WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

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

SEVENTH SESSION

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ITEM: 9.3

Original: ENGLISH

SOOP, GO-SHIP, AND ASAP METADATA REQUIREMENTS

(Submitted by the Secretariat, and the SOT Technical Coordinator)

Summary and purpose of the document

This document provides information on progress regarding the collection of SOOP and ASAP metadata, in line with recommendations from JCOMM-4. It particularly describes the JCOMMOPS metadata collection scheme for SOOP and GO-SHIP, and includes a proposal for the collection of ASAP metadata.

ACTION PROPOSED

The Team will review the information contained in this report, and comment and make decisions or recommendations as appropriate. See part A for the details of recommended actions.

Appendix: A. Proposal regarding the collection of ASAP metadata
B. Recommendation 1 (JCOMM-4) – Provision of Ocean Instrument/Platform Metadata

- A - DRAFT TEXT FOR INCLUSION IN THE FINAL REPORT

JCOMM-4 guidance regarding metadata

9.3.1 The Team recalled that JCOMM-4, through Recommendation 1 (JCOMM-4, see Appendix B) recommended in particular that (i) WMO Members and IOC Member States should record and provide through the appropriate mechanisms, on a routine basis the required metadata about ocean instruments and observing platforms that they operate; and (ii) JCOMMOPS should routinely contact platform operators so that the metadata are being submitted to the relevant Centres for Marine Meteorological and Oceanographic Climate Data (CMOCs[1]), including for operational platforms and for historical ones.

SOOP Metadata

9.3.2 The Team recalled that a metadata collection mechanism has been established by SOOP through the SOOP annual XBT survey[2] coordinated by JCOMMOPS. A dedicated metadata format[3] has been developed for SOOP operators to submit the ship metadata for every XBT profile on a yearly basis.

GO-SHIP Metadata

9.3.3 The Team discussed requirements for GO-SHIP metadata, and agreed that results of already scheduled discussions between the GO-SHIP chair and JCOMMOPS will provide further necessary information for the design of a dedicated metadata format. The overall format will be similar to the SOOP format. The GO-SHIP website, in particular the reference sections[4] page, gives an overview of the most crucial information, such as ship, observed parameters, PI, data history, voyage dates and voyage report.

9.3.4 The TC stressed that plans of upcoming cruises (both SOOP and GO-SHIP) should always be submitted as soon as possible to JCOMMOPS, in order to create synergies with other observation programs (e.g. deployment of Argo floats).

Automated Shipboard Aerological Programme (ASAP) Metadata

9.3.5 The Team recalled its discussion at SOT-6 regarding the collection of ASAP metadata. JCOMMOPS was particularly invited to discuss the details of a proposal with the ASAP Task Team, and the WMO Secretariat in the view to submit it at this SOT Session and later to the CBS.

9.3.6 The Team reviewed the proposal for better integration of ASAP metadata into WMO Publication No. 9 Volume A, Catalogue of Radio-sondes (Appendix A). Only metadata related to the ASAP station (not to the ship) are concerned by the proposal, where it is proposed that JCOMMOPS would play a role, by collecting the metadata from ASAP operators, and providing appropriate online tools to the complete metadata data-set. A simplified version of the ASAP metadata, consistent with WMO Publication No. 9, Vol. A, would be made available through the WMO website. At some later stage, the ASAP metadata would become consistent with the requirements for the WIGOS Operational Information Resource (WIR), and the Surface component (OSCAR/Surface) of the Observing System Capability Analysis and Review Tool (OSCAR[5]).

9.3.7 Per the proposal, ASAP operators would be required to (i) record, and compile their metadata; (ii) submit the metadata to JCOMMOPS using the proposed format; and (iii) submit the metadata on a quarterly basis, but preferably monthly. In addition, JCOMMOPS would be required

1 Per JCOMM-4 decision, National Marine Data and Information Service (NMDIS, Tianjin, China) of the China State Oceanic Administration (SOA) and the Deutscher Wetterdienst (DWD, Hamburg, Germany) undertake the functions of CMOCs on a trial basis.
2 http://www.jcommops.org/soop/soop_report.html
3 http://www.jcommops.org/doc/metadata/submission_format.html
4 http://go-ship.org/RefSecs/goship_ref_secs.html
5 http://www.wmo.int/oscar

to (i) routinely compile submissions from the ASAP operators and import them into the JCOMMOPS database as they become available; (ii) make the ASAP metadata accessible through the JCOMMOPS website and provide user friendly query tools; and (iii) extract the WMO No. 9 required fields from all the collected ASAP metadata, and submit updated files to the WMO Secretariat on a monthly basis in the appropriate format. It is also proposed to create an excel sheet with a reduced version of all ASAP metadata that is consistent with the WMO No. 9, Volume A, and includes additional information as provided for land-based systems through the *WMO Catalogue of Radio-sondes and Upper-air wind Systems*.

9.3.8 The Team agreed that metadata access policy needs to take into account the ship security and commercial sensitivity of maritime companies with regard to the availability of certain metadata fields to the general public. The Team therefore concurred with the ASAP metadata policy detailed in the proposal.

9.3.9 The Team concurred with the proposal (Appendix A) and requested JCOMMOPS and the Secretariat to initiate its development in the view to have the ASAP metadata collection scheme fully operational by the end of 2014 (***action; JCOMMOPS & Secretariat; end 2014***).

