

VOS PROGRAMME STATUS REPORT

(Submitted by Sarah North (United Kingdom))

Summary and purpose of the document

This document provides information on the status of the VOS fleet, including trends in recent years, VOS Participation, Metadata status & completion, Key Performance Indicators (KPI) compliances, and VOS data coverage.

ACTION PROPOSED

The Panel will review the information contained in this report, and comment and make decisions or recommendations as appropriate.

The Panel will particularly review current recruitment levels, and discuss Key Performance Indicators (KPI) and how to reach targets. The Panel will also review VOS data coverage, and discuss how selected ships could be upgraded to VOSclim. It will review the status of ship metadata submissions to Pub47, and discuss proposals to improve this.

See part A for the details of recommended actions.

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- Appendices:**
- A – VOS Classes – Changes since SOT-7
 - B – Growth of the VOS Climate Fleet over the last decade
 - C – Real time observations from VOS operating countries in 2014
 - C1 Revised Numbers of real time observations from VOS operating countries in 2014
 - C2 Percentage observations received from each VOS class and from national VOS operators
 - C3 Observation trends 2002 – 2015 (March)
 - D – Status of Global VOS Participation – 2012 TO 2014
 - Numbers of ships reported by VOS Operators
 - E – Status of Global VOS Participation – 2012 TO 2014
 - Numbers of observations reported by VOS
 - F – SOT Key Performance Indicators
 - G – Time of receipt for VOSclim Observations – January 2015
 - H – JCOMMOPS VOS-VOSCLIM Map - January 2015
 - I – List of ships that operated in Antarctica during the 2014/15 season
 - J – Ships present in Antarctic Waters
 - K – Submission to the IMO NCSR Sub-Committee
 - L – Extract from the Report to the IMO Maritime Safety Committee

- A - DRAFT TEXT FOR INCLUSION IN THE FINAL REPORT**8.2.1 VOS Status Report**

8.2.1.1 The VOSP Chair reported on the status of the VOS fleet, including trends in recent years, and considered proposals for the evolution of the fleet, in particular taking into account the upgrading of VOS to VOSClim standards, and the increasing demand for high quality observations to serve the needs of the developing Global Framework for Climate Service (GFCS).

8.2.1.2 In order to determine the status of participation figures had been drawn from the E-SURFMAR metadata database¹ and from the national VOS reports submitted by participating VOS operators. In this latter regard the VOSP Chair reported that only 19 national reports had been submitted for 2014 (i.e. by the March 2015 deadline). This compared with 22 reports in 2013 and 28 reports in 2012.

8.2.1.1 VOS Participation***Number of recruited ships***

8.2.1.1.2 The Panel noted that, using figures extracted from the E-SURFMAR database¹ there were 29 countries listed as having a total of 3,045 active VOS (on 24 March 2015). This compared to a figure of 3336 ships reported at the last session. A comparison between the numbers of ships recruited to each of the current eight approved VOS classes at the current session to those reported at the last session is at **Appendix A**.

8.2.1.1.2 In terms of numbers of ships reported there had been approximately a 9% reduction in the size of the international VOS fleet over the last two years since the last session. Moreover the fleet was less than half the size it was a decade ago.

8.2.1.1.3 However the Panel was pleased to note that there had been a further growth, albeit much smaller than had been hoped for, in the numbers of reported VOSClim ships. A table and graph showing the growth in the size of the VOSClim fleet over the last decade since the initiation of the then VOS Climate Project is at **Appendix B**. The number of active VOSClim and VOSClim (AWS) ships currently reported on the E-SURFMAR metadata database now stands at 498 ships. This represented a slight increase from 12% of the total number of reported global VOS to just over 16%.

Number of observations

8.2.1.1.4 The VOSP Chair advised that it had been extremely difficult to prepare accurate observation numbers for the current session. She drew attention to the figures derived from the E-SURFMAR counters² for each VOS operating country at **Appendix C**. Whilst these figures were generally correct it was believed that the figures for Canada were likely to be in error. This was due to interruptions in the transmission of unmasked data, and to known counting errors in the E-SURFMAR observation counters. A revised table was kindly generated by the E-SURFMAR team (at **Appendix C1**) using estimates for the Canadian contribution agreed with the SOT Technical Coordinator.

8.2.1.1.5 Based on these revised figures the Panel noted that a total of 1.88 million observations had been submitted by participating VOS Operators in 2014 and that VOSClim Class ships (i.e. manual and automated VOSClim ships) now accounted for more than 35% of the total (**Appendix C2**). The Panel therefore recommended introducing a new Key Performance Indicator (KPI) to measure the percentage of observations received from VOSClim Class ships (i.e. manual and automated VOSClim ships) with a target of 50% by SOT-9. The new KPI shall be included in the

1 http://surfmar.meteo.fr/doc/vosmetadata_v6/

2 <http://www.meteo2.shom.fr/vos-monitoring/counters.htm>

SOT Implementation Strategy (**action; Secretariat; asap**). The Panel also requested the VOSP Chair to monitor this KPI, and to report at the next Panel Session (**action; S. North; SOT-9**).

8.2.1.1.6 It was further noted that almost 90 % of the VOS observations came from just 7 participating members. (**Appendix C2**). Consequently there remained a need to increase the capacity of other countries that are seeking to implement VOS networks, and to involve other countries that have large national merchant fleets but which currently have no established VOS fleet.

8.2.1.1.7 According to the E-SURFMAR Observation counters² there appeared to have been a decrease in overall observation numbers over the last year, and since the last session (**Appendix C3**). However it was recognized that, for the reasons stated above, revisions to the scripts that generate these figures will be needed in order to verify this trend

8.2.1.1.8 In addition to the above figures, a further ~344k observations had been received under the anonymous call sign 'SHIP' and a further ~20k observations were received from ships not recognized as having been recruited by a particular national VOS operator. Consequently approximately 19% of observations were from unidentified ships (a slightly higher figure to that reported at the last session) that could not, therefore, be properly monitored for quality.

8.2.1.1.9 The Panel further noted that 521280 observations were received and processed from VOSclim registered ships by the Global Collecting Centres during 2014, representing 68% of the VOS data received.

8.2.1.2 Metadata – Status & completion

8.2.1.2.1 The VOSP Chair drew the meetings attention to figures that she had extracted from the E-SURFMAR metadata database and from the national VOS reports at **Appendix D**. She pointed out that, in certain cases, there were clear inconsistencies between the numbers of ships being reported and those recorded in the database. There were, for instance, some countries that reported substantial VOS fleets in their 2014 national VOS reports and yet had no ships recorded in the database. Conversely there were some countries that had more ships reported in the database than in the national reports, suggesting a failure to keep the database up to date.

8.2.1.2.2 The numbers of active VOS reported in the E-SURFMAR database were further compared with the number of VOS recorded in the E-SURFMAR Observation Counters² that had submitted real time observations in 2014. This revealed there were several countries that had reported large numbers of VOS and yet very few of these ships were actively submitting observations. It was recognised that whilst there may be good reasons for such discrepancies e.g. use of masked call signs, ships only recruited to submit delayed mode data etc., there were clearly several ships that needed to be made inactive on the database.

8.2.1.2.3 Furthermore the number of real time FM-13 SHIP (BBXX) observations reported as having been sent on the GTS in the national VOS reports was compared with the number of observations derived from the E-SURFMAR observations counters – **Appendix E** refers. This revealed further inconsistencies with a few countries reporting far more observations having been submitted in 2014 than were actually received on the GTS. Indeed it was noted that there were some countries with ships listed in the E-SURFMAR metadata database from which no observations had been received in 2014. The reasons for such inconsistencies is unclear but it is considered that, in some cases, these observations were collected in delayed mode rather than being transmitted in real time.

8.2.1.2.4 In view of these apparent inconsistencies VOS Operators were requested to examine the figured contained in **Appendices D** and **E** and to verify the accuracy of the figures they had recorded in their recorded national reports. The Panel requested the SOT Technical Coordinator to contact the national VOS Focal Point of the counties where marked differences were noted with a view to ensuring that E-SURFMAR records are corrected as necessary (**action; M. Kramp & VOS**

Operators; asap).

8.2.1.2.5 As there are currently no tools for analysing completeness of VOS metadata entries it was difficult to ascertain whether individual VOS operators were collecting the full suite of metadata for each ship or to determine the frequency at which of the data being updated. However brief examination of the WMO Pub 47 data when extracted from the E-SURFMAR database³ showed that, whilst the overall level of completeness was good, there were at least four countries that appeared to have supplied very limited national data for their VOS. In order to overcome this lack of data it was suggested that a more pro-active approach was needed.

8.2.1.2.6 The VOS Panel Chair therefore requested the SOT Technical Coordinator to send reminders, at least quarterly, to national VOS Focal points to request them to check that their metadata records are maintained up to date. (**action; M. Kramp; Oct. 2015 onwards**). In addition it invited the E-SURFMAR Programme Manager to take steps so that the E-SURFMAR metadata database would include a facility to generate a query based on the 'chgd' metadata field in order to determine the last dates of changes made to metadata fields by each nation (**action; P. Blouch PM; 2016**).

8.2.1.2.7 The Panel reiterated the request made at the last session that VOS Focal Points should ensure the accuracy of the metadata of their VOS fleets is maintained up to date in the E-SURFMAR database (or is regularly submitted to WMO in Pub47 format) and to upload digital imagery into the database, especially in the case of VOS Climate class ships.

