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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: 7.3.1

Original: ENGLISH

VOS ANCILLARY PILOT PROJECT

(Submitted by Sarah North (United Kingdom), acting Chairperson, VOSP)

Summary and purpose of the document

Late in 2011 the VOS Panel developed an initiative to allow ships to join the VOS programme without some of the constraints of being part of a national VOS. The VOS Ancillary Pilot Project was formed in order to enable VOS Operators to react quickly to potential offers by shipping companies, when a NMS may not have the personnel or met instruments to respond. This document provides a description of the pilot project, and recommendations to the SOT in this regard.

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.

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- Appendices:**
- A. VOS Ancillary Pilot Project proposal summary
 - B. List of ships recruited to the VOS Ancillary Class (01 March 2013)
 - C. January 2013 national VOS fleet scores for manual ship reports

- A - DRAFT TEXT FOR INCLUSION IN THE FINAL REPORT

7.3.1.1 The acting VOS Chair, Sarah North, reported on the background to the VOS Ancillary Pilot Project. She explained that the concept had been initiated as a consequence of requests by shipping companies for recruitment of ships to the VOS Scheme having to be turned down. There were several reasons for this including:

- Ships operating worldwide without a home port made it difficult to ensure the supply and regular inspection of the meteorological instruments, and training for the observers;
- As a consequence of increasing automation several NMS were planning reductions to the manually reporting VOS fleets;
- A reduction in the number of Port Meteorological Officers available internationally to inspect such ships; and
- Financial constraints meant that many NMS were having to restrict the supply of calibrated instruments to those ships that they can ensure will produce the required number and quality of observations.

7.3.1.2 Recognizing that turning ships away from the VOS scheme ran counter to the intent of the VOS Scheme and IMO Circular MSC.1/Circ.1293, it was proposed by SOT Task Team on VOS Recruitment and Programme Promotion (TT-VRPP) to establish a new VOS 'Ancillary' class that could enable the VOS community to respond quickly to such requests from shipping companies.

7.3.1.3 The meeting noted that the need to be able to respond to potential offers from shipping companies for ships to be recruited had been given added impetus by the Extreme Seas meeting (Geneva 4-6 October 2011) and the WOC meeting (Paris, December 2011).

7.3.1.4 Following further consideration by the TT-VRPP it had been decided to establish a new VOS Ancillary Pilot Project to enable such ships to join the global VOS without the constraints of being a part of a national VOS Fleet. Details of how the Project operates are published on the VOS Website¹ and are also provided in Appendix A of this report.

7.3.1.5 Details of the new project were subsequently circulated to the VOS and PMO JCOMMOPS mailing lists on 19 December 2011 together with an invitation to VOS operators to consider recruiting ships to the new Ancillary Class.

7.3.1.6 Under the VOS Ancillary PP ships are supplied with the latest TurboWin software, and report in real time. The parent shipping company is responsible for providing the metadata required for WMO Pub47 and is also responsible for ensuring data quality and for maintaining and inspecting the meteorological instruments that they supply.

7.3.1.7 It was noted that on 1 March 2013 only 8 ships had been recorded in the E-SURFMAR metadata database as having been recruited to the VOS Ancillary class. These ships are listed in Appendix B together with information on the number of observations that were received in 2012. No ships have been recruited to the VOS Ancillary AWS sub class.

7.3.1.8 The meeting further noted that 5 of these 8 these Ancillary ships had submitted observations under their assigned ITU call signs during 2012, amounting to 1629 observations. One of the Ancillary ships had additionally submitted a further 334 observations under a masked call sign – making a total of 1963 observations from 6 ships during 2012. Appraisal of the quality of the observations from these ships using the scoring system developed by the RSMC Exeter indicated that quality was generally good and that the Ancillary fleet albeit small was actually performing to a higher standard than some national VOS fleets – see Appendix C.

7.3.1.9 It was unclear whether quality monitoring checks were being carried out by the shipping

¹ <http://www.bom.gov.au/jcomm/vos/projects.html>

companies that had volunteered Ancillary class ships, or whether such monitoring information was being routinely fed back to the ships observers. It was considered therefore that the SOT TC/Ships Logistics Coordinator would have a key role to play in ensuring Pilot Project functions correctly and, in particular, in ensuring that the available QC tools are being used by participating companies and ships in order to ensure data quality. Similarly it was considered that the SOT TC/Ships Logistics Coordinator should help to ensure that the minimum metadata required for Ancillary ships is correctly entered into the E-SURFMAR Metadata database.