Appendices: 2

APPENDIX A

PROPOSAL REGARDING THE COLLECTION OF ASAP METADATA

Proposal for better integration of ASAP metadata into WMO Publication No. 9 Volume A, Catalogue of Radio-sondes

(Version 0.1 – 22/2/2013)

Table of content

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1. Summary

1.1 In the framework of the standardization promoted by the WMO Integrated Global Observing System (WIGOS), it is proposed to better integrate the Automated Shipboard Aerological Programme (ASAP) metadata with the WMO Publication No. 9, Volume A[6] and the WMO Catalogue of radio-sondes in order to fully address the user requirements. Eventually such metadata shall be integrated in the WIGOS Operational Information Resource (WIR). Only metadata related to the ASAP station (not to the ship) are concerned, and bear in mind that the WMO Publication No. 47[7] provides for ship metadata. It is proposed that JCOMMOPS would play a role, by collecting the metadata from ASAP operators, and providing appropriate online tools to the complete metadata data-set. A simplified version of the ASAP metadata, consistent with WMO Publication No. 9, Vol. A, would be made available through the WMO website.

2. Background

2.1 Rationale for the proposal

2.1.1 The ASAP programme[8] provides for atmospheric soundings from radio-sondes deployed from ships sailing in the world oceans. Its implementation is coordinated through the JCOMM Ship Observations Team (SOT[9]). The number of ASAP ships – about 20 worldwide, including 18 EUMETNET ASAP (E-ASAP) ships – is very small comparing to the number of active ships recorded in Publication No. 47 (about 4000). Some other ASAP soundings are made from research vessels (e.g. PolarStern) operated by research institutes outside of the scope of WMO activities, although their data are transmitted to the Global Telecommunication System (GTS).

2.1.2 While the ASAP observational data are routinely distributed to operational users in real-time through GTS, instrument/platform metadata are required for a number of applications. The requirements from metadata are detailed in section 3 below.

2.1.3 There is no central accessible database for ASAP metadata at this point while there is an increasing demand from the users of the data. Therefore a better collection of ASAP metadata and a better integration with WMO No. 9 are needed.

2.1.4 Technically, due to the small number of ships, it is relatively easy to set up an ASAP metadata database. Online tools will enable the metadata providers to keep the database updated without many efforts. This proposal also includes some data policy element.

2.2 WIGOS framework and implementation

2.2.1 The proper management of instrument/platform metadata is an important component of the integration effort promoted by the WMO Integrated Global Observing System (WIGOS[10]). Indeed, WIGOS is being designed as a framework facilitating standardization and interoperability and ensuring availability and utilization of, and access to, good-quality data and products, and associated metadata. The WIGOS Framework Implementation Plan (WIP[11]), calls for developing a strategy for the production, editing and management of metadata, including instrumentation/platform and data discovery. One of the key area of standardization according to the WIP is "*Instruments and methods of observation across all components including surface-based and space-based elements (observations and their metadata)*". Standardization will address best procedures and practices, including quality assurance, data and metadata formats for new

6: http://www.wmo.int/pages/prog/www/ois/volume-a/vola-home.htm
7: http://www.wmo.int/pages/prog/www/ois/pub47/pub47-home.htm
8: http://www.jcommops.org/sot/asap/
9: http://www.jcommops.org/sot
10: http://www.wmo.int/pages/prog/www/wigos/index_en.html
11: http://www.wmo.int/pages/prog/www/wigos/documents/Principal_Docs/WIP_en_APP-d04-4(1).doc

and emerging technologies. Standardization is necessary for all data and associated metadata so that the measurements from individual systems can be integrated into accurate and coherent data sets that allow for the development of unbiased, homogeneous long-term trends.

2.2.2 Observational data, metadata and processed observational products from WMO and, to the extent possible, co-sponsored observing systems will (i) adhere ultimately to WIGOS standards for instruments and methods of observation as well as standard observing network practices and procedures; (ii) be exchanged via WIS using agreed upon data and metadata representation forms and formats; (iii) use hardware and software that are compatible with WIGOS requirements; and (iv) be archived in compliance with WIGOS and WMO Information System (WIS) requirements.

2.2.3 The WIGOS Operational Information Resource (WIR), accessible via a centralized point (web portal), will provide all WIGOS related operational information, including observational user requirements, a description of the contributing observing networks (instrument/site/platform metadata), and their capabilities, list of standards used in the WIGOS framework, data policies applicable, and information on how to access data. The WIR will include an Observing Systems Capabilities Analysis and Review tool (OSCAR), used in particular for the Rolling Review of Requirements (RRR) to support gap analysis, network evaluation, redesign and optimization. OSCAR contains a surface component, OSCAR/Surface for providing surface-based observing capabilities, including analysis and review tools. OSCAR/Surface will describe all WIGOS observing components and provides end users with relevant and standardized metadata expanding from WMO-No. 9, Volume A, Observing Stations with limited site/platform metadata, as well as capabilities.

2.3 SOT-6 decisions and recommendations

2.3.1 The Sixth Session of the JCOMM Ship Observations Team (SOT-6), Hobart, Australia, April 2011, reviewed latest developments within JCOMM regarding the management of instrument/platform metadata for ship-based observations and their requirements for exchange in real-time and delayed mode. As mentioned above, there is no central database for ASAP metadata at this point. It was noted that the possible need for a dedicated ASAP metadata database has been discussed at previous sessions of the SOT and the Expert Team on Marine Climatology (ETMC).

2.3.2 SOT-6 requested JCOMMOPS and the Secretariat to consult with the ASAP Task Team, and operational users and research users of ASAP data (including real-time and historical data), and make a proposal for the collection and exchange of ASAP metadata taking their requirements into account. Data Policy issues had also to be considered. The plan is to submit the proposal to the seventh Session of the SOT in 2013.

3. Requirements for metadata

3.1 There is an increasing demand for instrument metadata to address the needs of WMO applications, necessity for operational and research purposes.