8.2.1.3 KPI Compliances

8.2.1.3.1 The VOSP Chair reminded the meeting of the KPI targets that were established for VOS and VOSClm class ships at the previous sessions, and to the targets that were proposed in the SOT Implementation Strategy. These are included at **Appendix F**.

8.2.1.3.2 The Panel noted that many of the KPIs agreed at the last session were assigned to the RTMC to determine, and were addressed in greater detail in under agenda item 10.1.2. However the VOSP chair summarised the level of compliance as follows;

- **25% of the global active VOS1 to be VOSClm class**

It was recalled that at the last session it had been decided to continue to monitor this KPI (which was originally set at SOT-6).

Based on an RTMC analysis of ships that had submitted more than 5 pressure observations per month a figure of 22% was achieved in 2014. This was therefore unchanged since the figure reported at the last session (in 2012).

At the present time the RTMC doesn't have an easy way to determine the percentage based upon the number of VOS which report at a single observation per month. However it was noted that figures derived by the SOT Technical Coordinator suggested approximately 28% was achieved (in December 2014 and January 2105).

Based on these statistics and also taking into account that ships reporting only in delayed mode are not included in the figures the meeting considered that the KPI had been met.

- **Less than 3% of VOSClm class ships being flagged on the suspect list for air pressure**

Because of the decision made at the last session to tighten the VOSClm monitoring criteria it had been agreed that compliance with this KPI should continue to be monitored until the current session. The Panel were please to note that his KPI had just been met.

³ ftp://esurfmar.meteo.fr/pub/Pub47/

- **95% of VOS_{Clim} class observations to be received within 120 minutes.**

It was recalled that it was agreed at the last session that this KPI should continue to be measured and reported to SOT-8. The Panel was pleased to note that this KPI had again been met at the current session (further details are given in the RTMC report – agenda item 10.1.2).

In considering this KPI the VOSP Chair also drew attention the Panel's to the timeliness figures produced by the RSMC each month for national observing fleets which are available on the Met Office website⁴. She encouraged VOS Operators to make good use of these statistics, in particular to determine the average receipt times of their fleets but also the average number of observation per ship. A copy of the January 2105 timeliness figures are at **Appendix G**.

- **All VOS ships aim to meet the reporting criteria of an 'Active ship' by providing an average of 20 Observations per month.**

It was recalled that this KPI had been set at SOT-6 and that at SOT-7 a figure of 43.2% had been achieved (based upon the annual ranking list produced by the UK Met Office).

Using the 2014 annual ranking lists it was noted that 41.97% of VOS ships (i.e. 1072 out of 2554 ships reporting) had reported an average of at least 20 pressure reports per month. The Panel were therefore disappointed to note that there had been a slight drop in the activity level of the VOS since the last session.

- **At least 25% of the active international VOS Fleet registered on the E-SURFMAR metadata database being recorded as VOS_{Clim} Class by SOT-8**

This new KPI target was introduced at the last session. The Panel noted that based solely on the numbers of national VOS Class ships recorded in the database (i.e. 498 out of a total of 3045 active nationally recruited ships) the figure currently stood at 16.4%. Taking into account only the VOS that were actually actively producing observations in 2014 (i.e. 2554 ships) the figure achieved was 19.4%. The KPI had not therefore been met.

8.2.1.3.3 In considering this item, the Panel recalled that the SOT Technical Coordinator had been assigned a task to create tools to monitor the SOT Key Performance Indicators (KPIs) as defined in the SOT Implementation Strategy. To this end he had recently developed an SOT 'Scorecard' to keep track of compliance levels. However it was noted that some of the level being reported differed in some cases from those being generated by the RTMC (Met Office). The Panel therefore requested the SOT Technical Coordinator to liaise closely with the RTMC to verify the figures being derived for the KPIs (**action; M. Kramp; SOT-9**).

8.2.1.3.4 In order simplify measuring compliance with some of the KPIs, the Panel also invited the E-SURFMAR Programme Management to include in the E-SURFMAR Observations Counters² a criteria to search on the VOS_{Clim} and VOS_{Clim} AWS (and indeed the other VOS Classes as well) and derive figures for individual ships, as is currently done on a country basis (**action; P. Blouch; SOT-9**).

8.2.1.4 VOS Data Coverage

8.2.1.4.1 The VOSP Chair drew attention to the latest JCOMMOPS VOS observation density map (**Appendix H**) and stressed the need to recruit VOS to fill data voids, particularly in the polar regions. In this respect she drew the Panels attention to the website⁵ maintained by the Scientific Community on Antarctic Research (SCAR) at which includes an updated list of all the names and

4 http://research.metoffice.gov.uk/research/nwp/observations/monitoring/marine/TOR/Pub47_ToR_by_CTRY.html

5 http://www.antarctica.ac.uk/met/jds/met/SCAR_oma.htm

call signs of ships that are known to have made meteorological observations in Antarctica during the 2014/15 season. A copy is attached at **Appendix I**.

8.2.1.4.2 The Panel noted that there were currently estimated to be 23 ships reporting in these waters and 60 not reporting in Antarctic waters. A graph showing the relative trend between ships reporting and not reporting in recent years is at **Appendix J**. The general picture was one of an overall increase in shipping in Antarctic waters, but with the number reporting observations not changing. The VOSP Chair reminded the meeting of the action placed on VOS Focal Points and PMO's at the last session to make determined efforts to recruit ships that operate in these waters to the VOS Scheme or preferably to consider installing AWS systems on suitable ships.

8.2.1.4.3 The VOSP Chair also reported on a paper was submitted jointly to IMO by Canada, Iceland, Norway, Sweden and the United States encouraging enhanced participation in the VOS Scheme in the Arctic (**Appendix K**). The paper was submitted to the first session of the International Maritime Organization's Sub-Committee on Navigation, Communications and Search and Rescue (NCSR) held from 30 June to 4 July 2014 at the IMO Headquarters in London.

8.2.1.4.4 The VOSP Chair made an intervention at this NCSR Sub Committee meeting supporting the submission. An extract from the Sub-Committee's report is at **Appendix L**. She pointed out that the Arctic was only one of several areas in the world where data was not forthcoming, and suggested that WMO should submit a paper providing information on areas where it seeks IMO members assistance with increasing participation in the WMO VOS Scheme. The Panel therefore requested the WMO Secretariat in liaison with the VOSP Chair and members to prepare a paper to the IMO concerning the need to increase VOS data coverage, and to consider how best to pursue this matter (**action; WMO Secretariat; Oct. 2015**).

8.2.1.4.5 The Panel noted with appreciation that the NCSR Sub-Committee invited Member States to consider increased participation in the VOS Scheme, in particular, those with vessels which sail in Arctic waters.

8.2.1.4.6 At the last session it had been hoped that data coverage could be enhanced in data sparse areas by means of VOS Drifter donation programme. It was recalled that WMO Secretary General had written (on 8 February 2013) to all WMO Permanent Representatives formally inviting developing countries to consider whether they could initiate a local VOS programme by participating in the VOS-DP. Unfortunately, to date, no drifters had been donated. Similarly it had been hoped that the Ancillary Pilot Project would have helped to increase data coverage, but very few ships were actively participating.

Appendices: 12

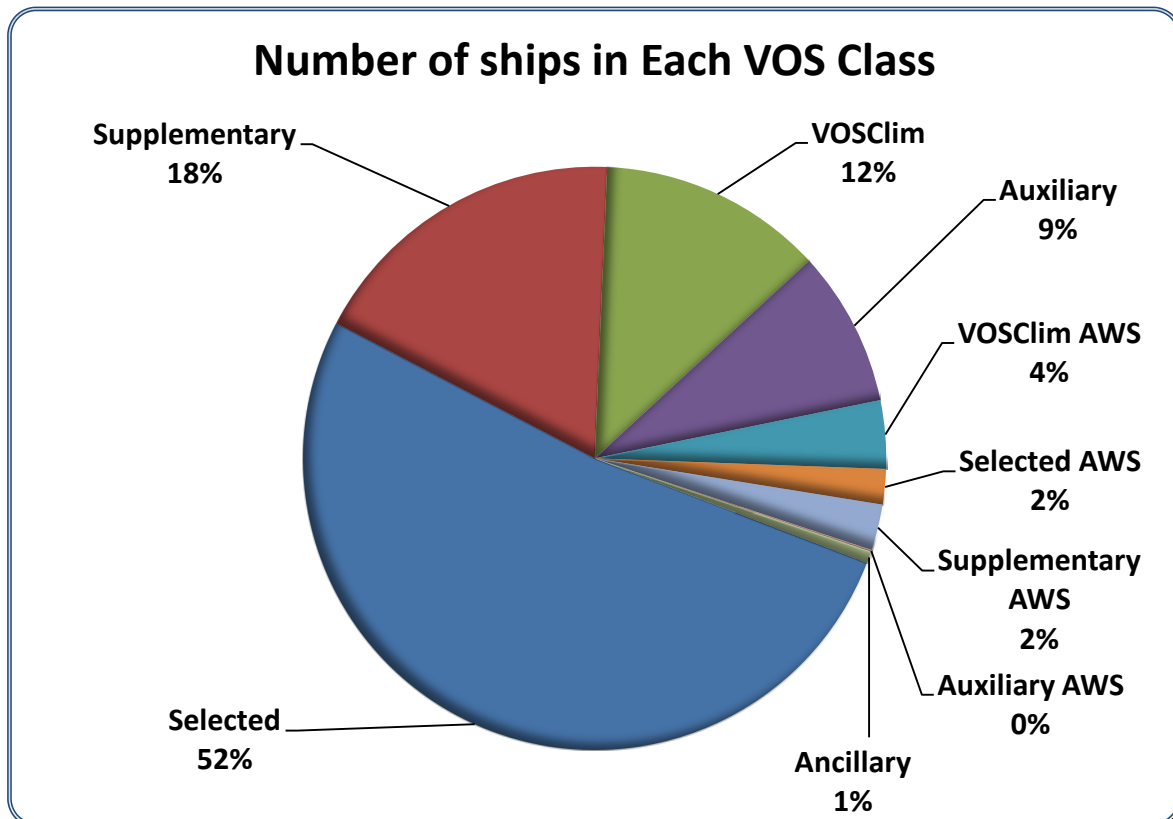
APPENDIX A

VOS CLASSES - CHANGES SINCE SOT-7

VOS Class	SOT-7	SOT-8
Selected	1,979	1589
Supplementary	627	552
VOSclim	305	382
Auxiliary	191	265
VOSclim AWS	109	116
Selected AWS	68	60
Supplementary AWS	57	78
Auxiliary AWS	0	3
TOTALS VOS Classes	3,336	3045

