WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY (JCOMM)
SHIP OBSERVATIONS TEAM

FOURTH SESSION

GENEVA, SWITZERLAND, 16 TO 21 APRIL 2007

SOT-IV/Doc. I-6.2.1
(28.II.2007)

ITEM I-6.2.1

Original: ENGLISH

PROGRAMME OPERATIONS AND DEVELOPMENT

Water Temperature Metadata Pilot Project (META-T)

(Submitted by Elanor Gowland)

Summary and purpose of document

This document presents the aims of the META-T project; the work carried out so far, and proposed plans.

ACTION PROPOSED

The Ship Observations Team is invited to:

(a) Review the information gathered so far;

(b) Use this information when discussing relevant agenda items;

(c) Make suggestions on future work plan, and volunteer involvement of suitable groups / people.

Appendices: A. Categorisation of metadata and requirements

B. Requirements matrix

C. Recommendation for changes to VOS BUFR template (not included at this time - to be confirmed)

DISCUSSION

Aim
The Water Temperature metadata pilot project is aiming at providing an international standardization framework for collecting sea surface temperature (SST) and water temperature profile instrumental metadata from a number of marine observational systems, including drifting and moored buoys, observing ships, sea level stations, sub-surface profiling floats, ocean reference stations, and ODAS (Ocean Data Acquisition Systems).

Current status of project
The project has a website http://marinemetadata.org/examples/external/meta-t

- An initial workshop was help at ECMWF, Reading, UK on 28-29th March 2006, this followed discussions with the DBCP, the SOT, OCG, and the JCOMM Management Committee
- As a result of this meeting a pilot project work group was formed, and the team worked on producing a categorisation and matrix of metadata requirements, which stemmed from the initial workshop. These were finally agreed and published on the website in November 2006.
- Between November 2006 and January 2007 the META-T project team formed sub-groups and documented the metadata which already exists (and hence where the gaps are) for the different data types (VOS, Moored buoy, SOOP, drifting buoys & Argo floats). These are also available to download from the website.

Future plans
- During March we are continuing with the separation of data streams, each data type will be evaluated against the matrix of metadata requirements which exists, to split the requirements for metadata elements into real-time and non real-time components.
- In April (possibly in time for this meeting and the Expert Team on Data Representation and Codes meeting on 23 to 27 April in EUMETSAT in Darmstadt, Germany) the groups will focus on the real-time metadata and methods of transmission. Recommendations will be made on the revision of the BUFR codes for ships, buoys, etc, for you to discuss and amend or agree as you see fit.
- Further into the future we will be considering:
    - Non-real time data and metadata transmission, through XML or another recommended format.
    - Full documentation of all the issues surrounding water temperature metadata (including strengths and weaknesses of current metadata centres; identification of duplicate data; agreed quality control standards / methods / storage centres / access to data; etc).
    - A trial of a system:-
        - Development of metadata servers
        - Transmission of metadata information not currently available
        - Development of software to access the metadata
        - Etc

Your contribution
I would like to request that all members of this group, who are now aware of the work being done, should liaise with the META-T team over the issues discussed above in order to help META-T deliver it's aim "to investigate and recommend the use of metadata to improve the quality and usefulness of ocean temperature information, particularly in real-time. The group should investigate and recommend data transmission codes and content, storage and distribution of data, for specific data streams."

Appendices: 2 (currently, possible 3rd to be circulated as background document)

APPENDIX A

CATEGORIZATION OF METADATA AND REQUIREMENTS

(version 2.00, 2006-11-06)

Categories of metadata

The following categories of metadata are being considered:

Category 1: Metadata required by operational users for real-time distribution within observational reports. Observational reports therefore include identification, observation date/time, location, sensor values, and category 1 metadata. Observational reports include GTS reports such as BUFR, BUOY, BATHY, TESAC, or SHIP, as well as reports distributed in real-time through other means, e.g. netCDF reports.