3.2 Requirements for ASAP metadata are similar to those for land-based atmospheric radio-soundings, which are maintained as part of the WMO Publication No. 9, Volume A, Observing Stations and the WMO Catalogue of Radio-sondes and Upper-air wind Systems[12]. The main differences concern ASAP specific information that is required by end users and that is not included in the WMO Catalogue:

- Ship's identification (Index number in case of a land station, and a call sign in case of a ship),

12 : http://www.wmo.int/pages/prog/www/ois/volume-a/vola-home.htm

- Ship's position (not a metadata in case of a moving ship),
- Height of deck of the ship where the balloon is launched,
- Information about the ship in order to better interpret the data and understand the effects of the ship's funnel exhaust fumes, which contaminate the readings,
- Metadata and photos of the launch site and installation in order for the users to understand the launch conditions (e.g. the sonde sometimes dips into the ocean surface and the sensors become soaked by sea water)

3.3 Instrument/Platform metadata are required for a number of applications, including in particular operational users (e.g. data assimilation and field analysis for Numerical Weather Prediction (NWP), ocean modelling; weather forecasters, seasonal to inter-annual climate forecasting, disaster response), satellite applications (e.g. virtual constellations & mixed products from the Group for High Resolution Sea Surface Temperature – GHRSST [13]), and climate applications (including climate monitoring and change, seasonal to inter-annual climate variability, and climate forecasting), and quality assurance activities serving above applications.

3.4 End users require instrument/platform metadata in order to understand the observations better and make a better use of them. Metadata provide detailed information about the instruments (accuracy, resolution, sampling, averaging) and the conditions under which they are made (e.g. sitting, sensor height) and therefore permit to estimate uncertainties, and weight the observations accordingly when using them (e.g. in data assimilation). They permit bias correction, and the black listing of platforms which are reporting systematic errors. They are useful for the validation of products, including models and satellite products, for the reanalysis of historical data, and for quality monitoring of the observations, including feedback to platform operators. High quality climatic researches also rely largely on metadata to judge the applicability of certain data.

3.5 The metadata should include some technical specifications, photos, main operating area (e.g. North Atlantic, West Pacific) etc. If data users, for example operational users and climate researchers, needs to know the ship, they will have to contact the provider of the metadata.

3.6 Instrument/Platform metadata are also required for observational programme management, including (i) programme monitoring, (ii) platform operator diagnostic & follow up, and (iii) identification of vessels recruited by other countries.

3.7 Moreover, standardization is necessary for all data and associated metadata so that the measurements from individual systems can be integrated into accurate and coherent data sets that allow for the development of unbiased, homogeneous long-term time-series. Therefore it explains why the collection and formatting of ASAP metadata is essential.

4. WMO No. 9

4.1 WMO Publication No. 9, Volume A[6], "Observing Stations" contains a complete list of all the surface and upper-air stations in operation, which are used for synoptic purposes.

4.2 In addition to the information included in Volume A for upper-air stations, the "*WMO Catalogue of Radiosondes and Upper-air wind Systems*" provides information on the type of radiosonde, windfinding equipment, ground systems, radiation corrections applied to temperature observations and other local practices for the radio-sondes and upper-air systems in use by Members.

4.3 It is proposed to maintain ASAP metadata separatly from WMO No. 9, because of GOS regulations, but to present these ASAP metadata on the same webpage according to the format in Annex III, which is similar to WMO No. 9 format.

13 : https://www.ghrsst.org/

4.4 Because of the WMO Global Observing System (GOS) regulations, ASAP metadata cannot be fully integrated in the WMO No. 9, Vol. A, which is dedicated to stations operated from land.

4.5 In the WIGOS framework, the proposed strategy for ASAP metadata is two-step, (i) better integration with surface-based radiosonde metadata using format similar to WMO No. 9, Vol. A, and provision of ASAP metadata through the same web page, and (ii) full integration as part of WIGOS developments in the future Surface component (OSCAR/Surface) of the Observing System Capability Analysis and Review Tool (OSCAR) of the WIGOS Operational Information Resource (WIR). OSCAR/Surface will essentially provide the WMO database describing the observing systems components contributing to WIGOS. This proposal only addresses step 1 at this point.

5. Proposal for the collection of ASAP metadata from ASAP operators

5.5 The following mechanism for the collection of metadata from ASAP operators and other sources, including on-line tools, and their submission to the WMO is proposed. This includes a proposal for a metadata access policy taking into account the ship security and commercial sensitivity of maritime companies with regard to the availability of certain metadata fields to the general public.

5.5.1. ASAP operators:

- To record, and compile their metadata;
- To submit the metadata to JCOMMOPS using the format described in Annex I.
- The metadata shall be submitted by ASAP operators on a quarterly basis, but preferably monthly.

5.5.2. JCOMMOPS:

- JCOMMOPS will routinely compile submissions from the ASAP operators and import them into the JCOMMOPS database as they become available;
- Respecting the metadata access policy described in section 7 below, JCOMMOPS will make the ASAP metadata accessible through the JCOMMOPS website through the following URL. Query tools shall permit to select specific records from the database (e.g. by country, station ID, Equipment Type). The complete ASAP metadata data-set shall also be made available through that web page through an Excel sheet or semi-column delimited ASCII file based on the format described in Annex I.

http://www.jcommops.org/asap-metadata.html

6. Proposed mechanism for the better integration with WMO No. 9, Volume A

6.1 The proposal is to create an excel sheet with a reduced version of all ASAP metadata that is consistent with the WMO No. 9, Volume A, and includes additional information as provided for land-based systems through the *WMO Catalogue of Radio-sondes and Upper-air wind Systems*. The proposed format for making the ASAP metadata available on the WMO website using an Excel sheet is described in Annex III.

6.2 JCOMMOPS will be extracting the required fields (Annex III) from all the collected ASAP metadata (Annex I), and submit updated files to the WMO Secretariat on a monthly basis in the appropriate format (Annex III).