Note - The above figures exclude 20 additional ships recruited to the Ancillary Pilot Project ships at SOT 8

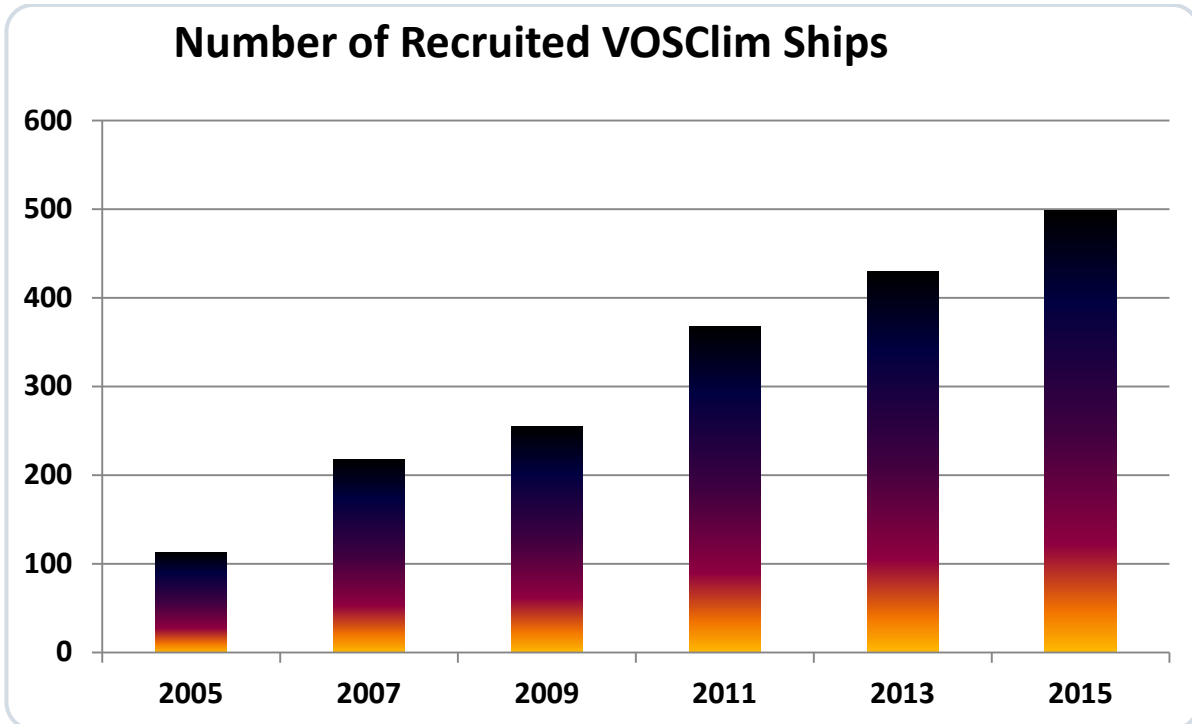
COMPOSITION OF INTERNATIONAL VOS CLASSES
(PERCENTAGES)



APPENDIX B

GROWTH OF THE VOS CLIMATE FLEET OVER LAST DECADE

Country	Number of VOSClm ships at SOT 3	Number of VOSClm ships at SOT 4	Number of VOSClm ships at SOT 5	Number of VOSClm ships at SOT 6	Number of VOSClm ships at SOT 7	Number of VOSClm ships at SOT 8 <i>(figures from E-SURFMAR database March 2015)</i>	
						Manual	AWS
Australia	10	12	10	9	7	5	0
Canada	14	40	47	55	50	0	54
Eumetnet	0	0	0	0	0	0	2
France	6	23	25	45	51	0	50
Germany	11	22	32	53	63	80	2
Hong Kong	0	0	0	0	0	8	0
India	21	22	22	22	22	0	0
Indonesia	0	0	0	0	0	0	1
Japan	5	5	5	5	2	0	2
Netherlands	1	19	37	48	64	86	0
New Zealand	0	1	1	1	3	1	0
UK	33	62	59	113	167	197	1
USA	[12]	[12]	[17]	[17]	1	5	4
TOTALS	113	218	255	368	430	498	



NOTE – figures in square brackets are US ships that were originally reported as VOSClm recruits but were unable to record the required delayed mode IMMT VOSClm elements.

APPENDIX C

**REAL TIME OBSERVATIONS
FROM VOS OPERATING COUNTRIES IN 2014**

EXTRACT FROM E-SURFMAR OBSERVATION COUNTERS

WORLD ships from 2014-01-01 to 2014-12-31	World Ocean			EUCOS Area						
	Country	Total	Manned	Pressure	Total	Manned	Pressure	Main synop.	Intermediate	Hourly
	13547	9546	13378	5528	2003	5517	2267	733	2528	0
Ancillary ships (ZZ)	2411	1748	2386	1470	846	1446	628	225	617	0
Australia	45651	10816	45613	22	22	22	13	5	4	0
Canada	671180	16492	630424	315365	16049	314635	55076	51567	208722	0
Chile	435	435	433	37	37	37	37	0	0	0
France	216748	11513	211686	151992	8811	148274	24304	25806	101875	7
Germany	247402	117481	246786	166965	39097	166542	45561	26490	94914	0
Greece	211	211	211	211	211	211	43	7	161	0
Hong Kong, China	15578	9999	15540	230	228	229	219	1	10	0
Iceland	934	934	929	933	933	928	500	433	0	0
India	377	377	357	3	3	3	3	0	0	0
Ireland	307	307	307	307	307	307	33	164	110	0
Israel	806	806	802	437	437	435	416	5	16	0
Japan	12621	6432	12553	125	125	124	94	0	28	3
Malaysia	618	618	610	0		0	0	0	0	0
Netherlands	30208	30054	30131	14148	14102	14123	9086	2044	3018	0
New Zealand	16433	3477	16133	0		0	0	0	0	0
Norway	33029	636	32874	25606	636	25451	4250	4274	17082	0
Republic of Korea	20	20	20	0		0	0	0	0	0
Russian Federation	12255	12253	12007	5113	5113	5025	5097	0	16	0
South Africa	70	70	70	0		0	0	0	0	0
Spain	3884	0	3884	3865	0	3865	639	649	2577	0
Surfmar	144686	771	138372	130919	764	124999	21449	21895	87575	0
Sweden	22281	7397	22083	18042	3602	17861	5501	3052	9489	0
United Kingdom	335631	82416	328374	261324	32885	254277	52080	43606	165618	20
United States of America	417499	277137	407556	82506	69992	81165	32376	12335	36666	1129
Total	2244822	27 %	2173519	1185148	17 %	1165476	259672	193291	731026	1159

NOTE – Figures for Canada derived from the E-SURFMAR Observation Counters are known to be incorrect due to an interruption of data between May and June when NOAA stopped the transmission of unmasked data from Environment Canada, and due to known errors in the E-SURFMAR observation counters- See Appendix C1 for estimated revised figures

