WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

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

EIGHTH SESSION

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VOS ISSUES

(Submitted by Sarah North (United Kingdom))

Summary and purpose of the document

This document contains proposals for the future composition of the international VOS fleets, for upgrading ships to VOSClim standards, and on third party data participation in the VOS Scheme. It also contains proposals for the future of the VOS website

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. In particular, the meeting will also review the status of the VOS website, discuss where it should be hosted, and agree on possible required changes or updates to the website.

Appendices: **A.** Types of meteorological reporting ship
. **B.** The elements observed by the various types of VOS
C. Extract from the Met Office Ships' Code and Decode Book (1996 Edition)
D. Report on the VOS Website

- A - DRAFT TEXT FOR INCLUSION IN THE FINAL REPORT

8.5.1 VOS Classes

8.5.1.1 The VOSP Chair pointed out that 52% of ships in the international VOS fleet were currently recruited to the 'Selected' Class. This had reduced from 59% at the last session. The second largest component of the fleet was the 'Supplementary' class which had remained constant since the last session at 18%, although the number of ships actually recruited to this class had fallen.

8.5.1.2 The Panel noted that, in terms of ship numbers, the automatic component of the VOS Fleet had only increased slightly, from 7% at the last session to 8.4% at the current session. Meanwhile the combined percentage of ships recruited to the VOSClim and VOSClim (AWS) Classes had only risen by 4%.

8.5.1.3 Although the overall composition of the VOS fleet classes had therefore not changed significantly since the last session, the overall size of the VOS fleet had fallen by almost 300 ships.

8.5.1.4 Bearing in mind the plans being made by several VOS operating countries to automate their vessels, and the proposals to upgrade TurboWin to permit only VOSClim class observations, the Panel considered that there would inevitably be a gradual shift away from the traditional manually reporting VOS Classes (i.e. Supplementary, Selected and Auxiliary) in the coming years.

8.5.1.1 Future composition of the international VOS fleets

8.5.1.1.1 At present there are eight approved VOS Classes in use in the VOS Scheme i.e. four classes for manual reporting VOS, and four classes for automated VOS. The definitions for each of these types of meteorological reporting ship are specified under the vsslM code in code table 2202 (**Appendix A**). Two further classes for Ancillary and Ancillary (AWS) will also be considered at the current session, making a potential total of ten VOS classes. The current VOS Classes are as follow:

- Selected
- Supplementary
- VOSClim
- Auxiliary
- Selected (AWS)
- Supplementary (AWS)
- Auxiliary (AWS)
- VOSClim (AWS)

8.5.1.1.2 The VOSP Chair pointed out that the original classes for manual reporting ships – Selected, Supplementary and Auxiliary were largely related to the number of elements in the WMO Ship Code that were to be reported. The Panels attention was drawn to the list of elements reported by each VOS Class (**Appendix B**) and to an extract from the Met Office Ships' Code and Decode Book (1996 Edition) detailing the code groups to be reported by each of these classes

8.5.1.1.3 Although the Traditional alphanumeric Code (TAC) FM-13 SHIP had now been superseded by the binary Table Driven Code (TDC) FM-94 BUFR for international data exchanges between national Meteorological Services, it was recognised that the use of the FM-13 SHIP code on board ships for transmitting data ashore would likely continue for a few more years. Notwithstanding, the Panel recognised that electronic logbook software was now being developed to allow data to be transmitted in binary compatible codes, such as the E-Surfmar #101 format. This would therefore allow the higher resolution data to be gradually increased and shared internationally. In addition the new TurboWin+ software would only permit reporting of VOSClim class data.

8.5.1.1.4 The Panel also recognised that the FM-94 BUFR code would now allow the additional VOSClim elements to be shared in real time, whereas for the last decade they have only been available in the delayed mode International Maritime Meteorological Tape (IMMT) format downloaded from the ships electronic logbooks i.e. because changes to the FM-13 SHIP code were restricted when the VOSClim elements were introduced.

8.5.1.1.5 With these significant changes in mind the VOSP Chair suggested that there was a growing need to revisit the current VOS classes for manually reporting VOS and proposed that, in her view, the Supplementary and Selected classes should be phased out and eventually withdrawn, ideally by SOT-10. She suggested however that the manned Auxiliary class should probably be continued, as these ships used their own instruments for reporting their observations, and had value for temporary recruitment in data sparse areas.