7. Metadata access policy

Rationale: Metadata access policy needs to take into account the ship security and commercial sensitivity of maritime companies with regard to the availability of certain metadata fields to the general public. Some maritime companies may wish to restrict access to the ship's identification as ships could be more easily tracked in case such details are made available to the general public through an on-line database. Maritime companies could be concerned about the availability of certain metadata, and this could threaten the ASAP programme. For example, the Spanish ASAP station ASES01 is operated on board a hospital ship. This ship follows the Spanish Tuna fishing fleet. The fishing vessels might object that their movements can be traced via the hospital ship. Purpose of the restriction described below is therefore to prevent unauthorized persons to follow the track of the host ships.

Policy:

(1) The ASAP metadata database is fully accessible to the public provided the ship's identification (callsign, ship name) is not disclosed if such a restriction is requested by the ship operator. The access key to the ASAP metadata is the ASAP Station identification or the ship's callsign as appropriate.
(2) If the ASAP ship is also making surface marine meteorological observations and is participating in the VOS fleet, then the ship metadata are normally submitted to the WMO Publication No. 47 (Pub47). However, the ship operator may decide not to provide the callsign nor the ship's name with the Pub47 metadata; in that case the only identification element provided with the Pub47 metadata, and disclosed to the public would be the ASAP station identification.
(3) For those ships masking their identification according to Resolution 27 (EC-LIX), only legitimate users[14] can access the cross reference list of "ASAP station identification" vs. "Callsign" through the password protected JCOMMOPS database. The WMO Secretariat is maintaining the list of authorized users. Legitimate users are nominated by the Permanent Representative of their Country with WMO by mean of a letter to the Secretary General of WMO.

14: Legitimate users are defined as all users of the data contributing to WMO Programmes and Co-Sponsored Programmes.

ANNEX I – PROPOSED FORMAT FOR THE COLLECTION OF ASAP METADATA

The proposal is to implement an ASAP metadata database which is largely consistent to the Pub 47 metadata format. The database is focused on the ASAP station and equipment, not on the host ship.

The proposed format of the metadata exchange file is:

1. The file shall contain one line, comprising 26 metadata elements, for each ASAP station.
2. The sequence of elements shall be in the order as given in the table below.
3. Each metadata element includes a semi-colon (;) delimiter as the last character.

Order	***Code name***	***Explanation***
1	ver;	Metadata format version.
2	chgd;	Last date of change to any metadata value, ddmmyyyy.
3	rcnty;	Recruiting country, see Pub 47 table 1801 plus 'EU' for EUMETNET.
4	stn;	ASAP station name (disseminated on the GTS).
5	stnP;	Launcher digital image, see Pub 47 table 2203. Digital image file-naming convention: "Station name" & "_number_" & "date" (YYYYMMDD), e.g. ASEU01_01_20110315
6	rte;	Route No.1, see Pub 47 table 1802.
7	rte;	Route No.2, see Pub 47 table 1802.
8	rte;	Route No.3, see Pub 47 table 1802.
9	rte;	Route No.4, see Pub 47 table 1802.
10	rte;	Route No.5, see Pub 47 table 1802.
11	rte;	Route No.6, see Pub 47 table 1802.
12	rte;	Route No.7, see Pub 47 table 1802.
13	rte;	Route No.8, see Pub 47 table 1802.
14	rte;	Route No.9, see Pub 47 table 1802.
15	rte;	Route No.10, see Pub 47 table 1802. Route = marine area of ASAP sounding operations (not necessarily the same as full sailing route, e. g. if ships perform soundings only in specified areas).
16	stntp;	Integrated (INT) or distributed (DIS) type of station. Integrated: Launcher and sounding equipment combined in e.g. container. Distributed: e.g. launcher on deck and sounding equipment on the bridge.
17	lnH;	Launch height above MSL (mtr).
18	EqTp1;	Equipment type: Equipment type (e.g. Vaisala Digicora, W9000, Star system, Star/Modem, Autosonde,etc.) and type of launcher (portable deck launcher, fixed deck launcher, manual container launcher, semi automatic container launcher, free hand launches, other.),
19	EqTp2;	2nd Equipment type: Second equipment type if available (e. g. portside and starboard)
20	Bln;	Balloon size (gram).

21	rcv;	Receiver, e.g. Vaisala SPS, Modem SR2K2, GRAW GS-E.
22	rds;	Radiosondes, e.g. Vaisala RS92, Modem GPS 3D, GRAW GPS/DMF-06. **Regular:** Type of radiosonde regularly used. **Alternative:** Alternative type of radiosonde used. Use Table 1 below.
23	prST;	Satcom, e.g. Inmarsat-C, Iridium, MeteoSat.
24	trms;	Transmission technique, e.g. email, FTP, SAC41, DCP.
25	freq;	Routine sounding times, see Pub 47 table 0602 plus 'MPD' = more than two snd./day (e.g. 00, 12, 18 UTC).
26	rem;	Optional remarks, any other information pertaining to the station

SONDE ABBREVIATION	***SONDE DESCRIPTION***
Blank	Unknown
AIR	Air Intellisonde (USA)
ELIN	ELIN (Austria)
IM-MK3	Indian Met. Services Mark 3
J/YANG	JINYANG radiosonde (VIZ type)
MARS/MET	Meteorit 1 or 2 system (former USSR)
MEIR91/MEIR80	Meisei (Japan)
MES	Mesural (French)
MRZ	AVK system (Former USSR)
MRZ-T	AVK prototype system
MSS	Space Data Corp. (USA)
ML-SRS	Meteolabor (Switzerland)
SDC	Space Data Corp. (USA)
SHANG	Shanghai Radio (China)
VIZ	V.I.Z. (USA)
VIZA/B VIZII	V.I.Z. (USA)
VRS80*	Vaisala RS80 (PTU)
VRS80N*	Vaisala RS80 (VLF)
VRS80L*	Vaisala RS80 (LORAN)
VRS80G*	Vaisala RS80 (GPS)
VRS92-SGP*	Vaisala RS92-SGP
?	Some doubt on accuracy

* Add in addition to "VRSxx" the letters "H" or "A" depending on the application of the H- or A-Humicap sensors for humidity measurement.