APPENDIX C1

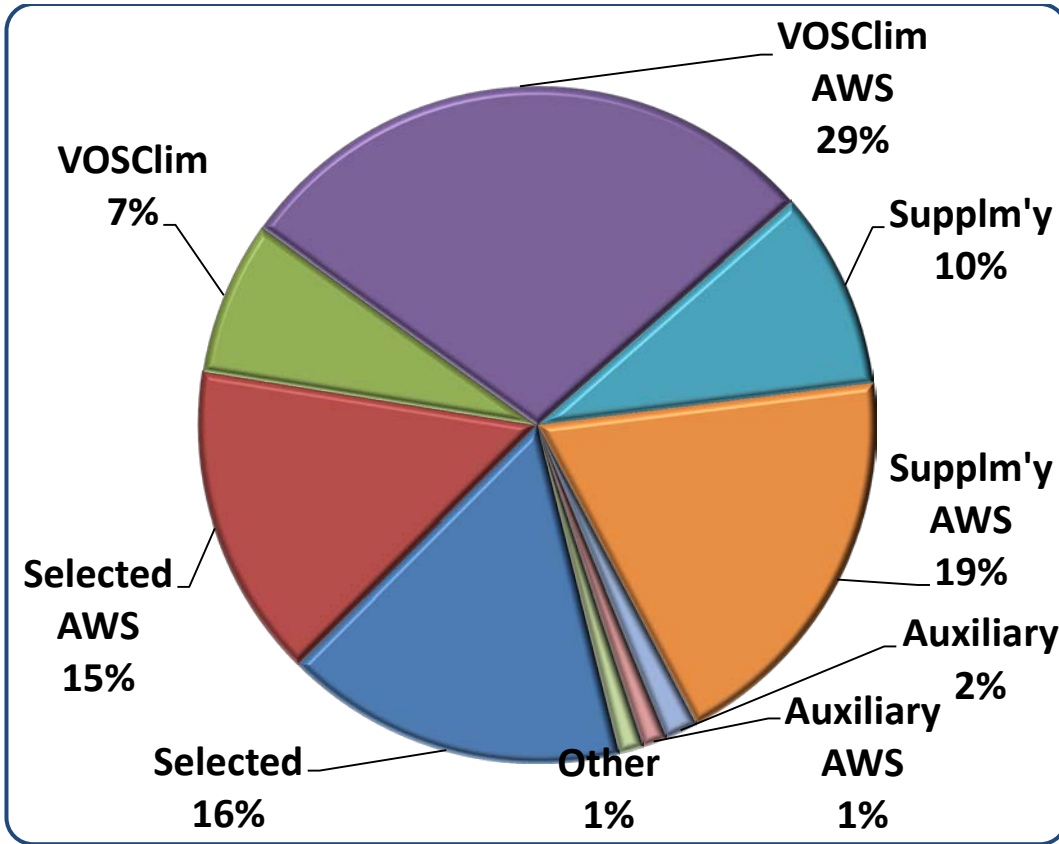
REVISED NUMBERS OF REAL TIME OBSERVATIONS FROM VOS OPERATING COUNTRIES
IN 2014

vssIM	10	15	30	35	40	45	70	75	OT	TOTALS
	Selected	Selected AWS	VOSclim	VOSclim AWS	Supplm'y	Supplm'y AWS	Auxiliary	Auxiliary AWS	Other	
AU	8738	34864	1282	0	0	0	214	0	0	45098
BR	302	0	0	0	216	0	0	0	0	518
CA	0	0	0	307400	0	1	0	0	12600	320000
CL	0	0	0	0	0	0	433	0	0	433
DE	74638	123043	31371	15291	0	0	621	0	0	244964
ES	3908	0	0	0	0	0	0	0	0	3908
EU	0	39549	0	9889	0	89350	0	0	0	138788
FR	7205	34501	0	174347	0	0	0	0	0	216053
GB	11473	0	70167	7930	0	236722	0	0	0	326292
GR	213	0	0	0	0	0	0	0	0	213
HK	6464	0	2637	0	13	5571	0	0	0	14685
IE	309	0	0	0	0	0	0	0	0	309
IL	807	0	0	0	0	0	0	0	0	807
IN	95	0	0	0	276	0	0	0	0	371
IS	932	0	0	0	0	0	0	0	0	932
JP	3289	0	0	9257	50	0	0	0	23	12619
KR	21	0	0	0	0	0	0	0	0	21
MY	798	0	0	0	0	0	0	0	0	798
NL	6141	0	26137	0	0	0	0	0	0	32278
NO	28155	4820	0	0	0	0	0	0	0	32975
NZ	3516	12670	21	0	0	0	0	0	0	16207
RU	11640	0	0	0	0	0	0	0	0	11640
SE	16367	5038	0	0	0	721	0	0	0	22126
US	115705	21844	3516	1871	173579	19976	28252	21205	35690	421638
ZA	70	0	0	0	0	0	0	0	0	70
ZY	0	0	0	0	0	0	0	0	15016	15016
ZZ	0	0	0	0	0	0	0	0	1941	1941
Total	300786	276329	135131	525985	174134	352341	29520	21205	65270	1880700

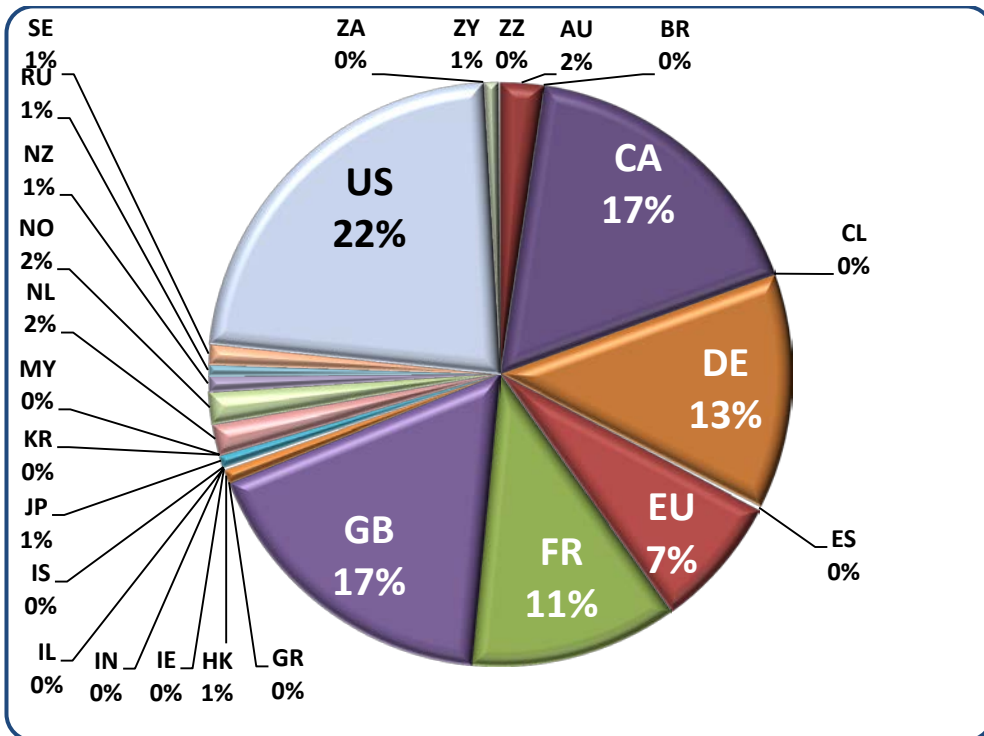
NOTE – Figures for Canada have been estimated due to an interruption of data between May and June when NOAA stopped the transmission of unmasked data from Environment Canada, and due to known counting errors in the E-SURFMAR observation counters.

APPENDIX C2

PERCENTAGES OF OBSERVATIONS RECEIVED FROM EACH VOS CLASS



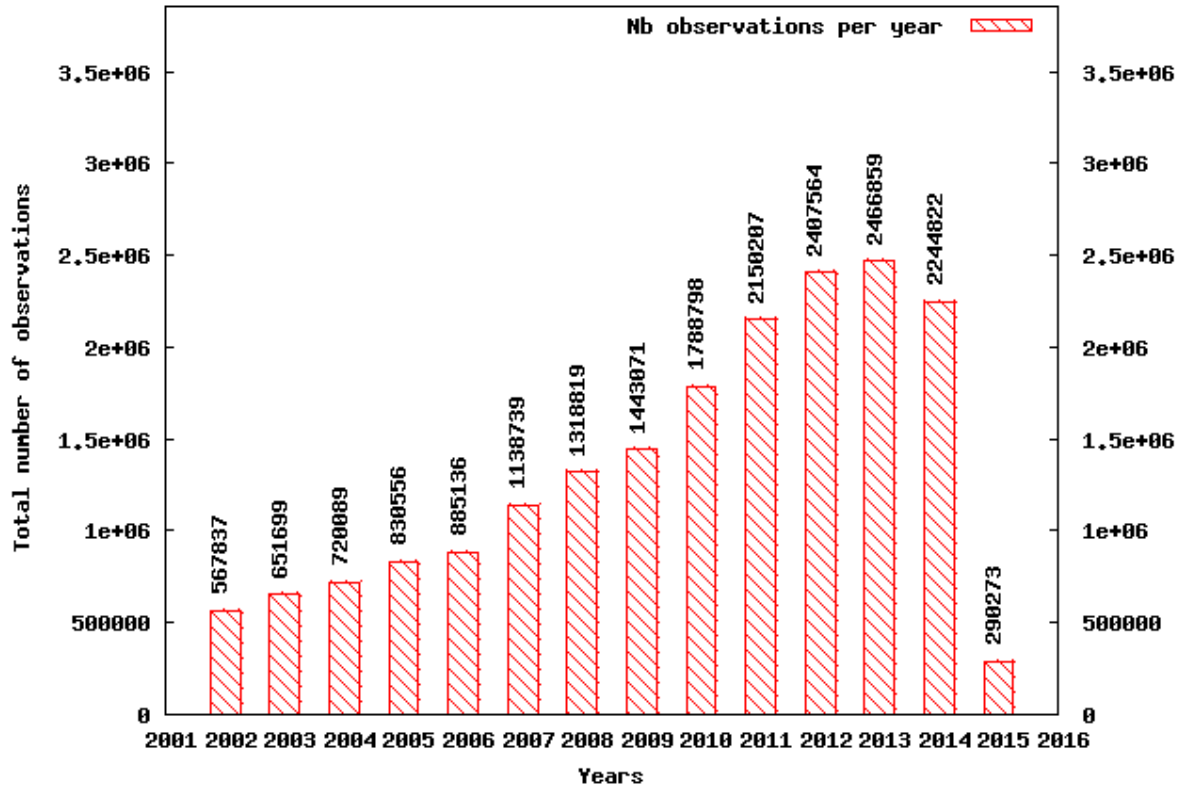
PERCENTAGE OBSERVATIONS FROM NATIONAL VOS OPERATORS



APPENDIX C3

OBSERVATION TRENDS 2002 – 2015 (MARCH)
(FROM E-SURFMAR OBSERVATIONS COUNTERS)

World Ocean Data : WORLD ships
Evolution of number of obs from 2002-01-01 to 2015-4-30
(Produced by Météo France for E-SURFMAR)



NOTE - The above graph may be slightly incorrect. A revision of the scripts that compute the numbers of observations is planned.