Under category 1, the following sub-categories can be proposed based on delivery techniques being used:

> Category 1.a: Metadata transmitted directly by the ocean platform (e.g. from the deck of the ship for a VOS) along with its observations and added to the real-time observational reports (BUFR, netCDF, SHIP, etc.).
>
> Category 1.b: Metadata not transmitted directly by the platform but known by the platform operator and added on-shore to the real-time observational reports after appropriate data processing (e.g. added in real-time to SHIP or BUFR reports before actual GTS insertion).

Category 2: Metadata of category 1 plus metadata required by users in real-time but obtained separately from the observations. Such metadata will not appear in the GTS or netCDF reports but platform operators should make them available as soon as possible after platform deployment to the servers for real-time access from there.

Category 3: Metadata of categories 1 and 2 plus metadata not required by the operational users. These typically include metadata useful for scientific purposes.

All categories of metadata should eventually reach the dedicated metadata server(s). Distribution mode is detailed below.

- Category 1 metadata require encoding in appropriate observational reports. BUFR and NetCDF formats are recommended format. Dedicated metadata server(s) should collect category 1 metadata from the GTS and from dedicated data systems (e.g. Argo, OceanSITES, GOSUD) for distribution.

- Platform operators should make category 2 metadata available to the servers as soon as possible after operational deployment of observing platforms. Formats in which to make the metadata available still needs to be defined by the META-T Pilot Project after careful consideration of existing standards (e.g. XML, MarineXML, ISO 19115).

- Category 3 metadata can be made available to the servers after the start of the platform operational life-time. Formats in which to submit the metadata will be defined by the META-T Pilot Project.

However, category 1b and 2 could be combined depending on the method of delivery of the information (i.e. if 1b is not via the GTS but pulled from a centralised server by the user).

The following user requirements are being considered by META-T: (i) data assimilation and ocean field

analysis; (ii) ocean modelling; (iii) ocean modelling validation; (iv) climate forecasting; (v) seasonal to decadal climate variability; (vi) numerical weather prediction; (vii) satellite calibration; (viii) satellite validation; (ix) SST analysis; (x) operational activities (e.g. weather forecasters, disaster response)' (xi) quality assurance activities serving above applications, and (xii) diagnostics for platform operators.

Categorisation

From the user requirements matrix, the categorisation of metadata types has been proposed, where the fields appear in the earliest section they are mentioned, so the information is provided in time for all users:

Category 1:

- Operational state of platform (e.g. state of ship)
- Platform type (e.g. moored buoy, drifter, VOS ship, SOOP ship, Research Vessel, profiling float, ODAS)
- Instrument type (e.g. manufacturer)
- Instrument height or depth (e.g. relative to agreed standard)
- Quality information
- Data QC'ed indicator (y/n)
- Data modified indicator (y/n)
- Sampling intervals and schemes
- Averaging schemes
- Unique tag (e.g. CRC)
- Instrument behaviour (e.g. fall rate equation)
- Housekeeping parameter (e.g. battery voltage)

Category 2:

- Platform characteristics (e.g. size, dimensions, manufacturer)
- Assumed instrument performance/resolution/precision Instrument calibration status
- Instrument location information
- Period of validity of metadata
- Information regarding data centre processing the data
- Location of further information (e.g. photos, drawings)
- Data management information (e.g. creation date, update date)
- Data telecommunication system (e.g. Argos, Iridium, Code 41)
- Type of algorithm used to convert the data

Category 3:

- Operator of platform or instrument
- Global programme in which platform is participating (e.g. Argo, VOS)
- Date of last useful transmission
- Post-Calibration information

APPENDIX B

CATEGORIZATION OF METADATA AND REQUIREMENTS MATRIX

(version 2, 2006-11-06)

Requirements matrix

From the matrix, it can be deduced in what category every type of metadata should eventually be placed.