8.5.1.1.6 With respect to the automated VOS classes the Panel noted that the number of small autonomous AWS systems, currently recorded under the Supplementary (AWS) class had increased since the last session. Meanwhile the number of Selected (AWS) class ships, which according to their definition may or may not have a facility to manually add visually observed elements, had decreased. The VOSP Chair pointed out that AWS systems were increasingly modular in design and ranged from complex 'integrated' AWS systems to very simple 'Autonomous' AWS systems. With these developments in mind, and taking into account the need for increased volumes of VOSClim quality data, she suggested that consideration could therefore be given to the phased withdrawal of the Selected AWS class.

8.5.1.1.7 The Panel discussed this matter and requested the TT-VRPP, in liaison with the VOSP Chair, to undertake a review of the current VOS Classes with a view to making recommendations to the Panel for consideration and approval at SOT-9 (***action; S. North & TT-VRPP; SOT-9***). Accordingly the Team agreed to add the review of the current VOS classes to the Task Team's Terms of Reference (***action; TT-VRPP; SOT-8***).

8.5.1.2 Upgrading to VOSClim standards

8.5.1.2.1 Further to the consideration given to the issue under agenda item 8.2.1.1, the VOSP Chair suggested that proposals made at the last session to significantly increase the number of ships recruited to the VOSClim class had not been successful. She suggested however that restricting future versions of the TurboWin+ and TurboWeb software to only VOSClim would help encourage future levels of participation in the class.

8.5.1.2.2 In order to accelerate VOSClim participation by manually reporting ships, the VOSP Chair therefore proposed that consideration should be given to restricting all future electronic logbook versions to VOSClim class reporting. Because the NOAAs National Weather Service had now decided to discontinue using AmverSEAS software this proposal would essentially only apply to the OBSJMA and TurboWin software. Accordingly the Panel requested the KNMI and JMA to consider the feasibility of restricting future versions of their future electronic logbook versions to VOSClim class reporting (***action; KNMI/E-SURFMAR, JMA; SOT-9***)

8.5.1.3 Third party data and non-VOS support ships

8.5.1.3.1 Further to the discussions that had already taken place on the Ancillary Pilot Project (Agenda item 7.8) and on increased data coverage (agenda item 8.2.1.4), the VOSP Chair suggested that the Panel should consider the potential for 'crowd-sourcing' third party data as a way of increasing coverage, recognising however that quality may be impacted and would require new monitoring procedures.

8.5.1.3.2 The VOSP Chair pointed out that the growing world of social networking online made it relatively easy for anyone to get involved and to share their weather observations. In this respect

the planned extension of the WOW website[1] to include marine data was expected present a possible means of promoting the growth of the marine weather observing community, not only in the UK, but worldwide.

8.5.1.3.3 WOW is open to both casual marine observers and keen weather enthusiasts. As with the current land based WOW observers, weather reports could be made using all levels of equipment found on board ships. In addition, bearing in mind that relatively few marine users have access to the web at sea, the VOSP Chair pointed out that users could bulk upload files of delayed mode data as long as it was in the correct WOW format.

8.5.1.3.4 In addition to the potential offered by interactive sites such as WOW the VOSP Chair suggested that currently data sparse areas could also be filled through the targeted use of low cost autonomous ship AWS systems, and through the recruitment of ocean going yachts.

8.5.1.3.5 The VOSP Chair also pointed out that shipowners were increasingly fitting their new vessels with quality instruments, and in some cases with automatic weather stations, but that the data from such instruments was not available to national meteorological services. Recognising the limitations on NMS and PMO resources to recruit and maintain observing ships, she suggested that closer linkage was needed with the leadership shipping companies in order to gain access to this valuable third party data. In this regard she pointed out that many operators of oil rigs and platforms around the UK continental shelf were already making their third party data available so that it could be used for safety purposes and for the common good.

8.5.1.4 Collection of delayed mode data

8.5.1.4.1 The VOSP Chair invited the Panel to consider the possibility of configuring the TurboWin electronic logbook program to allow the delayed mode IMMT log files to be emailed directly to the Global Collecting Centres (GCCs).

8.5.1.4.2 In accordance with WMO Pub 471 it was noted that the primary responsibility for applying the Minimum Quality Control Standard (MQCS) of IMMT data currently rests with the contributing national meteorological service (Contributing Member / CM) where the data originated. The CMs then send the data to the Global Collecting Centres (GCCs), who ensure that the MQCS have been applied, and thereafter supply data sets to the Responsible Members (RMs).

8.5.1.4.3 The VOSP chair suggested that provided the TurboWin program could quality control the data to the required levels and eliminate duplicates it would be more efficient for the data to be routine direct to the GCCs. This would be simple to achieve, would streamline the current procedures, and would potentially increase the volume of data provided to the GCCs. She reported that she had already informally raised this suggestion with a number of members, and the GCCs, and had received a mixed response.