7.3.1.10 Although Ancillary Pilot Project ships are currently only required to report in real time, it was recognized that the use of TurboWin software would also permit the data to be logged in delayed mode. However because the data from such ships might prove to be of questionable quality this could potentially increase the workload of the GCCs and would also have consequences for the climate record. Similarly because Ancillary ships would not be assigned to any specific recruiting country this could introduce additional complications. The GCCs were therefore invited to confirm whether they wished to receive this Ancillary VOS data and, if so, how it would be processed.

7.3.1.11 Because relatively few ships have so far been recruited to the Ancillary class the meeting felt that it was difficult to draw clear conclusions at this time without a more representative sample of participating ships. Furthermore, recognizing that the number of VOS withdrawals was likely to increase in the next few years as NMSs increasingly automate their VOS fleets, the meeting considered that the Ancillary Pilot project should continue until SOT-8 when a final decision on the value of the VOS Ancillary class will be taken.

7.3.1.12 It was noted that if SOT-8 subsequently decides to introduce the new VOS Ancillary class then the proposal would need to be submitted to JCOMM-V (2017 or 2018) for formal approval unless it is possible to permit an intersessional fast track approval procedure [e.g. whereby the JCOMM Co-President, acting on behalf of the Commission, and with supporting written evidence, could bring forward the changes that would need to be made to WMO No. 471, WMO Pub 47, etc.].

7.3.1.13 In considering the need to support ships that wish to observe as Ancillary class ships the meeting noted that in 2011, the UK Met Office, supported by the Royal Meteorological Society, had launched a new Weather Observations Website (WOW) for land based amateur observers: <http://wow.metoffice.gov.uk/>. Consideration was being given to extending this website to marine observing sites. It might therefore have potential in the future to be used by some Ancillary observing ships. Data collected via WOW had already proven to be a useful additional source of information to Met Office forecasters, particularly during severe weather events. The Chair of the TT-VRPP undertook to keep SOT advised of any relevant developments.

7.3.1.14 Accordingly the meeting made the following recommendations:

- (i) Rec. 1 – That the Ancillary Pilot Project should be continued until the next SOT session, e.g. SOT-8, when a final decision will be taken on the future value of the Ancillary class.
- (ii) Rec. 2 – That when it is not possible to recruit a potentially suitable manually reporting ship to participate in the VOS Scheme, or to maintain an existing manually reporting ship within the VOS Scheme that has a suitable observing record, then such ships and their parent shipowners/managers should be offered the opportunity to participate in the Ancillary Pilot Project.
- (iii) Rec. 3 – That the new SOT TC/Ship Logistics Coordinator should be tasked to liaise with Ancillary Ship Masters and parent companies (and with VOS Focal Points where appropriate), to gather and check the accuracy of Ancillary metadata prior to entering such information into the E-SURFMAR database.

- (iv) Rec. 4- That the new SOT TC/Ships Logistics Coordinator should be tasked with ensuring any masked call signs that may be assigned to Ancillary ships are referred to the Task Team on Callsign Masking for approval.
- (v) Rec. 5- That the new SOT TC/Ships Logistics Coordinator should be tasked with ensuring that monitoring information and qc tools are made available and are applied by shipping companies that have volunteered Ancillary class ships to participate in the Pilot Project.
- (vi) Rec. 6 – That the new SOT TC/Ships Logistics Coordinator should provide input to the TT-VRPP on the operation of the Ancillary PP to assist decisions being made on the need to formally introduce the new VOS Ancillary class at SOT-8
- (vii) Rec. 7 – That the TT-VRPP should be additionally tasked with promoting the VOS Ancillary class and reporting on its implementation at SOT-8. Its Terms of Reference should be amended as appropriate.
- (viii) Rec. 8 – That the next version of TurboWin software should be amended to include ‘Ancillary Pilot Project’ as an option under ‘Projects’, until such time as a decision is made on the need to formally introduce the new class. (Selecting this option will disable the standard VOS class options).
- (ix) Rec. 9- That the RSMC should produce and disseminate monthly monitoring statistics for Ancillary (and if necessary Ancillary AWS) Pilot Project ships, as a separate ‘Not Assigned’ list.
- (x) Rec. 10- That the GCCs should advise if they wish to additionally receive delayed mode data from Ancillary (Ancillary AWS) ships.