	Category 1 (real time with obs)	Category 2 (real-time via server)	Category 3 (delayed, e.g. for research)
NWP	(SST related only) • Platform type • Instrument type • Instrument height/depth • Quality information • Data QC'ed indicator (y/n) • Data modified indicator (y/n) • Sampling intervals and schemes • Averaging schemes • Unique tag	Any metadata useful for programme management • Operational state of platform • Assumed instrument performance/resolution/precision • Platform characteristics • Instrument calibration status • Instrument location information • Instrument behaviour • Type of algorithm used to convert the data • Period of validity of metadata • Information regarding data centre processing the data • Location of further information • Data management information • Housekeeping parameter • Data telecommunication system	• Operator of platform or instrument • Global programme
SST analysis GHRSST	• Platform type • Instrument type • Instrument height/depth • Quality information • Data QC'ed indicator (y/n) • Data modified indicator (y/n) • Sampling intervals and schemes • Averaging schemes • Unique tag	Any metadata useful for programme management • Operational state of platform • Assumed instrument performance/resolution/precision • Platform characteristics • Instrument calibration status • Instrument location information • Instrument behaviour • Type of algorithm used to convert the data • Period of validity of metadata • Information regarding data centre processing the data • Location of further information • Data management information • Housekeeping parameter • Data telecommunication system	• Operator of platform or instrument • Global programme

	Category 1 (real time with obs)	Category 2 (real-time via server)	Category 3 (delayed, e.g. for research)
Data assimilation and ocean field analysis	• Platform type • Instrument type • Instrument height/depth • Quality information • Data QC'ed indicator (y/n) • Data modified indicator (y/n) • Sampling intervals and schemes • Averaging schemes • Unique tag	Any metadata useful for programme management • Operational state of platform • Assumed instrument performance/resolution/precision • Platform characteristics • Any metadata useful for programme management • • Instrument calibration status • Instrument location information • Instrument behaviour • Type of algorithm used to convert the data • Period of validity of metadata • Information regarding data centre processing the data • Location of further information • Data management information • Housekeeping parameter • Data telecommunication system	• Operator of platform or instrument • Global programme
Ocean modeling	• Platform type • Instrument type • Instrument height/depth • Quality information • Data QC'ed indicator (y/n) • Data modified indicator (y/n) • Sampling intervals and schemes • Averaging schemes • Unique tag	Any metadata useful for programme management • Operational state of platform • Assumed instrument performance/resolution/precision • Platform characteristics • Instrument calibration status • Instrument location information • Instrument behaviour • Type of algorithm used to convert the data • Period of validity of metadata • Information regarding data centre processing the data • Location of further information • Data management information • Housekeeping parameter • Data telecommunication system	• Operator of platform or instrument • Global programme
Ocean modeling validation	• Platform type • Instrument type • Instrument height/depth • Quality information • Data QC'ed indicator (y/n) • Data modified indicator (y/n) • Sampling intervals and schemes	Any metadata useful for programme management • Operational state of platform • Assumed instrument performance/resolution/precision • Platform characteristics • Instrument calibration status • Instrument location information • Instrument behaviour	• Operator of platform or instrument • Global programme • Post-calibration information

	Category 1 (real time with obs)	Category 2 (real-time via server)	Category 3 (delayed, e.g. for research)
	• Averaging schemes • Unique tag	• Type of algorithm used to convert the data • Period of validity of metadata • Information regarding data centre processing the data • Location of further information • Data management information • Housekeeping parameter • Data telecommunication system	
Climate forecast	• Platform type • Instrument type • Instrument height/depth • Quality information • Data QC'ed indicator (y/n) • Data modified indicator (y/n) • Sampling intervals and schemes • Averaging schemes • Unique tag	Any metadata useful for programme management • Operational state of platform • Assumed instrument performance/resolution/precision • Platform characteristics • Instrument calibration status • Instrument location information • Instrument behaviour • Type of algorithm used to convert the data • Period of validity of metadata • Information regarding data centre processing the data • Location of further information • Data management information • Housekeeping parameter • Data telecommunication system	• Operator of platform or instrument • Global programme • Post-calibration information •
Seasonal to decadal climate variability	All metadata types from that category moved to category 2 (Keeley & Charpentier, 29/06/2006)	A practical way to access the data. Platform type and Instrument type as an indication of where the data can be accessed. Any metadata useful for programme management. • Operational state of platform • Platform type • Platform characteristics • Instrument type • Instrument height/depth • Quality information • Data QC'ed indicator (y/n) • Data modified indicator (y/n) • Sampling intervals and schemes • Averaging schemes • Instrument behaviour • Type of algorithm used to convert the data • Unique tag • Assumed instrument performance/resolution/precision • Instrument calibration status	• Operator of platform or instrument • Global programme • Post-calibration information