Table 1 - RADIOSONDE TYPES[15]

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15: Consistent with the WMO Catalogue of Radiosondes and Upper wind Systems

ANNEX II – WMO PUBLICATION NO. 9, VOLUME A, OBSERVING STATIONS
RECORD LAYOUT OF THE MASTER FLAT FILE
May 1998 edition
(revised version April 2010)

Table of Contents

Introduction

WMO Publication No. 9 Volume A - *Observing Stations* contains a complete list of the surface and upper-air weather observing stations in operation which are used for synoptic purposes.

The Volume A data file is now produced in a new format. This guide explains the layout of this data file, and describes the fields in each record.

Two code tables (A and B) are also available at the WMO Web site to be used (A) as a reference guide to the codes and symbols used in the data file and (B) to the footnote codes used.

NEW COUNTRY CODE FIELD:

A new field was added to the data files in March 1998 to respond to user requests. Following field No. 3 "***Country Area***", a new field No. 4 "***Country Code***" has been added (and the following fields renumbered 5 to 29 instead of 4 to 28). The ***Country Code*** number in this field is the same code number used in the former data files (prior to May 1997) to identify the country in which the station is located. This is provided to make importing the data files easier for those users whose computer systems are set up according to the old country numbering system.

NEW STATION COORDINATES:

A modification to accommodate station coordinates with higher precision was implemented in April 2010 to field No. 9 ***"Lat"***, field No. 10 ***"Long"***, field No. 11 ***"Hp"*** and field No. 13 ***"Hha"***. No new fields have been added to the existing layout of the master *Station* Data File.

Record Layout of the Station Data File

(Pub9volA9yymmdd.flatfile)

1. Description of contents:

The data file "Pub9volA9yymmdd.flatfile" is the master *Station Data* file. It contains the information on the station name and identification number, location, elevation/pressure, the types and times of observations carried out, as well as additional notes and remarks regarding the station and its observations.

2. Languages:

Since Volume A is issued as a bilingual publication, the text in several of the data fields is in both English and French (e.g. region name, country name, footnotes - see Code Table B).

3. Format of data file:

The data file is in ASCII code, in tab-delimited format (i.e. the fields of each record are separated by tabs).

4. Record and field structure:

All the data concerning each station is contained in one *record* in the master *Station Data* file. This includes the station name, number, and location; the country and region to which the station belongs; and data about the station's observations (for an explanation of the symbols in the "Observations and Remarks" field, see *Code Table A*). Each of these *records* is composed of 29 *fields* (even if some fields are left blank because there is no data for those fields). Each field contains a specific type of data related to the station. The fields of each record are separated by tabs (the "field delimiter"). The layout of the records, with the order and code names of the fields, is illustrated in the following record model ("**>**" = tab character):

1.RegionId **>** 2.RegionName **>** 3.CountryArea **>** 4.CountryCode **>** 5.StationId **>** 6.IndexNbr **>** 7.IndexSubNbr **>** 8.StationName **>** 9.Lat **>** 10.Long **>** 11.Hp **>** 12.HpFlag **>** 13.Hha **>** 14.HhaFlag **>** 15.PressureDefId **>** 16.SO-1 **>** 17.SO-2 **>** 18.SO-3 **>** 19.SO-4 **>** 20.SO-5 **>** 21.SO-6 **>** 22.SO-7 **>** 23.SO-8 **>** 24.ObsHs **>** 25.UA-1 **>** 26.UA-2 **>** 27.UA-3 **>** 28.UA-4 **>** 29.ObsRems

5. Sample record:

The data in each of the records in the *Station Data* file appears like in the following sample record:

2 > ASIA / ASIE > CHINA / CHINE > 2250 > 3594 > 67853 > 0 > WUGANG > 26 44 00N > 110 38 33E > 340.22 > > 330.00 > # > > X > X > X > X > X > X > X > X > S00-24 > RW > . > W > . > CLIMAT(CT);EVAP;M/B;SUNDUR

In the printed edition of Volume A, the above sample record appears as follows:

REGION II - ASIA / ASIE
CHINA / CHINE

INDEX NUMBER	NAME	LAT.	LONG.	ELEVATION HP H/HA	PRESSURE LEVEL	SURFACE OBSERVATIONS 00 03 06 09 12 15 18 21	OBS.H OBS.S	UPPER-AIR 00 06 12 18	OTHER OBSERV. AND REMARKS
57853	WUGANG	26 44 00 N	110 38 33E	340.22 330.00#	850 HPA	X _X _X _X _X _X _X _X	S00-24	_. _. _. _.	CLIMAT(C);EVAP;M/B;SUNDUR

6. Data fields - order and contents:

The 29 data fields of each record are listed in order in the table below. For each field, the field code name is given along with the field definition, as well as an explanation of the contents, including the symbols, if any, that are used in that particular field.