APPENDIX D

STATUS OF GLOBAL VOS PARTICIPATION – 2012 TO 2014

Numbers of ships reported by VOS operators

Recruiting Country	Number of VOS reported in 2012 SOT report	Number of VOS reported in 2013 SOT report	Number of VOS reported in 2014 SOT report (March 2015)	Number of VOS listed as Active in E-SURFMAR database (March 2015)	Number of VOS that real time obs were received from in 2014 (from E-SURFMAR Obs Counters)
AR				0	0
AU	75	72	63	62	63
BR	12		85	0	0
CA	52	53	54	58	56
CD		0		0	0
CL	7	8		2	1
CN	67		117	0	0
DE	753	656	601	592	596
EC			2	1	0
ES	1			1	1
EU	26	28	28	31	32
FR	65	63	63	62	62
GB	321	314	292	312	280
GM	0			0	0
GR	7	5	6	6	3
HK	54	56	51	60	53
HR	2*	2*		30	0
ID		10		1	0
IE	10		10	10	3
IL				20	4
IN	138			50	13
IS				6	3
IT	6*	8*	9*	0	0
JP	526	533	530	530	[64]
KR	33	28		33	1
MY	90	90		17	10
NL	102	102	98	95	89
NO				5	5
NZ	32	31	23	34	24
PL				38	0
PT		1*		0	0
RU	148	142		149	67
SE	24	20	20	30	21
SG	20		20	1	0
TH	0			0	0
US	899	1205	831	824	915
ZA	19		15	5	1

* Includes E-SURFMAR BAROS systems

** Only includes BBXX in quadrants 3 and 5

APPENDIX E

STATUS OF GLOBAL VOS PARTICIPATION - 2014

Numbers of observations reported by VOS

Recruiting Country	Number of GTS obs in 2012 SOT report	Number of GTS obs in 2013 SOT report	Number of GTS obs in 2014 SOT report (@ 31 March 2015)	Number of real time observations in 2014 (from E-SURFMAR obs counters)	Percentage of Manned observations (from E-SURFMAR obs counters)
AR				0	-
AU	59099	50330	46754	45651	24
BR	230		1308	0	-
CA	304974	318152	354139	671180*	2
CD		0		-	-
CL	620	702		435	100
CN	0		0	0	-
DE	273657	251726	272553	247402	47
EC			2	0	-
ES	-			3884	0
EU	113685	139996	138740	144686	1
FR	219195	220607	224383	216748	5
GB	333388	312644	350837	335631	25
GM	0			0	0
GR	343	206	211	211	100
HK	4082	6122	10106	15578	64
HR	-	Not provided		0	-
ID		Not provided		0	-
IE	960		860	307	100
IL				806	100
IN	48368			377	100
IS				934	100
IT	-	-	-	-	-
JP	34058	46176	43827	[12621]	[51]
KR	132	75		0	-
MY	Not provided	14374		618	100
NL	44026	36545	30208	30208	99
NO				33029	2
NZ	17965**	17980	17808	16433	21
PL				0	-
PT		3141*		-	-
RU	12452	9362		12255	100
SE	[7189]	7189	22362	22281	33
SG	Not provided		Not provided	0	-
TH	0			0	-
US	457534	447040	427961	417499	66
ZA	55600		43533	70	100

* Includes E-SURFMAR BAROS systems

** Only includes BBXX in quadrants 3 and 5

* NOTE – Figures for Canada generated by the E-SURFMAR observation counters are known to be incorrect

APPENDIX F**SOT KEY PERFORMANCE INDICATORS****KPIs Established for VOS and VOSClm ships at SOT-7***Actions set at SOT-7*

76	7.2.2.3	To continue to measure the existing KPI for 25% of the global active VOS to be upgraded to VOSClm class until SOT-8	VOSClm FP & RTMC
77	7.2.2.4	In view of the decisions taken at this session to tighten the VOSClm monitoring criteria the Panel agreed that the KPI for less than 3% of VOSClm class ships being flagged on the suspect list for air pressure	RTMC
76	7.2.2.3	To continue to measure the existing KPI for 25% of the global active VOS to be upgraded to VOSClm class until SOT-8	VOSClm FP & RTMC
77	7.2.2.4	In view of the decisions taken at this session to tighten the VOSClm monitoring criteria the Panel agreed that the KPI for less than 3% of VOSClm class ships being flagged on the suspect list for air	RTMC
92	7.2.8(i)	To introduce a new KPI target should be introduced to aim for least 25% of the active international VOS Fleet registered on the E-SURFMAR metadata database being recorded as VOSClm Class by SOT-8	VOS Operators

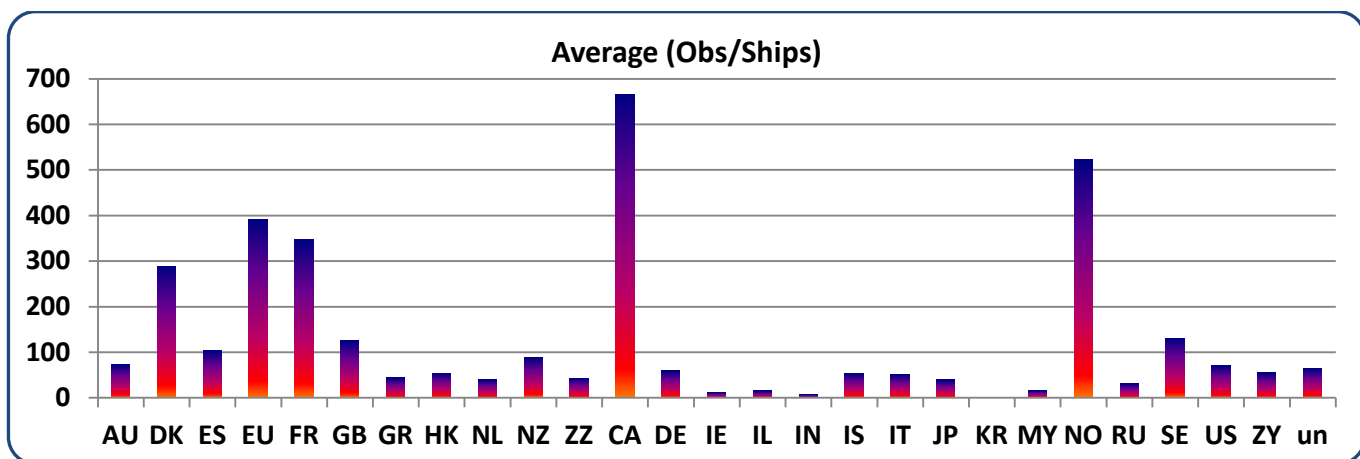
KPIs Established for VOS and VOSClm ships in the SOT IMPLEMENTATION STRATEGY

KPI	Definition	Type
1	Percentage of VOSClm ships in the global active VOS ¹	Quantity
2	Percentage of VOS ships to meet the reporting criteria of an 'Active ship' by providing an average of 20 Observations per month	Quantity
3	Percentage of VOSClm class ships per month being flagged on the Suspect List for Air Pressure	Quality
4	Percentage of VOSClm class observations to be received within 120 minutes	Timeliness

¹ The global active VOS is defined as the number of VOS registered in the Pub47 and reporting at least once per month – Today there are about 2000 such ships.

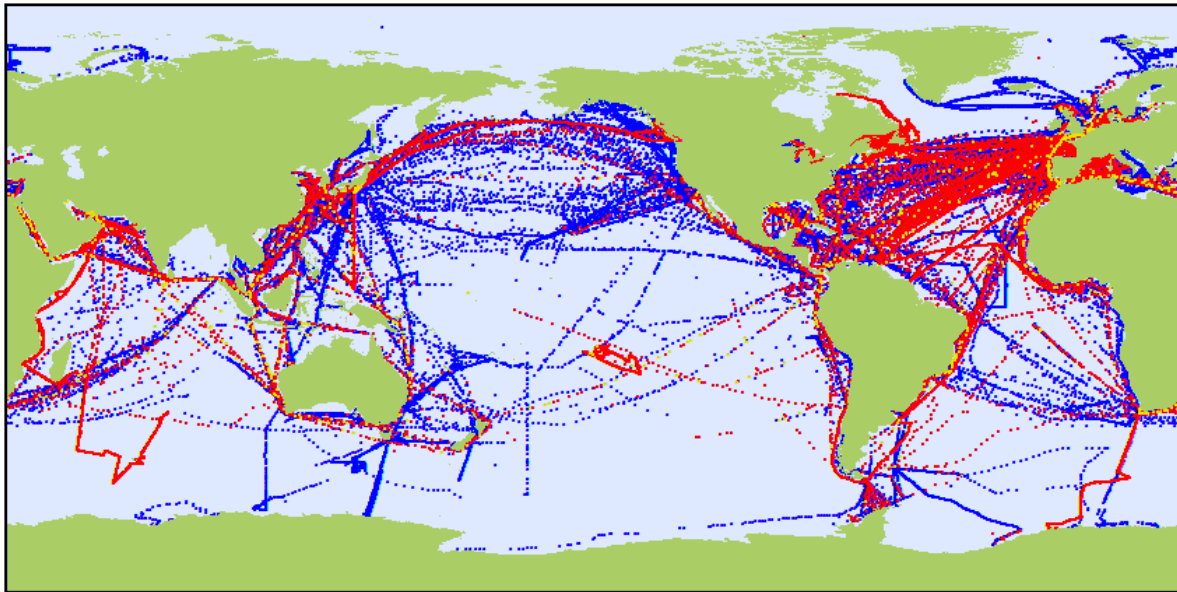
APPENDIX G
Time of receipt for VOSclim Observations – January 2015