- B - BACKGROUND INFORMATION

1. The need for an Ancillary class of observing ships was initially borne out of discussions between the current Acting VOS Chair, the SOT Chair and the then VOS Chair Julie Fletcher in late 2011.
2. At the time several VOS countries reported that they were planning to automate their VOS operations and, as a consequence, were expected to substantially reduce the size of their manually reporting observing fleets to a core number of ships reporting to ‘VOSCLIM’ quality, often drawn from major shipping companies that have shown an ongoing commitment to the VOS Scheme.
3. In addition, the availability of full time Port Meteorological Officers (PMOs) to service manually reporting ships was in decline and VOS Focal Points were increasingly having to turn ships away that were asking to be recruited as manually reporting ships. Often this was because the ships requesting to be recruited were operating on a worldwide basis and would therefore be difficult to inspect. Moreover it would be difficult to justify loaning meteorological instruments to such ships if there was no certainty of their being recovered. Turning ships away would therefore run counter to the intention of the IMO Circular MSC.1/Circ.1293 which encouraged ships and shipowners to propose ships for recruitment to the VOS Scheme.
4. Whilst some of these ships could potentially be recruited as ‘Auxiliary’ class VOS using their own instruments there nevertheless remained a responsibility on the recruiting VOS country to ensure ongoing inspections and routine monitoring of their data quality.
5. With the Extreme Seas meeting (Geneva 4-6 October 2011), attended by Graeme Ball and

Julie Fletcher) and the WOC meeting (Paris, December 2011, attended by the acting VOS Chair) it was considered that there was a need to be ready to respond to potential offers from shipping companies which suddenly want to be involved in VOS and offer up ships to be recruited. It was therefore decided that there was a need to create a new VOS 'Ancillary' class so that the VOS community would be able to respond quickly to such requests from shipping companies.

6. Because many NMS are not in a position to supply calibrated instruments to an influx of recruited ships, it was considered that the new 'Ancillary' ships should report using their own shipboard instruments, and that their parent shipping companies should take responsibility for the quality, maintenance and inspection of these instruments.

7. Ancillary class ships are recorded as 'Not Assigned' in the recruiting country section of the TurboWin station metadata, and are recorded under country 'ZZ' in the E-SURFMAR Metadata database. For the purposes of WMO Pub 47, Ancillary ships are currently recorded as 'OT' Other in field vssIM and a footnote is added to clarify that the ship is a participant in the VOS Ancillary Pilot Project

Appendices: 3

APPENDIX A

VOS ANCILLARY PILOT PROJECT PROPOSAL SUMMARY

The VOS Ancillary Pilot Project is an initiative to allow more ships to join the global VOS without some of the constraints of being part of a national VOS fleet.

The SOT Task Team on VOS Recruitment and Programme Promotion (TT-VRPP) proposes that a 'VOS Ancillary Pilot Project' be created, to respond to offers from ships that want to join the VOS scheme, but which for various reasons cannot be recruited to a national VOS in the traditional way. Due to a finite pool of NMS calibrated instruments for ships, and a lack of PMO support in some areas, it is recognized that NMS may not be in a position to recruit all ships wishing to join VOS.

The TT-VRPP wants to encourage the participation of these ships and recognizes that with the support of shipping companies, these vessels could provide useful observations, particularly in data sparse regions. Under the VOS Ancillary Pilot Project, ships will prepare observations using their own instruments and TurboWin software, and will be actively supported in their VOS participation by their shipping companies, who will take responsibility for data quality and the feedback of performance monitoring information.

Background

About 25 countries are listed as having a VOS fleet, with approx. 4000 ships listed in WMO Pub 47, of which around 2000 ships are considered to be active on a monthly basis. This is however, only a small percentage of the global merchant fleet of about 29,000 ships, and the TT-VRPP has considered ways to increase VOS participation and deal with potential offers of ships wanting to join VOS.