8.5.1.4.4 The initial response from the GCC was generally not supportive as it was felt that it might generate extra work putting datasets together from the original ship files. They also considered that it was a good arrangement for the contributing members to do this work as it allowed them closer interaction with their own fleet's data. Apparently the contributed data can often contain many near-duplicates (date/time) and decisions have to be made about which observations can be stored, and which have to be deleted. Other problems in the data can include missing country codes, dates in the future, missing indicators or signs, displaced columns, wrong positions etc. Whist it was recognised that TurboWin does take care of some of the quality issues, the GCCs nevertheless felt that some would remain.

8.5.1.4.5 However at least one member was of the view that the TurboWin checks were in some respects better than those applied in the MQCS procedure in that they take into account the extra confirmations made the observer him/herself who would be asked 'are you sure' before making a

[1] http://wow.metoffice.gov.uk/

positive confirmation of an extreme reported value. It was also questioned why the GCCs didn't have the necessary computing power to automatically eliminate duplicates etc to derive a complete data set. In this respect it was further suggested that consideration should be given to revising the current MQCS routines to take into account extra information like model analysis, advanced spatial checks algorithms etc.

8.5.1.4.6 The VOSP Chair reminded members that the volume of delayed mode data from manned VOS was likely to be in decline as VOS operators increasingly automate their fleets. She also pointed to the 2014 GCC report which showed that more than half the IMMT data received was now derived from automated VOSClim (AWS) class ships. Furthermore it was noted that the number of contributing members and volume of data processed had been in decline in recent years (currently 18 out of 27 members currently contributing).

8.5.1.4.7 With these considerations in mind the Panel invited the ETMC to investigate the potential for developing automated procedures to allow IMMT data to be sent direct to the GCCs, and to liaise with KNMI about any modifications that might be necessary to the quality controls in TurboWin to allow this to happen (***action; ETMC & KNMI; SOT-9***).

8.5.2 VOS website

8.5.2.1 The VOSP Chair, acting on behalf of the VOS website webmaster (Mr Graeme Ball) advised the Panel about the arrangements for transitioning the VOS website from the Australian Bureau of Meteorology to JCOMMOPS. She thanked Mr Ball for all the hard work he had put into developing and maintaining the website, and for acting as the VOS Webmaster. The website was now the recognised international focus for all VOS Scheme and first stop for anyone interested in VOS activities.

8.5.2.2 The Panel noted that Mr Ball had prepared a report on the changes to the VOS Website during the last inter-sessional period and follow-up actions from SOT-7. Mr Ball also reported on the proposed relocation of the VOS Website from ABOM to JCOMMOPS during 2015.

8.5.2.3 In this latter regard the SOT Technical Coordinator advised that he had recently activated a redirection from the VOS webpages[2] of JCOMMOPS to the existing VOS URL[3] at the Australian Bureau of Meteorology.

8.5.2.4 The Panel concurred with the following recommendations proposed by Mr Ball:

- The Panel endorsed the proposal to relocate the VOS Website from ABOM to JCOMMOPS (***action; G. Ball & M. Kramp; 1 Aug. 2015***);
- The VOSP and SOT TC to discuss **Find-a-PMO** and decide who will be responsible for future updates to the PMO contact details (***action; S. North & M. Kramp; 1 Aug. 2015***);
- Mr Ball to place a redirection link from the VOS Website at ABOM to the VOS Website at JCOMMOPS once the transfer is complete (***action; G. Ball; once the website relocation is complete***);
- The VOSP Chair or SOT TC to inform the mailing lists of the relocation, including the new link to Find-a-PMO (***action; S. North or M. Kramp; once the relocation is complete***).

- B - BACKGROUND INFORMATION

An extract from the Met Office Ships' Code and Decode Book (1996 Edition) detailing the code groups to be reported by Selected, Supplementary and Auxiliary class observing ships is attached at **Appendix B**

[2] http://sot.jcommops.org/vos
[3] http://www.bom.gov.au/jcomm/vos/

Appendices: 4

APPENDIX A

TYPES OF METEOROLOGICAL REPORTING SHIP

WMO Pub –No.47 Code Table 2202 (vssIM)

