and science centres.
- Extensive metadata capture on observations and data processing history.
- Delivery as rapidly as possible of the highest quality, highest resolution temperature and salinity profile data from all sources within days of receipt at data centre partners.
- Replacement as rapidly as possible of lower quality, lower resolution data with higher quality, higher resolution data as they become available. Scientific quality controlled delayed mode data at highest vertical resolution possible is considered the most valuable version. The hierarchy of replacement is:

    - real-time data with no QC are replaced by real-time data with data centre QC
    - real-time data with data centre QC are replaced by real-time data with scientific QC
    - real-time data with scientific QC are replaced by delayed mode data with data centre QC

   - delayed mode data with data centre QC are replaced by delayed mode data with scientific QC

Before responding to the specific changes proposed, we provide some overall comments:

1. The unification of as many as possible T, S profile sources under GTSPP provides a significant service to users. GTSPP will be approaching the OceanSITES program as another potential source of high quality, scientifically QC'ed profile data. Changes to GTSPP operations will have implications for current and future data providers and should be discussed with them.

2. Being a part of GTSPP has been very beneficial to data centres in providing stronger contact to some segments of the data collection community (e.g. SOOP) and to scientists who use the data (e.g. Argo community). It has built significant trust between these groups and this is very important for data centres. A reduction in operations can erode that.

3. GTSPP appears as a named data system in the GCOS Implementation Plan. Changes to operations may have consequences that reduce the accepted relevance of the data system to GCOS.

4. A number of oceanographic programs that serve users rely on GTSPP for data and its completeness. Among them are MyOcean (particularly sensitive to real-time data delivery) and the IODE Ocean Data Portal. Changes in delivery times and content will have impacts on their operations.

The following table provides a statement of our understanding of the proposed changes (on the left) with our response to those changes (on the right). In a few cases, greater explanation is needed and these are provided in the notes that appear afterwards.

Item	Proposed Change	Response
1	Exclude profile data (all moorings - coastal, equatorial) with thermistor chain profiles reporting on the GTS from the CMD.	Real-time thermistor chain data from any source would then only be available if Canada serves them. This would require changes to Canadian operations. Otherwise, thermistor chain data are only available quarterly and this is a significant degradation of GTSPP service. See note 1.
		Assuming mooring data are available with more frequent updates (than quarterly) from external sources, users would still need to do format conversions and reconciliations of processing information before combining with profile data from other sources. Presently GTSPP does this for them. See note 2.
		Single point profiles as found in coastal moorings are a significant issue for GTSPP and there is consideration to exclude this is any case. If this happens this would reduce the burden on current GTSPP operations. See note 3.

Item	Proposed Change	Response
2	Exclude Argo real-time (GTS) data going to the CMD.	Real-time Argo data are available at the GDACs through operations supported by Canada. Users wishing to combine such data with profiles from other sources more frequently than quarterly have the same assembly issues noted above.
3	Exclude SEAS data not on the GTS from the CMD.	Users wanting these XBT data will need to wait for quarterly updates, unless comments under item 8 apply. This could represent a reduction in timeliness of access to high resolution data.
4	The CMD will remain synchronized on the 3 times per week update schedule with ISDM and "where possible" provide netCDF access capabilities. See note 4.	Sustaining the synchronization is good, though access to real-time data will be degraded because of exclusion of some sources.
		Access to netCDF versions of data through interfaces such as OpeNDAP is an important service to GTSPP users. Removing such service is a degradation in service; we strongly support its continuance.
5	All delayed mode data to enter WOD. This includes the non GTS reported SEAS data, and other delayed mode data submissions to GTSPP.	Data that have undergone GTSPP data centre or scientific QC (real-time and delayed mode) need to enter WOD with all information intact including QC flags, and all other metadata.
		Representatives from AOML noted that such SEAS data reach the CMD in days to weeks after collection. Such data include metadata that cannot be sent on the GTS. These data are rapidly added to the CMD but with only quarterly production of "best copy" files would represent a significant delay to data access.
		It is perceived that WOD operations are quite different in QC operations (flags set, linkage to levels), metadata stored on processing, timeliness of updates and so on. Reconciling these differences could take some time and could result in different (degraded?) principles of operation for GTSPP.
		Management of WOD would now be subject to negotiations to operation changes identified by the GTSPP Steering Group. Any conflicts with current objectives and operations of WOD would need to be resolved.
		With yearly submissions of delayed mode data from international data centres, a quarterly update schedule is likely to have minimal impact. If submissions and processing are more frequent, there is greater impact on timeliness of data availability.

Item	Proposed Change	Response
6	WOD excludes data streaMs managed at other centres such as Argo, tropical and coastal moorings.	Where GTSPP provided a unified view to aggregated data (data structure, processing, QC, metadata), WOD would provide only the subset noted as excluding those listed (perhaps others?) in point 6 above.
		The GTSPP meeting will move to establish a connection with the OceanSITES program. This perhaps would operate similarly to that with Argo.
7	GTSPP “best copy” data sets would be assembled quarterly with the data extraction from WOD combined with externally maintained archives, such as Argo, PMEL, and NDBC. This would be a consolidation of all data into a single data structure. See note 5.	The consolidation process means dealing with a variety of formats, though this is perhaps not a big difference from operations in dealing with delayed mode data submissions from sources now.
		Mapping of incoming formats is a one-time operation for each received data format but will need to resolve many-to-one mappings of information. This, also, is not different from present operations.
		QC operations at external archives will be different, and remapping flags does not guarantee reconcilable differences in quality control operations. This may complicate how users work with data. See note 2.
		We assume all tropical mooring data in all oceans would be treated the same way.
		A possible monthly update frequency moves the proposed operations closer to present GTSPP operations. Though it would be a positive move, it is still less than what is currently available.
8	WOD would maintain present “WOD Select” capabilities.	Direct Access to the WOD database could reduce the significant data access delays that would be experienced in only quarterly updates are available. This assumes, that data are added to WOD continuously as they arrive. See note 6 and 7.
9	Single interface access to ocean data.	We support this.