In recent years, some countries have withdrawn funding for their VOS programmes and the number of PMOs has also been decreasing. Budget constraints and a lack of PMO resources have resulted in some NMS rationalising their VOS fleets to discard inactive ships and to concentrate their efforts on supporting ships in the Selected and VOSclim classes.

The TT-VRPP recognizes there is a need to find a solution to deal with ships that volunteer to join VOS, but which do not fit under the traditional national VOS recruitment process. The need to address this has arisen because of the following reasons:

- The number of shipping companies wanting to be involved in 'green' environmental monitoring activities has increased in recent times. There is a greater awareness of SOT activities and bodies like the WOC are promoting SOT participation, which could lead to a sudden increase in the numbers of ships wanting to join the VOS Programme.
- NMS have an inability to recruit a sudden influx of ships, for example if a company suddenly offered 10 or more ships to join the VOS, it is unlikely that these ships could be accommodated within a national VOS programme.
- Some ships want to join VOS while trading in areas where there are no PMOs. Consequently these offers have not been utilized because formal recruitments were not possible.

The VOS Ancillary Pilot Project has been conceived to respond to offers from ships wanting to join the VOS scheme, but which for various reasons cannot be recruited to a national VOS in the traditional way. These 'Ancillary' ships will be seen as supporting the global VOS.

The definition of the term Ancillary as quoted from www.yourdictionary.com means: '*something that is helping or subordinate but not as necessary*'.

How the VOS Ancillary Pilot Project will operate

1. At SOT-VIII, the TT-VRPP will report on the progress of the Ancillary Pilot Project. If the review is positive, then, in conjunction with the TT-Pub47, the SOT will be asked to consider a proposal to create a new Ancillary class of VOS, and possibly an Ancillary AWS class of VOS. Creating a new class will involve in particular (i) updating Chapter 6 describing the VOS Scheme of the WMO No. 471 (Guide to Marine Meteorological Services), (ii) updating JCOMM TR No. 4 (VOS Framework Document), (iii) updating WMO No. 47, and (iv) proposing an implementation date, and (v) communicating with the PMO network about the new class and its requirements. Until the new Ancillary class is approved (by SOT and JCOMM), the metadata element 'type of reporting ship' (Pub 47 table 2202) will be reported as OT, with 'Ancillary Pilot Project' denoted in the footnote for this element.
2. Ancillary Pilot Project ships will report using their own shipboard instruments, with their Shipping Companies taking responsibility for data quality, and for the maintenance and inspection of the shipboard instruments.
3. Ancillary Pilot Project ships will be supplied with TurboWin version 5.0 software. They will select 'Not Assigned' as the country option in the 'Station Data'. The 'Not Assigned' country option assumes the Barometer data will be sea level pressure. The next version of TurboWin will require 'Ancillary Pilot Project' to be added as an option under 'Projects', until the new class is introduced. Selecting this option will disable the standard VOS class options.
4. Ancillary Pilot Project ships will report in real-time in the full code with Email being the primary means of communication (only if it does not impact on data timeliness). Ships may use SAC services when email is not an option, but this raises concerns about increased communications costs for NMS at a time when NMS are trying to reduce costs. There is also an overhead in resource time in setting up ship addresses on an email 'white list' and in ensuring that observations are actually received.
5. The ships and shipping companies must provide a minimum suite of Pub 47 metadata (e.g. Ship name, callsign, registry, IMO number, vessel type) to populate the ESURFMAR database for operational requirements. Operators will be encouraged to provide the metadata pertaining to instrument type and location. The TurboWin Pub47 module can be installed and used to collect these data.
6. The new SOT TC/Ship Logistics Coordinator could be tasked to gather and check the accuracy of the metadata before entry into the ESURFMAR database.
7. Ancillary Pilot Project ships will report using REAL callsign where possible. The use of a MASK callsign, within a dedicated callsign series for the Ancillary Pilot Project, would firstly need approval by the Task Team on Callsign Masking and would then require administration of the allocated MASK callsign series. This task could be assigned to the SOT TC/Ships Logistics Coordinator.
8. The Real-Time observations from Ancillary Pilot Project ships will be monitored by the RSMC. There is a risk that some poor quality data (from un-calibrated ships' instruments) could be assimilated into the models prior to the poor quality ships being rejected/black-listed. For this reason it is proposed that the RSMC would produce monthly monitoring statistics for the Ancillary Pilot Project ships as a separate list, and this be provided to the companies operating Ancillary Pilot Project ships. Consideration could be given to possibly recruiting good quality Ancillary Pilot Project ships into a national VOS programme as a Selected or VOSclim ship in the future as resources allow.
9. The emphasis for data quality will be put on the Shipping Companies. The Companies will use the QC monitoring tools as provided to them, with the new SOT TC/Ship Logistics