Code	Description
10	**Selected** ***Definition:*** *A mobile ship station equipped with sufficient certified meteorological instruments for making observations, transmits regular weather reports and enters the observations in a meteorological logbook. A Selected ship should have at least a barometer, a thermometer to measure SST, a psychrometer (for AT and humidity), a barograph and possibly an anemometer.*
15	**Selected (AWS)** ***Definition:*** *an AWS system equipped with certified meteorological instruments to measure at least at least air pressure, pressure change, temperature and humidity. Optional sensors would include wind speed and direction and sea temperature measurement. The AWS may or may not have the facility for manual input of the visual elements, and transmit reports at least three hourly or more frequently. The AWS should have the facility to log the data.*
30	**VOSClim – VOS Climate** ***Definition:*** *A mobile ship station equipped with sufficient certified meteorological instruments for making observations, transmits regular and timely weather reports, enters the observations in an IMMT compliant electronic logbook including the extra VOSClim delayed-mode groups, and has a proven record of providing high quality observations. The ship should have at least a barometer, a thermometer to measure SST, a psychrometer (for AT and humidity), a barograph and possibly an anemometer. The ship should be inspected at less that six month intervals.*
35	**VOSClim (AWS) – VOS Climate (AWS)** ***Definition*** *An AWS system equipped with certified meteorological instruments to measure at least air pressure, pressure change, temperature and humidity. Optional sensors would include wind speed and direction and sea temperature measurement. The AWS may have a facility for manual input of the visual elements, and transmit reports at least three hourly or more frequently. The AWS must have the facility to log the data including the additional IMMT delayed-mode VOSClim groups. The ship should be inspected at less that six month intervals.*
40	**Supplementary** ***Definition:*** *A mobile ship station equipped with a limited number of certified meteorological instruments for making observations. It transmits regular weather reports and enters the observations in a meteorological logbook.*
45	**Supplementary (AWS)** ***Definition:*** *an AWS system equipped with a limited number of certified meteorological instruments that reports regularly. The AWS should at least measure air pressure.*
70	**Auxiliary** ***Definition:*** *A mobile ship station normally without certified meteorological instruments, which transmits in a reduced code form or in plain language, either on a routine basis or on request, in certain areas and under certain conditions.*
75	**Auxiliary (AWS)** ***Definition:*** *an AWS system using non-certified meteorological instruments and reporting regularly. The AWS should at least measure air pressure.*
OT	**Other** (specify in footnote).

APPENDIX B

THE ELEMENTS OBSERVED BY THE VARIOUS TYPES OF VOS

element	Selected	VOSClim	Supplementary	Auxiliary
present and past weather	X	X	X	X
wind direction and speed	X	X	X	X
cloud amount	X	X	X	X
cloud type and height of base	X	X	X	
visibility	X	X	X	X
temperature	**X**	**X**	X	X
humidity (dew point)	**X**	**X**		
atmospheric pressure	**X**	**X**	**X**	X
pressure tendency	**X**	**X**		
ship's course and speed	**X**	**X**		
sea surface temperature	X	X		
direction, period and height of waves	X	X		
sea ice and/or icing	X	X	X	X
special phenomena	X	X		
max height of deck cargo from SLL		**X**		
height difference from the SLL to the water line		**X**		
course of ship over ground		**X**		
ship's ground speed		**X**		
ship's heading		**X**		

X = reported by non-AWS and AWS ships || X = reported by non-AWS ships only.

APPENDIX C

EXTRACT FROM THE MET OFFICE SHIPS' CODE AND DECODE BOOK (1996 EDITION)

SECTION 1
THE CODING OF SHIPS' WEATHER REPORTS

FM13-X — Selected Ship's Code

BBXX D .... D YYGGi$_w$ 99L$_a$L$_a$L$_a$ Q$_c$L$_o$L$_o$L$_o$L$_o$ i$_R$i$_x$hVV Nddff (00fff) 1s$_n$TTT 2s$_n$T$_d$T$_d$T$_d$ (3P$_0$P$_0$P$_o$P$_o$) 4PPPP 5appp (6RRRt$_R$) 7wwW$_1$W$_2$ 8N$_h$C$_L$C$_M$C$_H$ (9hh///) 222D$_s$v$_s$ 0s$_s$T$_w$T$_w$T$_w$ (1P$_{wa}$P$_{wa}$H$_{wa}$H$_{wa}$) 2P$_w$P$_w$H$_w$H$_w$ 3d$_{w1}$d$_{w1}$d$_{w2}$d$_{w2}$ 4P$_{w1}$P$_{w1}$H$_{w1}$H$_{w1}$ 5P$_{w2}$P$_{w2}$H$_{w2}$H$_{w2}$ 6I$_s$E$_s$E$_s$R$_s$ 70H$_{wa}$H$_{wa}$H$_{wa}$ 8s$_w$T$_b$T$_b$T$_b$ ICE c$_i$S$_i$b$_i$D$_i$z$_i$