COUNTRY	Ships	Obs	Average (Obs/Ship)	N<30 mins	N<60 mins	N<120 mins	N>360 mins	%<30 mins	%<60 mins	%<120 mins	%>360 mins	Average (R-O) (mins)
AU	39	2847	73	1859	2627	2728	59	65%	92%	96%	2%	30.8
DK	2	578	289	578	578	578	0	100%	100%	100%	0%	3.2
ES	1	104	104	92	95	98	4	88%	91%	94%	4%	40.4
EU	21	8210	391	8208	8208	8208	2	100%	100%	100%	0%	13
FR	48	16676	347.4	16253	16475	16626	6	97%	99%	100%	0%	4.7
GB	240	30038	125.2	25712	28096	29148	325	86%	94%	97%	1%	53.5
GR	1	44	44	43	44	44	0	98%	100%	100%	0%	14.7
HK	42	2283	54.4	13	1715	2259	5	1%	75%	99%	0%	34.9
NL	72	2907	40.4	2075	2486	2702	97	71%	86%	93%	3%	59.5
NZ	19	1695	89.2	405	1641	1689	1	24%	97%	100%	0%	34.5
ZZ	9	390	43.3	231	280	325	22	59%	72%	83%	6%	85.1
CA	48	31939	665.4	31267	31909	31918	19	98%	100%	100%	0%	12.8
DE	341	20377	59.8	13387	15798	17337	645	66%	78%	85%	3%	119.8
IE	2	24	12	20	23	23	0	83%	96%	96%	0%	22.3
IL	4	60	15	59	59	59	1	98%	98%	98%	2%	23.2
IN	1	8	8	2	3	4	0	25%	38%	50%	0%	100.1
IS	2	108	54	101	103	106	0	94%	95%	98%	0%	3.6
IT	1	51	51	27	48	48	1	53%	94%	94%	2%	37.2
JP	26	1021	39.3	844	966	989	14	83%	95%	97%	1%	50.4
KR	2	2	1	0	0	0	0	0%	0%	0%	0%	231
MY	4	64	16	0	59	62	0	0%	92%	97%	0%	61.4
NO	4	2088	522	2079	2081	2086	1	100%	100%	100%	0%	11.4
RU	23	722	31.4	390	625	648	47	54%	87%	90%	7%	69
SE	17	2231	131.2	593	2154	2187	23	27%	97%	98%	1%	43.9
US	465	32508	69.9	22118	27512	29346	1199	68%	85%	90%	4%	49.8
ZY	15	822	54.8	177	701	746	29	22%	85%	91%	4%	72.8
XX	1	28053	28053	26215	27325	27785	170	93%	97%	99%	1%	18.7
un	105	6721	64	4814	6136	6442	114	72%	91%	96%	2%	24.6
Total	1555	192571	123.8	157562	177747	184191	2784	82%	92%	96%	1%	39.9



APPENDIX H

JCOMMOPS VOS-VOSCLIM MAP January 2015



Ship Observations Team

VOS - VOSCLIM

January 2015



(Active platform-IDs / number of observations in period)

• VOS (1447 / 156833) • VOSCLIM (399 / 60680) • VOSCLIM > 120' (175 / 1009)

Percentage of VOSCLIM ships in global active VOS: 28%. Target: >25%

VOS ships with at least 20 observations: 908 / 63%. Target: 100%

VOSCLIM observations on the GTS within 120 min.: 59671 / 98%. Target: >95%



APPENDIX I

List of ships that operated in Antarctica during the 2014/15 season, with call signs and names

List of ships that operated in Antarctica during the 2014/15 season, with call signs and names.

The SCAR and WMO request that all ships operating in Antarctic waters should make meteorological observations and report them on the GTS.

The following ships, which entered Antarctic waters in 2014/2015, made meteorological reports, they may have reported from outside Antarctic waters after the date given here. For most ships the season begins in November or December and ends in March. Country is the country of registration, VOS is the country of recruitment. Monitoring is manual and may miss some ships. From November 1, WMO formally abolished the use of text in synoptic messages and as a result messages from some ships disappeared from general view; most messages do however seem to have been restored.

Call sign	Name	Country	VOS	Arrive	Depart	Latest obs	
9HJD9	Celebrity Infinity (Tourist)	USA	US	2015 February		2015 February	
C6JC3	Bremen (Tourist)	Germany	DF	2014 December		2015 February	2
C6WR2	National Geographic Explorer (Tourist)	Bahamas	UK	2014 November	2015 February	2015 February	2
C6YZ5	Seabourn Quest (Tourist)	Bahamas	US	2014 December		2015 February	
CCAQ	Aguiles (Supply)	Chile		2015 January		2015 January	
DBLK	RV Polarstern (Research)	Germany	DE	2014 December	2015 January	2015 February	
FIIZI	L'Astrolabe (Supply)	France	AU	2014 October	2015 March	2015 March	
FHIV	Le Soleal (Tourist)	W & F	ZZ	2014 December		2015 March	
OXGN2	Mary Arica (Containership)	Denmark		2015 January	2015 February	2015 February	
PBGH	Prinsendam (Tourist)	Netherlands	US	2015 February	2015 February	2015 February	
PBQK	Plancius (Tourist)	Netherlands	NL	2014 November		2015 March	2
PDAN	Zaandam (Tourist)	Netherlands	US	2015 January	2015 January	2015 March	
PDZS	Europa (Ice strengthened tall ship)	Netherlands	FR	2014 November	2015 February	2015 March	2
PWAR	Ary Rongel (Navy ice breaker)	Brazil		2014 October	2015 March	2015 March	
PWPM	Almirante Maximiano (Navy ice breaker)	Brazil		2014 November		2015 March	5
UCKZ	Akademik Fedorov (Research)	Russia	RU	2014 December	2015 March	2015 March	
VNAA	RV Aurora Australis (Supply)	Australia	AU	2014 November		2015 March	
WBP3210	Nathaniel B Palmer (Oceanographic)	USA	US	2014 August	2015 March	2015 March	
WCX7445	Laurence M Gould (Oceanographic)	USA	US	2014 June		2015 February	
WIKM	Maersk Peary (Oil Tanker)	USA	US	2015 January	2015 February	2015 February	
ZDLP	RRS James Clark Ross (Research)	UK	UK	2014 November	2015 March	2015 March	
ZDLS1	RRS Ernest Shackleton (Supply)	UK	UK	2014 December		2015 March	
ZSNO	SA Agulhas II (Supply)	South Africa		2014 December	2015 February	2015 March	

Notes:

1. No Antarctic Tx since November
2. Observations intermittent
3. Only one SYNOP from Antarctica
4. Reports via Yotreps
5. No reports in March

The following ships and yachts are known or suspected to have visited Antarctic waters in 2014/2015, but no synoptic reports were received whilst south of 60° (most records are via Palmer AIS). Some have position only reports from Antarctica on the sailwx website :

Call sign	Name	Country	VOS	Arrive/Present	Present/Depart	Comment
SKMK	20 de Julio (Military Ops)	Colombia		2015 January	2015 February	
SVBR5	Bob Barker (NGO)	Netherlands		2015 February		News report
UAUN	Akademik Ioffe (Tourist)	Russia		2014 November	2015 March	
UAUO	Akademik S Vavilov (Tourist)	Russia		2014 December	2015 March	
PEAR	Anne Margaretha (Yacht)	Netherlands		2015 January	2015 March	
LAWR	Antarctic Sea (Fishing)	Norway		2015 February		AIS position only
SGBF	Arianna (Yacht)	Sweden		2015 January		
ESU2905	Australis (Yacht)	Cook Is		2015 January	2015 March	
9HOB8	Azamara Journey (Passenger)	Malta		2015 January		
LOCB	Canal Beagle	Argentina		2015 January	2015 March	AIS position only
9HUT9	Corinthian (Tourist)	Malta		2014 December	2015 February	
I.2FF	Dr Bernardo Houssay (Yacht)	Argentina		2015 January		
ZCGI.9	Drumbeat (Yacht)	Cayman Is		2015 January	2015 February	
ARQL4	Expedition (Tourist)	Liberia		2014 November	2015 March	
2EHX6	Fidelis (Yacht)	UK		2015 January		
LADA7	Fram (Tourist)	Norway		2014 November	2015 February	AIS position only
V2E14	Hanse Explorer (Tourist)	Antigua		2014 December	2015 January	
C6KA9	Hanseatic (Tourist)	Bahamas		2014 November	2015 February	
ZMFS	HMNZS Wellington	New Zealand		2015 January		News report