Coordinator acting as the intermediary. The Shipping Companies will use the monthly monitoring statistics to provide feedback to their ships (in the same way as a PMO would) and will take responsibility to improve bad performance. The sort of text that accompanies the ESURFMAR-generated monitoring reports would be included with the statistics sent to Shipping Companies, so that they know how to interpret the results.

10. The GCCs will be consulted about the usefulness of delayed mode data from Ancillary Pilot Project ships. Some data maybe of questionable quality, so the GCCs should advise if they wish to receive this data and what the preferred method of submission is.

Terms of Reference for the VOS Ancillary Pilot Project

- Promote the VOS Ancillary Pilot Project as a means of getting more ships to join VOS.
- Ensure steps are in place to get the data from the VOS Ancillary Pilot Project ships distributed in real-time.
- Monitor the data quality and provide feedback to the responsible shipping companies.
- Provide a detailed report on the progress of the Pilot Project to SOT-VIII. If considered appropriate, liaise with TT-Pub47 to recommend the creation of new VOS classes as necessary, and propose relevant changes to WMO No. 471, WMO No. 47, and JCOMM TR No. 4.

Membership and chair

Existing members of TT-VRPP, plus
SOT TC/Ship Logistics Coordinator
RSMC
GCCs
Scientific Advisors
Chair – same as TT-VRPP (Julie Fletcher)

Bullet Point List of what is required from a Ship/Shipping company point of view

- Support of shipping company for ship to become an Ancillary Pilot Project ship
- Ship to use ship's own instruments
- Ship to be supplied with TurboWin 5.0 software
- TurboWin setup to show 'Not assigned' country code
- Ship/Shipping company to supply essential metadata, plus as much additional metadata as possible
- Ship to send real-time reports
- Reports to be emailed where email is timely
- Shipping company to be provided with QC monitoring feedback and to take action with ship to improve data where necessary
- Shipping company to inspect and maintain the instruments