Station Data file - Summary of field layout and contents

Type of data	Field No.	Field Code Name	Definition of Field Contents	Symbols used	Explanation of Field Contents and/ or Description of Symbols Used
Region	1	RegionId	WMO region number		
	2	Region Name	Name of WMO region		Region name, in English and French
Country	3	Country Area	Name of country or area		Country or area (in English and French) in which station is located.
	4	Country Code	Code number of country or area		Code number used in pre-May 1997 data files to identify the country or area of a station.
Station identificati	5	StationId	Station identifier number		The station identifier is the "KeyField Value" used by the data base
on	6	IndexNbr	WMO Station Index Number		Unique station identifier, used in the transmission of weather observation reports from the station.[(a)]
	7	Index SubNbr	Sub-index number		A sub-index number is inserted for each station. It is used in the data file to differentiate between two stations with the same index number, usually established at the same (or nearly the same) location/elevation, one for surface and one for upper-air observations. The first station to be established under any station index number always has a sub-index of "0". If a second, *separate* station with that index number is opened for upper-air observations, it will be assigned a sub-index number of "1".
				0	First station established under a given station index number (surface and/or upper-air)
				1	Second station opened under a given station index number, for upper-air observations
Station identificati on (Contd..)	8	Station Name	Name of station		Station's name, assigned by the country
Location	9	Lat	Latitude		Latitude, in degrees, minutes and integer seconds:
				N	North of the Equator
				S	South of the Equator
	10	Long	Longitude		Longitude, in degrees, minutes and integer seconds:
				E	East of the Greenwich meridian
				W	West of the Greenwich meridian
Elevation / Pressure level	11	Hp	Elevation of the station		Elevation[1] of the station, in metres rounded up to two decimals; the datum level to which barometric pressure reports *at* the station refer;

					such current barometric values being termed “station pressure” and understood to refer to the given level for the purpose of maintaining continuity in the pressure records.
	12	HpFlag	Indicates approximate figure	#	A hash sign ("#") is inserted if the elevation figure shown for HP is approximate.
	13	Hha	Elevation or Altitude: H or HA		H: For stations *not* located on aerodromes: elevation[16] of the ground (*height above mean sea level of the ground on which the raingauge stands or, if there is no raingauge, the ground beneath the thermometer screen. If there is neither raingauge nor screen, it is the average level of terrain in the immediate vicinity of the station*) in metres rounded up to two decimals. HA: For stations located on aerodromes: official altitude[11] of the aerodrome. These stations are designated by the letter "A" in the column/field "Other observations and remarks" (*see Field 29 below, and Code Table A - Observations and Remarks*).
	14	HhaFlag	Indicates approximate figure	#	A hash sign ("#") appears if the elevation figure shown for H or HA is approximate.
	15	Pressure DefId	Pressure level		For stations which do not indicate air pressure reduced to mean sea level in their synoptic reports (group 4PPPP), the following indicators show the information reported in lieu of group 4PPPP:
				STATION	Pressure at station level is reported using group $3P_oP_oP_oP_o$
				1000 HPA	Geopotential of the given standard isobaric surface is reported using group $4a_3hhh$.
				850 HPA	
				700 HPA	
				500 HPA	
Surface observations			Surface synoptic observations:	X	Surface synoptic observations are made regularly at the time indicated, in accordance with a fixed schedule.
	16	SO-1	at 00 UTC	(figures)	Time figures shown instead of an X (e.g. "02" under column "03" / in field "SO2") mean that observations are made regularly at the *time inserted* (e.g. 0200 UTC) instead of at the *standard* observation time for the corresponding column/field (in this case 0300 UTC).
	17	SO-2	at 03 UTC		
	18	SO-3	at 06 UTC		
	19	SO-4	at 09 UTC		
	20	SO-5	at 12 UTC		
	21	SO-6	at 15 UTC		

16 HP, H and HA are with respect to mean sea level (MSL)which is defined in the International Meteorological Vocabulary (WMO No. 182).

	22	SO-7	at 18 UTC	.	No surface observations are made at
	23	SO-8	at 21 UTC	(dot)	the time indicated.
	24	ObsHs	Hourly or Half-hourly surface observations		If surface observations are made on an hourly or half-hourly basis, this is indicated by the symbol H or S, followed by the period of the day during which this is done. When the period begins or ends at the half-hour, the full four-figure time is given.
				H	Hourly observations are carried out during the period indicated.
				S	Half-hourly (semi-hourly) observations are carried out during the period indicated.
Upper-air observations			Upper-air observations:	X	Upper-air observation of an unspecified type is carried out.
	25	UA-1	at 00 UTC	(figures)	The symbol "X" is replaced by figures indicating a time (e.g. 23, 02, etc.) when the observation is carried out at a non-standard time.
	26	UA-2	at 06 UTC	P	Pilot-balloon: observation of upper-wind is obtained by optical tracking of a free balloon.
	27	UA-3	at 12 UTC	R	Radiosonde: observation of atmospheric pressure, temperature and humidity in the upper-air is obtained by electronic means.
	28	UA-4	at 18 UTC	W	Radiowind: upper-wind observation is obtained by tracking a free balloon by electronic means.
				WP	Wind Profiler: a wind profiler is used to obtain the upper-air observation.
				PR	The letters P, R and W are combined as necessary to indicate simultaneous upper-air observations of the different types listed above.
				RW	
				PR	No upper-air observations are made at the time indicated.
				RW	
				. (dot)	
Additional information	29	ObsRems	Other observations and remarks	***See Code Table A.***	Information on additional observations made at the station, special types of stations, and additional information relating to other fields in the data file is shown here. (See ***Code Table A - Observations and Remarks*** for an explanation of the abbreviations and symbols used in this field.)

Note: Words highlighted in yellow represent the changes in re-designed WMO No. 9 Vol. A.

ANNEX III – EXISTING WMO CATALOGUE OF RADIO-SONDES AND UPPER WIND SYSTEM FORMAT

Index Number The station index number is composed of the block number (II) and the station number (iii). The block number defines the area in which the reporting station is situated. For example: 60360, 60 is the block number for Algeria and 360 is the station number for Annaba.

Station Name Name of the station.

Position Latitude/Longitude: Latitude/Longitude of the station in degrees, minutes and seconds. The positions of stations north (N) or south (S) of the Equator and east (E) or west (W) of the Greenwich meridian are indicated by the appropriate letters after the minutes figures.