	Category 1 (real time with obs)	Category 2 (real-time via server)	Category 3 (delayed, e.g. for research)
		• Instrument location information • Data telecommunication system • Period of validity of metadata • Information regarding data centre processing the data • Location of further information • Data management information • Housekeeping parameter	
Satellite calibration	• Platform type • Instrument type • Instrument depth/height • Quality information • Data modified indicator (y/n) • Data QC'ed indicator (y/n) • Unique tag	• Operational state of platform • Platform characteristics • Instrument calibration status • Instrument location information • Assumed instrument performance/resolution/precision • Sampling intervals and schemes • Averaging schemes • Instrument behaviour • Type of algorithm used to convert the data • Period of validity of metadata • Information regarding data centre processing the data • Data management information • Housekeeping parameter • Data telecommunication system	• Operator of platform or instrument • Global programme • Location of further information • Post-calibration information
Satellite validation	• Platform type • Instrument type • Instrument depth/height • Quality information • Data modified indicator (y/n) • Data QC'ed indicator (y/n) • Unique tag	• Operational state of platform • Platform characteristics • Instrument calibration status • Instrument location information • Assumed instrument performance/resolution/precision • Sampling intervals and schemes • Averaging schemes • Instrument behaviour • Type of algorithm used to convert the data • Period of validity of metadata • Information regarding data centre processing the data • Data management information • Housekeeping parameter • Data telecommunication system	• Operator of platform or instrument • Global programme • Location of further information • Post-calibration information
operational activities (e.g. weather forecasters,	• Platform type • Instrument type • Operational state of platform • Instrument height/depth	• Platform characteristics • Assumed instrument performance/resolution/precision • Instrument location information • Type of algorithm used to convert the data	• N/A

	Category 1 (real time with obs)	Category 2 (real-time via server)	Category 3 (delayed, e.g. for research)
disaster response)	• Quality information • Instrument behaviour • Sampling intervals and schemes • Averaging schemes	• Period of validity of metadata • Information regarding data centre processing the data • Data modified indicator (y/n) • Data QC'ed indicator (y/n)	
Quality assurance activities serving above applications	• Platform type • Instrument type • Operational state of platform • Instrument height/depth • Quality information • Data modified indicator (y/n) • Data QC'ed indicator (y/n) • Instrument behavior • Unique tag • Housekeeping parameter • Sampling intervals and schemes • Averaging schemes	• Platform characteristics • Assumed instrument performance/resolution/precision • Instrument calibration status • Instrument location information • Type of algorithm used to convert the data • Period of validity of metadata • Information regarding data centre processing the data • Location of further information • Data management information • Data telecommunication system	• Operator of platform or instrument • Global programme in which platform is participating • Date of last useful transmission • Post-calibration information
diagnostic by platform operators	• Platform type • Instrument type • Operational state of platform • Instrument height/depth • Quality information • Data QC'ed indicator (y/n) • Data modified indicator (y/n) • Unique tag • Instrument behavior • Housekeeping parameter	• Platform characteristics • Instrument calibration status • Instrument location information • Assumed instrument performance/resolution/precision • Sampling intervals and schemes • Averaging schemes • Type of algorithm used to convert the data • Period of validity of metadata • Information regarding data centre processing the data • Location of further information • Data management information • Data telecommunication system	• Operator of platform or instrument • Global programme in which platform is participating • Date of last useful transmission • Post-calibration information