Julie Fletcher
9/12/11

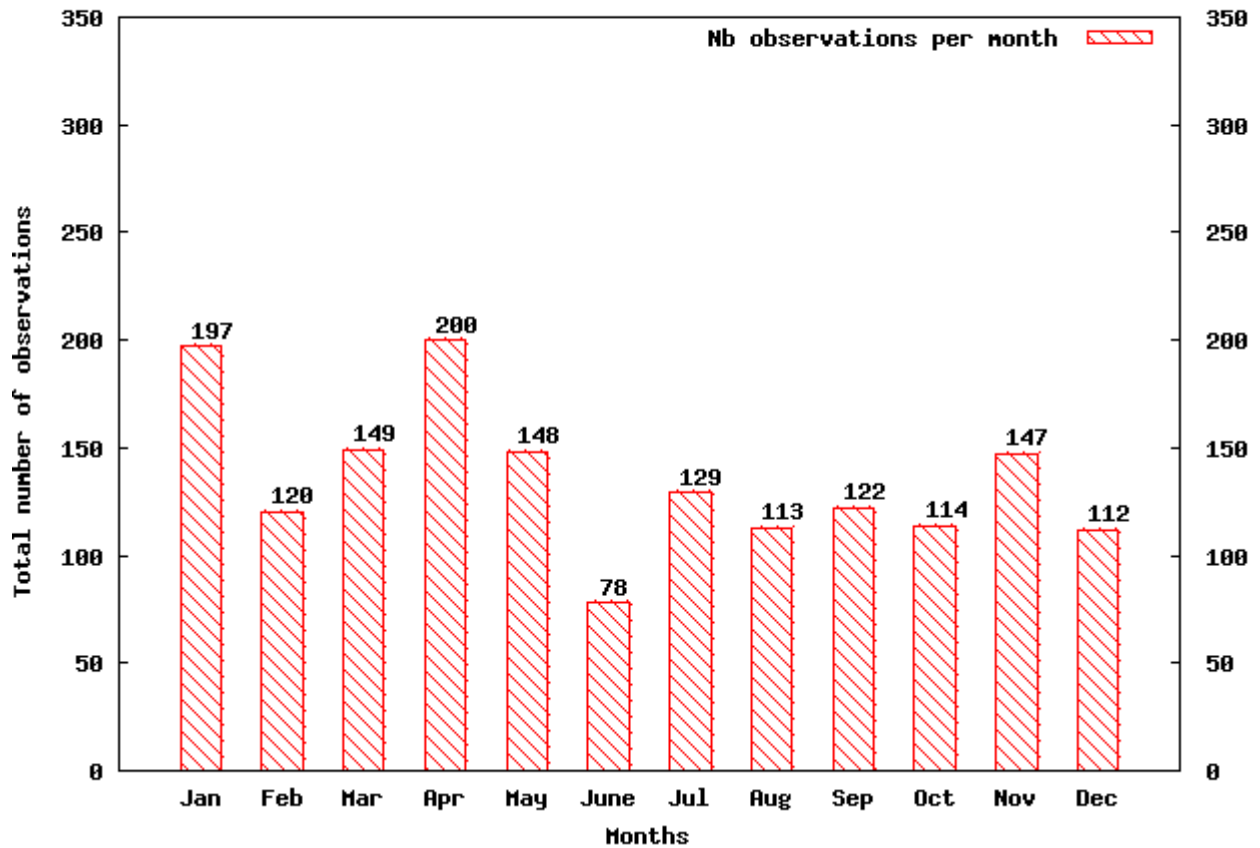
APPENDIX B

LIST OF SHIPS RECRUITED TO THE VOS ANCILLARY CLASS (01 MARCH 2013)

country	call_sign	nmsID	name	IMOn	atm code	vssIM code	prST code	Mask
ZZ	PCBI	0	LONDON	7402453	5	OT	CT41	---
ZZ	GHJV	0	Lord Nelson	1002495	5	OT	CT41	---
ZZ	PF7197	0	Rainbow Warrior	9575383	5	OT	SMAI	---
ZZ	PHPO	0	ROTTERDAM	7402439	5	OT	CTH	---
ZZ	PHHB	0	SINGAPORE	8213964	5	OT		---
ZZ	ZQHM2	0	TENACIOUS	1005679	5	OT	CT41	---
ZZ	3EPD8	0	TRINITY ARROW	9319404	5	OT	CT41	---
ZZ	3FMV6	0	TRINITY GLORY	9350927	5	OT	CT41	---

Number of observations received from VOS Ancillary Class ships in 2012

World Ocean Data : (ESURFMAR database query)
 Evolution of number of obs from 2012-01-01 to 2012-12-31
 (Produced by Météo France for E-SURFMAR)



Number of observations received from VOS Ancillary Class ships in 2012 - ctd

From 2012-01-01 to 2012-12-31	World Ocean			EUCOS Area							
	Call Sign	Total	Manned	Pressure	Total	Manned	Pressure	Main synop.	Intermediate	Hourly	Others
3FMV6	737	100 %	735	0		0	0	0	0	0	0
GHJV	375	100 %	374	292	100 %	291	108	62	122	0	0
ZQHM2	268	100 %	268	246	100 %	246	82	65	99	0	0
3EPD8	215	100 %	201	48	100 %	48	46	0	2	0	0
PHPO	34	100 %	34	19	100 %	19	19	0	0	0	0
PCBI	0			0			0	0	0	0	0
PF7197	0			0			0	0	0	0	0
PHHB	0			0			0	0	0	0	0

Total of observations received From 2012-01-01 to 2012-12-31 for 8										
World Ocean			EUCOS Area							
Total	Manned	Pressure	Total	Manned	Pressure	Main synop.	Intermediate	Hourly	Others	
1629	100 %	1612	605	100 %	604	255	127	223	0	