Elevation HP and H/HA

HP	Elevation of the station in metres rounded up to two decimals. It is the datum level to which barometric pressure reports at the station refer; such current barometric values being termed "station pressure" and understood to refer to the given level for the purpose of maintaining continuity in the pressure records.
H	Elevation of the ground in metres (average level of terrain in immediate vicinity of station) rounded up to two decimals is given for stations not located on aerodromes. It is normally also the height of the radiosonde release point.
HA	Official altitude of the aerodrome given for stations located on aerodromes is indicated by the letter "A" in the column "Other observations and Remarks" of Volume A.

Note: The symbol "#" indicates that the elevation figures are approximate.

Upper-air Observations This column indicates the official observation time fixed by the service for the release of a balloon, parachute or rocket. Upper-air observations are indicated by means of the use of one or more appropriate letters (see Table 1) below the corresponding standard observation time of 0000 UTC, 0600 UTC, 1200 UTC and 1800 UTC. If the official observation time falls within the period of 45 minutes immediately before the corresponding standard time, the appropriate letters are placed below the standard time. In cases where it does not fall within the standard time, the official observation time should be stated.

Symbol	Meaning
P	Pilot balloon; observation of upper-wind obtained by optical tracking of a free balloon
R	Radiosonde; observation of atmospheric pressure, temperature and humidity in the upper-air obtained by electronic means.
W	Radiowind; upper-wind observation obtained by tracking a free balloon by electronic means
X	The symbol may be used to indicate an upper-air obervation of unspecified type. The symbol "X" is replaced by a time (eg. 23, 02 etc...) when the observation is carried out at a non-standard time

Note: The letters P, R and W are combined as necessary to indicate simultaneous observations (PR or RW)

CLIMAT Indicate whether the station is used to generate CLIMAT messages.

CT	Station for which monthly climatological means of both surface and upper-air elements are transmitted.
T	Station for which monthly climatological means of upper-air elements are transmitted.

GUAN (GCOS) Indicate whether the station is a station of the Global Climate Observing Upper-air Network (GUAN). Y = Yes; N = No 14.

Geo. ht. calc. AUTO/MAN Indicate how the geopotential height calculation will be done:

AUTO	Automated

	MAN Manual
Radiation Correction	Y/N: Indicate if radiation correction is applied or not: Y=Yes ¦ N = No Type: If radiation correction is applied indicate the type of identification if known

Radiation Correction Type	Description
V82	Vaisala RS80 radiation correction 1982
V86	Vaisala RS80 radiation correction 1986
V93	Vaisala RS80 radiation correction 1993
NIR	Vaisala RS80 solar correction (86) but no Infra-Red correction
? with above	Some doubt concerning accuracy

Ground Equipment Type	Type of ground equipment in use at the station
Radio Frequency	The approximate radiosonde transmitter frequency (MHz) or frequency range regularly used at the station.
Radiosonde	Regular: Type of radiosonde regularly used. Alternative: Alternative type of radiosonde used.

SONDE ABBREVIATION	SONDE DESCRIPTION
Blank	Unknown
AIR	Air Intellisonde (USA)
ELIN	ELIN (Austria)
IM-MK3	Indian Met. Services Mark 3
J/YANG	JINYANG radiosonde (VIZ type)
MARS/MET	Meteorit 1 or 2 system (former USSR)
MEIR91/MEIR80	Meisei (Japan)
MES	Mesural (French)
MRZ	AVK system (Former USSR)
MRZ-T	AVK prototype system
MSS	Space Data Corp. (USA)
ML-SRS	Meteolabor (Switzerland)
SDC	Space Data Corp. (USA)
SHANG	Shanghai Radio (China)
VIZ	V.I.Z. (USA)
VIZA/B VIZII	V.I.Z. (USA)
VRS80*	Vaisala RS80 (PTU)
VRS80N*	Vaisala RS80 (VLF)
VRS80L*	Vaisala RS80 (LORAN)
VRS80G*	Vaisala RS80 (GPS)
?	Some doubt on accuracy

* Add in addition to "VRS80" the letters "H" or "A" depending on the application of the H- or A-Humicap sensors for humidity measurement.

Windfinding	System/Method:	Windfinding system or method in use at station.
	Equipment:	Windfinding equipment in use at station.
Remarks	Any other information pertaining to the station.	

ANNEX IV – FORMAT FOR RECORDING ASAP METADATA ON WMO WEBSITE

The following table includes the proposed format for recording and making ASAP metadata available from the WMO website (modelled on existing WMO No. 9, Volume A – Annex II –, and the WMO Catalogue of Radiosondes and Upperwind systems – Annex III):

Type of data	***Field No.***	***Field Code Name***	***Coding***	***Corresponding field in WMO No. 9, Vol A (and differences)***	***Corresponding field in WMO Catalogue***	***Corresponding field in ASAP metadata (Annex I)***
Region	1	RegionID	Mandatory, coded “8”	1	/	/
Region	2	Region Name	Mandatory, coded “SHIP STATIONS”	2	/	/
Country	3	Country Area	Mandatory, coded according to recruiting countries, “EUMETNET” for stations of E-ASAP fleet	3	/	3 (rcnty)
	4	Country Code	Mandatory, coded according to recruiting countries, new code (same codes as in Vol. A) corresponding to EUMETNET for stations of E-ASAP fleet	4	/	3 (rcnty)
Station	5	StationID	Empty	5	/	/
Identification	6	IndexNbr	Empty	6	Index number	/
	7	Index SubNbr	Empty	7	/	/
	8	Station Name	ASAP station name or ship’s call sign	8	Station name	4 (stn)
Location	9	Lat	Empty	9	Position	/
	10	Long	Empty	10	Position	/
Elevation	11	Launcher height	Optional, height of launcher above mean sea level	11	Elevation HP and H/HA	17 (InH)
	12	HpFlag	Empty	12	/	/
	13	Hha	Empty	13	Elevation HP and H/HA	/
	14	HhaFlag	Empty	14	/	/
	15	PressureDefId	Empty	15	/	/
Surface	16	SO-1	Empty	16	/	/
Observations	17	SO-2	Empty	17	/	/