Supplementary Ship's Code

BBXX D .... D YYGGi$_w$ 99L$_a$L$_a$L$_a$ Q$_c$L$_o$L$_o$L$_o$L$_o$ i$_R$i$_x$hVV Nddff (00fff) 1s$_n$TTT 4PPPP 7wwW$_1$W$_2$ 8N$_h$C$_L$C$_M$C$_H$ 222D$_s$v$_s$ 6I$_s$E$_s$E$_s$R$_s$ ICE c$_i$S$_i$b$_i$D$_i$z$_i$

Auxiliary Ship's Code

BBXX D .... D YYGGi$_w$ 99L$_a$L$_a$L$_a$ Q$_c$L$_o$L$_o$L$_o$L$_o$ i$_R$i$_x$/VV Nddff (00fff) 1s$_n$TT/ 4PPP/ 7wwW$_1$W$_2$ 222D$_s$v$_s$ 6I$_s$E$_s$E$_s$R$_s$ ICE c$_i$S$_i$b$_i$D$_i$z$_i$

Offshore Observer's Code

BBXX A$_1$b$_w$n$_h$n$_h$n$_h$ YYGGi$_w$ 99L$_a$L$_a$L$_a$ Q$_c$L$_o$L$_o$L$_o$L$_o$ i$_R$i$_x$hVV Nddff (00fff) 1s$_n$TTT 2s$_n$T$_d$T$_d$T$_d$ 4PPPP 5appp 7wwW$_1$W$_2$ 8N$_h$C$_L$C$_M$C$_H$ 222D$_s$v$_s$ 0s$_s$ T$_w$T$_w$T$_w$ 1P$_{wa}$P$_{wa}$H$_{wa}$H$_{wa}$ 2P$_w$P$_w$H$_w$H$_w$ 3d$_{w1}$d$_{w1}$d$_{w2}$d$_{w2}$ 4P$_{w1}$P$_{w1}$H$_{w1}$H$_{w1}$ 5P$_{w2}$P$_{w2}$H$_{w2}$H$_{w2}$ 6I$_s$E$_s$E$_s$R$_s$ 70H$_{wa}$H$_{wa}$H$_{wa}$ 8s$_w$T$_b$T$_b$T$_b$ ICE c$_i$S$_i$b$_i$D$_i$z$_i$

Mandatory reporting of information in the coded groups

The following groups must always be reported:

1. Call sign or identification number followed by the next five groups.

2. Group 222D$_s$v$_s$.

3. Groups 7wwW$_1$W$_2$, 8N$_h$C$_L$C$_M$C$_H$, 2P$_w$P$_w$H$_w$H$_w$, 3d$_{w1}$d$_{w1}$d$_{w2}$d$_{w2}$ and 4P$_{w1}$P$_{w1}$H$_{w1}$H$_{w1}$, i.e. weather, clouds, waves and swell.

4. Supplementary Ships which have been supplied with sea temperature equipment, should report the groups 222D$_s$V$_s$ and, 0s$_s$T$_w$T$_w$T$_w$.

APPENDIX D

REPORT ON THE VOS WEBSITE

Changes since SOT-7
The following table describes the changes to the VOS Website since SOT-7. The table does not include changes made to **Find-a-PMO**.

Date	Action	Description
March 31, 2015	Updated	Pub47 XML Generator
March 2, 2015	Added	SAMOS Guide to Climate Quality Meteorological and Flux Measurements at Sea
	Added	SAMOS Short Course on Automated Underway Meteorological Observations
June 4, 2014	Updated	VOSClim Focal Point details
February 26, 2014	Updated	VOSClim Certificate of Participation
August 9, 2013	Updated	VOSClim page
	Added	IMMT-5 Data Format
May 23, 2013	Updated	Pub47 XML Generator
	Updated	Form VOSP002

Table 1: List of changes to the VOS Website during the 2013-2015 inter-sessional period

Action items from SOT-7
The Action Items from SOT-7 pertaining to the VOS Website and their current status are provided in the SOT Chair's report.

Future of the VOS Website
Preliminary discussion has been held regarding the relocation of the VOS Website to JCOMMOPS. It is proposed that the relocation would happen about mid-2015, prior to the retirement of Mr Ball. The URL of the VOS website at JCOMMOPS will be http://sot.jcommops.org/vos/

Recommendations of the VOS Webmaster to SOT-8

(i) The Team to endorse the relocation of the VOS Website from ABOM to JCOMMOPS.

(ii) The VOSP and SOT TC to discuss Find-a-PMO and decide who will be responsible for future updates.

(iii) Mr Ball to place a redirection link from the ABOM VOS Website to the relocated website at JCOMMOPS once the transfer is complete.

(iv) The VOSP Chair or SOT TC to inform the mailing lists of the relocation, including the new link to Find-a-PMO