Notes:

1. It is not known if the external (to GTSPP) tropical mooring data assembly sites also present real-time data nor if the data from all tropical moorings (TAO, PIRATA, RAMA) are all assembled at PMEL or some other site.

2. Combining data from several sources is not just a matter of mapping one QC flag system to another. Diligent users will want to know the differences between the different data processing systems. This would mean acquiring suitable

documentation of procedures which are not always readily available. It may well require different treatments for data from different sources. The uniformity and agreed standardization of procedures among GTSPP partners eases the burden on users as well as speeds processing of data by GTSPP partners.

3. The meeting decided that for the present, these data would continue to be included in the data stream from Canada.

4. The words in quotation, “where possible”, are a direct quotation from the document provided by NODC.

5. We understand that although some data maintained externally, using Argo as an example here, may be present in the WOD, the Argo data served in the “best copy” files would not come from an extraction from the WOD, but from a download from the externally maintained Argo GDACs. We believe the same strategy will be employed with mooring data, but we wonder about the CTD data collected when moorings are serviced. We do not know the status of glider data.

6. We did not know if WOD Select does a direct query on the WOD itself, or simply a query of the last updated version. We assume WOD adds data continuously and that WOD Select accesses this dynamically changing database. If this is not true, WOD Select is no better for GTSPP that the production of quarterly “best copy” files.

7. A few participants attempted to use WOD Select during the meeting. The service was perceived to be slow. Data presently in the GTSPP CMD (and there for some time) did not appear to be in the WOD. A cursory comparison of content in the CMD compared to WOD showed fewer metadata (noted that originator IDs were gone) in the WOD. These explorations, albeit one-time and ad hoc, reinforce our perception (see comment to item 5 above) that there are significant differences in WOD and GTSPP operations. Very detailed discussions will be necessary to reconcile these differences.

ANNEX VII

COLLATED COMMENTS ABOUT A GTSPP NETCDF FORMAT

These comments are collected from the discussion under agenda items 7.1 and 7.2. Where recorded, they are attributed to the participant who made them.

No.	Remark	Person
1	GTSPP data should be as widely readable as possible	Sun
2	A netCDF format for GTSPP should place all profile, trajectory, metadata and technical information in a single file.	Carval
3	An organization of one file per platform is worth GTSPP consideration	Carval
4	GTSPP should look at the CTD data structure for CTD being developed for SeaDataNet	Carval
5	The GTSPP exchange format needs to contain everything that is known about the data and this should also be what is delivered to users	Thresher
6	Canada would like a separate data file for the geographically well defined Arctic Ocean t	Ouellet
7	The GTSPP format should be able to expose individual stations to a THREDDS server	Sun
8	Fields in MEDS ASCII that encode two concepts should have these attributes split apart	Ouellet
9	A unique cruise identifier is needed and that the cruise id used in MEDS ASCII is not the solution	Ouellet
10	Need to identify all the agencies through which the data passed	Ouellet
11	Data provenance is important to record. This includes an originator cruise identifier, perhaps all the other identifiers attached by subsequent processing, and who carried out subsequent processing.	Ouellet
12	Place all variants of a single concept (like platform identifier) into a array for which it is mandatory to have at least one element present. Generalize this.	Thresher
13	Searchable fields should have controlled content	Keeley
14	Designate which fields are mandatory and which optional	Keeley
15	Include sections for metadata, for calibrations, for observed data, for original (raw) and corrected data and for processing history	Thresher
16	Quality flags (assessment of the reliability of the values) were needed on all variables.	Thresher
17	Make the names of the fields with the most value to a user the simplest	Thresher
18	Original data should not be in processing history	Thresher
19	Include indicators of acceptable (but perhaps unusual) features	Thresher
20	Consider including a comment field	Thresher

No.	Remark	Person
21	A more transparent way than QCP, QCF to indicate tests performed and failed but not at every level in the profile	Thresher
22	Need for a field to indicate the best quality found in the station	Carval
23	Observations such as surface meteorological measurements should be in the netCDF file	Carval
24	Need a controlled list of all the quality control tests performed by GTSPP partners processing data.	Keeley
25	Vector quantities, such as wind velocity, be explicitly indicated as vectors	Keeley
26	Prefer fall rate coefficients explicitly rather than through a code table.	Bringas
27	Need some sample files to illustrate netCDF use and in both V3 and V4.	Trinanes
28	CRC value if used should appear in a “unique ID” section	
29	Comments should be used for clear descriptions of the contents of fields.	
30	Where possible dispense with codes and code tables and use descriptive terms. Avoid URLs to code tables.	
31	Should handle multiple (e.g. T, S, currents) and different vertical dimensions (e.g. 760 levels for T, S, 10 levels for currents) in a single file.	
32	Dispense with distinction between character and numeric representations of observations (a OS quirk in MEDS ASCII)	
33	The “Data_Type” field in MEDS ASCII combines two concepts and these should be split.	
34	The “One_Deg_Square” field in MEDS ASCII may not be necessary	
35	The “Uflag” field of MEDS ASCII is useful but needs a more complete definition. When is this changed?	