	18	SO-3	Empty	18	/	/
	19	SO-4	Empty	19	/	/
	20	SO-5	Empty	20	/	/
	21	SO-6	Empty	21	/	/
	22	SO-7	Empty	22	/	/
	23	SO-8	Empty	23	/	/
	24	ObsHs	Empty	24	/	/
Upper-air Observations	25	UA-1	Empty	25	Upper-air observations (0UTC)	25 (freq)
	26	UA-2	Empty	26	Upper-air observations (6UTC)	25 (freq)
	27	UA-3	Empty	27	Upper-air observations (12UTC)	25 (freq)
	28	UA-4	Empty	28	Upper-air observations (18UTC)	25 (freq)
Additional Information	29	ObsRems	Other observations and remarks, e.g. reference to ASAP metadata database (general link to JCOMMOPS)	29	Remarks	26 (rem)
Equipment type	30	EqTp	Equipment type	/	Ground Equipment Type	18 (EqTp1)
Radiosonde	31	RadSnd	Radiosonde	/	Radiosonde	22 (rds)

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ANNEX IV – LIST OF ACRONYMS

ASAP	Automated Shipboard Aerological Programme
CBS	the Commission for Basic Systems
CONOPS	WIGOS Concept of Operations
EUMETNET	The Network of European Meteorological Services
E-ASAP	EUMETNET ASAP
ET-EGOS	Expert Team on the Evolution of the Global Observing System
ETMC	Expert Team on Marine Climatology
GHRSST	the Group for High Resolution Sea Surface Temperature
GTS	Global Telecommunication System
JCOMM	Joint Technical Commission for Oceanography and Marine Meteorology
JCOMMOPS	JCOMM in situ Observing Platform Support Centre
NWP	Numerical Weather Prediction
SOT	Ship Observations Team
VOS	Voluntary Observing Ship
VOSClim	VOS Climate Subset Project
WIGOS	Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization

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APPENDIX B

RECOMMENDATION 1 (JCOMM-4)

PROVISION OF OCEAN INSTRUMENT/PLATFORM METADATA

THE JOINT WMO/IOC TECHNICAL COMMISSION FOR
OCEANOGRAPHY AND MARINE METEOROLOGY,

Noting:

(1) Recommendation 3 (JCOMM-III) – Provision of ocean data acquisition system and water temperature metadata

(2) The Abridged Final Report with Resolutions and Recommendations of the Third Session of the Joint WMO/IOC Commission for Oceanography and Marine Meteorology (WMO-No. 1049), general summary, paragraphs 5.2.10, 6.1.5, 6.1.11.4, 6.2.5, 7.1.5, 7.2, 7.4, 10.1.7, 10.2.7

(3) Resolution 24 (Cg-XVI) – Marine Meteorology and Oceanography Programme,

(1) Resolution 50 (Cg-XVI) – Implementation of the WMO Integrated Global Observing System (WIGOS),

(1) The final report of the third meeting of the JCOMM Expert Team on Marine Climatology (JCOMM/MR-No. 70),

(2) The final report of the fourth session of the JCOMM Data Management Programme Area Coordination Group (JCOMM/MR-No. 71),

(7) The final report of the Eighth Session of the JCOMM Management Committee (JCOMM/MR-No. 83),

(8) The Final report of the workshop for a new Marine Climate Data System (MCDS) meeting, including the draft MCDS strategy in JCOMM MR-No. 90;

(9) The summary report of the Twenty-First Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE-XXI);

(10) Recommendation 7.2/1 (JCOMM-IV) – Marine Climate Data System (MCDS)

Considering:

(1) The importance of instrument and platform metadata in a number of domains including climate applications and research (for example, bias correction), and operational applications, permitting amongst other things to interpret the data correctly, ensure traceability to standards, enhance coherence of data records, and facilitate quality monitoring activities.

(2) That China has fully developed an Ocean Data Acquisition System (ODAS) Metadata Service (ODASMS) for assembling, preserving and disseminating metadata on ODAS platforms.

(3) That there is a number of systems in place that are collecting metadata from ocean observing platforms (e.g. WMO Publication No. 47, European Directory for Initial Ocean and Observing Systems – EDIOS maintained by the SeaDataNet infrastructure) that can contribute metadata to the MCDS.

(4) The Development of the JCOMM Marine Climate Data System (MCDS), including WMO-IOC Centres for Marine-meteorological and Oceanographic Climate Data (CMOCs), providing an integrated data-flow for the collection of marine-meteorological and oceanographic climate data, including metadata from in situ ocean observation platforms.

(5) That metadata systems require the active involvement of all Members/Member States which operate such platforms and equipment to provide updated metadata in a routine fashion.

Recommends:

(1) Members/Member States to record and provide through the appropriate mechanisms, including CMOCs – once established – on a routine basis required metadata about ocean instruments and observing platforms that they operate.

(2) Members / Member States providing the functions of the ODASMS into their CMOC should they establish one.

(3) The JCOMM in situ Observation Programme Support Centre (JCOMMOPS) to routinely contact platform operators so that the metadata are being submitted to the relevant CMOC(s), including for operational platforms and for historical ones.

Requests the Secretary-General of WMO and the Executive Secretary of UNESCO/IOC, to assist Members/Member States, as necessary, in the submission of metadata to the CMOCs.

This Recommendation replaces Recommendation 3 (JCOMM-III), which becomes obsolete.