APPENDIX C

JANUARY 2013 NATIONAL VOS FLEET SCORES FOR MANUAL SHIP REPORTS

Country	Number of ships	Final score	Total Num of elements observed	Pressure		Wind Speed		Wind Direction		Air Temperature		Relative Humidity		Visibility		SST		Timeliness
				Score	Num Obs	Score	Num Obs	Score	Num Obs	Score	Num Obs	Score	Num Obs	Score	Num Obs	Score	Num Obs	
"SHIP"	1	0.166	21806	0.246	3312	0.183	3328	0.152	2383	0.111	3316	0.126	3113	0.080	3273	0.111	3081	MISSING
IS	2	0.492	802	0.355	142	0.373	142	0.316	102	0.321	142	MISSING	0	0.309	142	0.152	132	0.009
NL	87	0.545	22672	0.520	3627	0.566	3583	0.553	2234	0.517	3604	0.511	3422	0.429	3549	0.508	2653	0.209
Ancillary	4	0.552	770	0.594	122	0.556	122	0.585	56	0.521	121	0.561	120	0.446	117	0.511	112	0.176
JP	8	0.561	2452	0.593	364	0.561	362	0.470	280	0.537	364	0.522	360	0.497	364	0.470	358	0.383
GB	215	0.571	52412	0.564	8191	0.608	8179	0.578	5236	0.528	8168	0.542	7936	0.464	8138	0.546	6564	0.357
NO	9	0.595	14824	0.070	2693	0.132	2706	0.090	954	0.114	2706	0.161	2700	MISSING	0	0.094	3065	0.013
NZ	19	0.603	5675	0.590	963	0.638	960	0.645	619	0.552	961	0.575	954	0.569	368	0.539	850	0.268
AU	51	0.625	8967	0.596	1382	0.630	1402	0.594	838	0.564	1384	0.579	1368	0.484	1401	0.579	1192	0.322
DE	444	0.636	76261	0.629	12090	0.639	12087	0.603	7170	0.599	12077	0.628	11511	0.531	11826	0.580	9500	0.361
GR	2	0.640	69	0.607	10	0.817	10	0.811	9	0.570	10	0.629	10	0.576	10	0.530	10	0.025
SE	15	0.669	2842	0.610	482	0.603	480	0.525	368	0.531	482	0.794	64	0.489	472	0.550	494	0.451
MY	2	0.669	452	0.773	63	0.710	66	0.706	52	0.576	69	0.577	66	0.549	69	0.593	67	0.552
FR	1	0.672	47	0.630	8	0.670	8	0.652	2	0.674	8	0.726	8	0.637	7	0.753	6	0.225
US	439	0.689	135511	0.663	23469	0.650	24394	0.595	15092	0.605	23364	0.645	14018	0.556	15999	0.616	19175	0.641
IL	3	0.704	337	0.739	63	0.632	64	0.645	48	0.563	64	0.688	22	0.475	64	0.650	12	0.059
HK	26	0.712	3570	0.754	557	0.703	550	0.641	371	0.652	557	0.660	492	0.565	554	0.658	489	0.518
CA	3	0.721	124	0.601	22	0.646	22	0.616	9	0.771	22	0.673	22	0.607	19	0.501	8	0.028
Unknown	185	0.784	30078	0.792	5216	0.745	5160	0.683	3401	0.673	5113	0.735	2520	0.613	4618	0.681	4050	MISSING
RU	50	0.799	5570	0.739	1004	0.755	1003	0.662	686	0.722	1008	0.540	92	0.644	988	0.632	789	0.495
IE	2	0.844	68	0.704	14	0.692	14	0.533	12	0.641	14	MISSING	0	0.539	14	MISSING	0	0.083
IN	8	0.973	386	0.995	56	0.904	68	1.009	27	0.851	68	0.916	65	0.809	68	0.816	34	1.101
CL	1	0.974	52	1.071	10	0.814	10	1.047	2	0.827	10	0.824	10	0.702	10	MISSING	0	1.040
PL	1	1.010	61	1.048	9	1.016	9	1.056	5	0.911	9	0.995	9	0.964	9	1.030	11	2.000
KR	3	1.129	52	1.102	14	1.000	14	0.995	10	1.044	14	MISSING	0	MISSING	0	MISSING	0	2.000