GXRK	HMS Protector (Hydrographic)	UK	UK	2014 November	2015 March	AIS position only
VJT6066	Howard Burton (Pleasure Craft)	Australia		2015 January		AAID AIS
SPG3305	Isfuglen (Yacht)	Poland		2015 January		
VLMJ	Investigator	Australia		2015 February		AIS 116 position
2CLQ7	Katharsis II (Yacht)	UK		2015 January	2015 February	AIS 116 position
	Kunlun (Fishing)	Eq Guinea		2015 January	2015 February	News report
YJV17	I.a Manche (Supply)	Vanuatu		2015 January		AIS position only
FLSY	Le Boreal (Tourist)	W & F	ZZ	2014 December	2015 February	
HBV4333	Libellule (Yacht)	Switzerland		2015 January		
UYDV	More Sodruzhestva (Fishing)	Ukraine		2015 February		
C6TE3	National Geographic Orion (Tourist)	Bahamas		2015 January	2015 February	
C6ZR5	Ocean Diamond (Tourist)	Bahamas		2014 December	2015 March	
C6US3	Ocean Nova (Tourist)	Bahamas		2014 November	2015 February	
5BMC3	Ortelius (Tourist)	Cyprus		2015 January	2015 March	
CCOV	Oscar Viel (Supply)	Chile		2014 November	2015 March	
VJT6295	Pagodroma (Yacht)	Australia		2015 February		AIS 699 position
UBST	Polar Pioneer (Tourist)	Russia		2014 November	2015 March	
NBTM	Polar Star (Icebreaker)	USA		2015 January		AIS position only in SH
12AI:	Prefecto Derbes (Coastguard)	Argentina		2015 January		
ZGC14	Pumula (Yacht)	Cayman Is		2015 January		
FGE6996	Safari (Yacht)	France		2015 January	2015 February	
LNSK	Saga Sea (Trawler)	Norway		2015 January	2015 February	Fishing off South Orkneys AIS
VJN4108	Sam Simon (NGO)	Australia		2015 February		News report
DPRL	Sarah W Vorwerk (Yacht)	Germany		2015 January	2015 February	
L2EE	SB 15 Tango (Tug)	Argentina		2015 February		
C6PG6	Sea Adventurer (Tourist)	Bahamas		2014 November	2015 February	
C6BG2	Sea Explorer I (Tourist)	Bahamas		2014 December	2015 February	
V7W18	Sea Explorer I (Tourist)	Marshall Is		2014 November	2014 December	Presumably re-registered
C6PJ8	Sea Spirit (Tourist)	Bahamas		2014 November	2015 March	
C6TA8	Silver Explorer (Tourist)	Bahamas		2014 November	2015 March	
URBX	Simeiz (Fishing)	Ukraine		2015 March		
	Songhua (Fishing)	Eq Guinea		2015 January		News report
EBBW	SPS RV Hesperides (Research)	Spain		2014 December	2015 February	AIS position only
LOCS	Suboficial Castillo (SAR)	Argentina		2015 January	2015 February	
	Thunder (Fishing)	Nigeria		2015 January		News report
V7GFS	Triton (Yacht)	Marshall Is		2015 February		
D6FH2	Ushuaia (Tourist)	Comoros		2014 November	2015 March	
OS8477	Vaihere (Yacht)	Belgium		2014 December	2015 February	
UGWJ	Vasilij Golovnin (Tanker)	Russia		2015 January	2015 March	AIS 775 position only
BNSK	Xue Long (Supply)	China		2014 November	2015 March	AIS position only
	Yongding (Fishing)	Eq Guinea		2015 January	2015 February	News report

The following launches are known to have been in Antarctic waters in 2014/2015, (records are via Palmer AIS). Launches are not expected to make meteorological observations :

Call sign	Name	Country	Arrive/Present	Present/Depart	Parent ship
21N17	James Caird IV (Survey Boat)	UK	2015 January		HMS Protector
2FZX4	MIB1	UK	2014 November		HMS Protector
578000501	LB9	W & F	2015 January	2015 February	Le Boreal
982589326	Anneli Tender 6	Norway	2015 February		Fram
983110032	Zodiac 7	Bahamas	2014 December		Seabourn Quest
983110034	Zodiac 8	Bahamas	2014 December		Seabourn Quest
983110036	Zodiac 4	Bahamas	2014 December		Seabourn Quest
983110038	Zodiac 10	Bahamas	2014 December		Seabourn Quest
983110039	Zodiac 5	Bahamas	2014 December		Seabourn Quest
983110040	Zodiac 1	Bahamas	2014 December		Seabourn Quest
983110041	Zodiac 3	Bahamas	2014 December		Seabourn Quest
985780001	LS AXE01	W & F	2014 December		Le Boreal
985780002	LS AXE02	W & F	2015 January		Le Boreal
985780003	LS AXE03	W & F	2015 January	2015 March	Le Boreal
985780004	LS AXE04	W & F	2014 December	2015 January	Le Boreal
985780005	LS AXE05	W & F	2015 January		Le Boreal
985780006	LS AXE06	W & F	2014 December	2015 March	Le Boreal
985780008	LS AXE08	W & F	2014 December	2015 January	Le Boreal
985780009	LS AXE09	W & F	2015 January		Le Boreal
985780010	LS AXE10	W & F	2015 January		Le Boreal
985780013	Zodiac 2	W & F	2015 January	2015 February	Le Boreal
985780014	AXE 3	W & F	2015 January	2015 February	Le Boreal
985780015	AXE 4	W & F	2015 January	2015 February	Le Boreal
985780016	AXE 5	W & F	2015 January		Le Boreal
985780017	AXE 6	W & F	2015 February		Le Boreal
985780018	AXE 7	W & F	2015 January	2015 February	Le Boreal
985780019	AXE 8	W & F	2015 January		Le Boreal
985780021	AXE 10	W & F	2015 January	2015 February	Le Boreal

985780022	AXE 11	W & F	2015 January	2015 February	Le Boreal
985780023		W & F	2015 February		Le Boreal

A list of IAATO member vessels that may visit Antarctica is at

<http://apps.iaato.org/iaato/vessel/listVessels.jsp>.

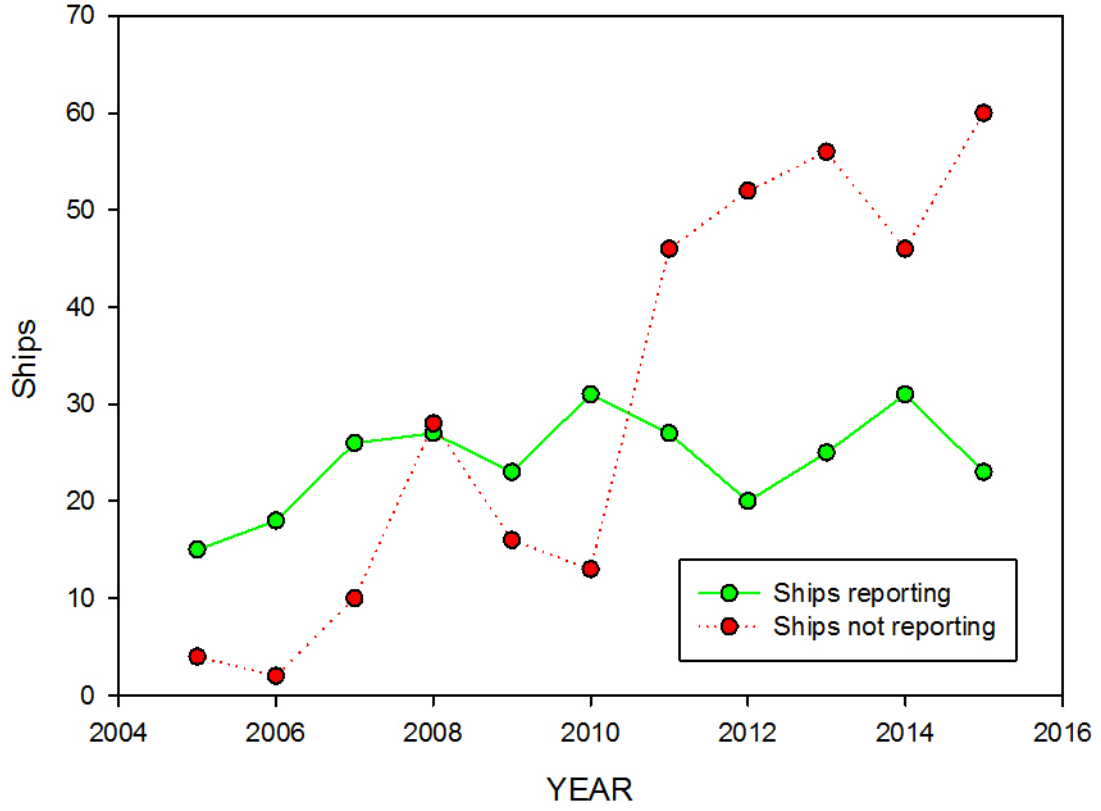
The following ships may operate in Antarctica, but are not positively known to have done so in 2014/15. The list has not been updated with VOS status. The latest report is either the date of any noted on the GTS or the last time the ship was known to be in Antarctic waters, but may not be definitive as this section is updated on an ad-hoc basis:

Call sign	Name	Country	Last Antarctic report	Last in Ant.	Latest obs/Comment
KS085	[Seakeepers AWS]	USA	2010 December	2011 January	2011 January
KS094	[Seakeepers AWS]	USA	2010 December	2011 January	2011 January
	Ady Gil (NGO)	New Zealand	2010 January		Sank after collision
ZSAF	Agulhas (Expedition)	South Africa	2013 January	2013 February	2014 April
UBNF	Akademik Shokalskiy	Russia	2013 December	2014 January	2013 December (6)
UBXH3	Akademik Tryoshnikov (Research)	Russia	2014 March	2014 April	2014 April
PBAD	Amsterdam (Tourist)	Netherlands	2012 February	2012 February	2013 January
HQXJ2	Antarctic_Dream (Tourist)	Honduras	2011 November	2012 March	
DSQL7	Araon (Research)	Korea	2013 April	2013 May	2014 November
C6MA9	Arctic P (Yacht)	Bahamas	2013 January		
V7WR4	Asteria (Pleasure)	Marshall Is	2013 December	2014 March	
CCLA	ATF Lautaro (Supply)	Chile	2013 December	2014 January	
PCVX	Atlasgracht (Cargo)	Netherlands	2010 March		
9HOM8	Azamara Quest (Tourist)	Malta	2013 January		Reporting in February
CBTZ	Betanzos (Fishing)	Chile	2013 December		
V7UH7	Big Fish (Pleasure)		2011 January		
	Braveheart	New Zealand	IAATO 14/15		
UBRF9	Chiyo Maru 3 (Trawler)	Russia	2011 December		Nearby UAGL
C6MY5	Crystal Symphony	Bahamas	2013 December		
MKCG8	Dana Felicia (Yacht)	UK	2013 December	2014 January	2014 January (1)
SIGF	Dawnbreaker (Sailing Yacht)	Sweden	2012 January		
C6ZV6	Delphin (Tourist)	Bahamas	2013 January	2013 February	IAATO 14/15
ZCTD	Deniki (Pleasure yacht)	Cayman Is	2011 December	2012 January	
DMMC	Deutschland (Tourist)	Germany	2010 February		
2ATM7	Elinca (Yacht)	UK	2013 December	2013 December	2013 December
	Endurance of Antarctica		IAATO 13/14		
V7HZ2	Enigma XK		IAATO 14/15		
ZCDZ4	Erica XII (Sloop)	Bermuda	2013 January	2013 February	
ZR2369	Faraway (Yacht)	South Africa	2013 December	2014 January	2014 January (1)
FLES	Fleur Australe (Yacht)	France	2013 December	2013 December	2013 December
BAOC	Fu Rong Hai (Trawler)	China	2013 February		
	Gojira (NGO)		2011 January		News report
	Golden Fleece (Yacht)		2009 January	IAATO 14/15	
C6OX6	Hamburg (Tourist)	Bahamas	2012 December	2013 January	
	Hans Hansson		IAATO 14/15		
2CEK7	Happy Thaurus	UK	2012 January		
	HMNZS Otago	New Zealand	2013 November	2014 January	Obs not put on GTS
GCUP	HMS Scott	UK	2011 February		
ZCYH4	Hortense (Yacht)	Cayman Is	2013 January	2013 February	
ZCRY8	Icebird (Yacht)	Cayman Is	2014 February	2014 February	IAATO 14/15
UIFC	Igarka (Cargo)	Russia	2010 January		
ZR2219	Imvubu (Yacht)	South Africa	2014 January		
V7DM2	Insignia	Marshall Is	2011 January		
FHNR	Isatis (Yacht)	New Caledonia	2010 December	2011 February (1)	2011 April (1)
	Island Sky		IAATO 13/14		
UCJE	Ivan Papanin (Container ship)	Russia	2011 November		(3)
DSBC	Joides Resolution (Research)	USA	2010 February		
UCJP	Kapitan Dranitsyn	Russia	2014 February	2014 February	2015 February
	Kotick (Yacht)		IAATO 14/15		
FLTU	L'Austral (Tourist)	W & F	2013 November	2014 February	
FZY1954	La Francoise (Yacht)	France	2011 January	2011 January (1)	
EBDG	Las Palmas (Tug)	Spain	2011 December	2012 March	
	LB-01		2014 January		
	Le Sourire (Yacht)		IAATO 14/15		
VSBL5	Licorne (Yacht)	Bermuda	2011 January		
GHJV	Lord Nelson (Yacht)	UK	2014 February	2014 March	2014 March
	Louise (Yacht)		IAATO 13/14		
WMLI	Maersk Illinois (Oil Tanker)	USA	2014 January	2014 February	2014 February
UDYN	Maksim Starostin (Trawler)	Russia	2010 March		

LFKU	Marina Cvetaeva (Passenger)	Russia	2011 January	2011 March	
WDF4078	Moana Wave (Research)	USA	2011 March		
ZC1S	My Octopus	Cayman Is	2011 February		
V7MH7	MY Suri (Yacht)	Marshall Is	2012 December	2013 January	
2FZX2	Nimrod (RIB)	UK	2013 January		From HMS Protector
JJCJ	Nisshin Maru (Whaler factory ship)	Japan	2014 January	2014 February	News report
WDG4379	Ocean Giant (Cargo)	USA	2013 February	2013 March	
SMLQ	Oden (Oceanographic)	Sweden	2010 December	2011 February	2015 February
PGNP	Oosterschelde (Tourist)	Netherlands	2014 January	2014 January	2014 January
3ERV9	Oriental Bluebird (Whaler supply ship)	Panama	2009 February ?		
MWSE2	Pakea Bizkaia (Yacht)	UK	2013 January		
	Paradise (Yacht)		IAATO 14/15		
PY2KAK	Paratii 2 (Yacht)	Brazil	2012 March	2012 April	
	Pelagic (Yacht)		IAATO 14/15		
ZJL6951	Pelagic Australis (Yacht)	Virgin Is	2013 December		IAATO 14/15
	Podorange (Yacht)		IAATO 14/15		
WSC2276	Point Sur (Dive Vessel)	USA	2013 January	2013 February	
8PPK	Polar Star (Tourist)	USA	2011 January		
UAKA	Professor Molchanov (Tourist/Research)	Russia	2010 March		
LOPD	Puerto Descado (Yacht)	Argentina	2013 February		2015 January
LW2760	Quijote (Yacht)	Argentina	2013 February		
WTEC	Ron Brown	USA	Came close in 2014	January	2015 February
MLRM6	RRS James Cook (Research)	UK	2010 December	2011 February	2015 January
WFCB	RV Melville (Research)			2013 October	
ZMFR	RV Tangaroa (Research)	New Zealand	2013 February	2013 March	2014 July
ZM2534	San Aotea II (Long-liner)	New Zealand	2014 January		Internal news
ZMGO	San Aspiring (Trawler)	New Zealand	2011 December		Rescue UAGL
	Santa Maria Australis		IAATO 14/15		
9HB2145	Scorpius	Malta	2012 March	2012 April	
LK YA	Seljoevac (Trawler)	Norway	2011 December		Stuck in pack near UAGL
	Selma Expeditions (Yacht)		2009 January	IAATO 14/15	
C6VV8	Seven Seas Mariner		2011 February		2013 January
FGF9553	Shag 2	France	2012 January		
PHDD	Sherakhan (Yacht)	Netherlands	2013 February		
JFCF	Shonan Maru #2 (Whale Research)	Japan	2014 February		
JFCF	Shonan Maru #2 (Whaler)	Japan	2013 February		News report
JFCF	Shonan Maru No 2 (Whaler)	Japan	2010 January		News report
VLHJ	Southern Surveyor			2013 July	
UAGL	Sparta (Trawler)	Russia	2011 December		Holed in Ross Sea
	Spirit of Enderby (Tourist)		IAATO 14/15		
	Spirit of Sydney (Yacht)		IAATO 14/15		
ZCDD6	Star Princess (Tourist)	UK	2010 December	2011 January	2013 January
GUMF	Steve Irwin (NGO)	Netherlands	2014 January	2014 February	News report
3F1H2	Sun Laurel (Tanker)	Panama	2013 February	2013 March	News report
FVNM	Tara [Ex Antarctica] (Research)	France	2011 January	2011 January	2014 November
ABCD1	Terra Nova (Tender)	UK	2013 December	2014 February	Boat from HMS Protector
C6RW4	The World (Passenger)	Bahamas	2010 December	2011 January	
KTDQ	Thomas G Thompson (Research)	USA	2010 February		2012 January
PHFL	TIMCA (Cargo)	Netherlands	2013 April	2013 May	
MPTU5	Uhuru (Yacht)	UK	2011 January		
JPAT	Umitaka Maru (Fisheries research)	Japan	2013 January	2013 January	2015 February
YM8176	Uzaklar II (Yacht)	Turkey	2012 February		
PHEO	Vecdam (Tourist)	Netherlands	2013 January	2013 February	
2FZX4	W1 (Launch ?)	UK	2013 January		From HMS Protector
2FZX5	W2 (Launch ?)	UK	2013 January		From HMS Protector
VIIMW	Whale Song (Research)	Australia	2014 January	2014 January	2014 August
DD2MM	Xenia II	Germany	2013 August	2013 October	2013 October (1)
	Xplore (Yacht)		IAATO 14/15		
2FZW8	Yelcho (FRC)	UK	2014 March		From HMS Protector
JPPV	Yushin Maru #2 (Whaler)	Japan	2014 January	2014 February	News report
	Yushin Maru #3 (Whaler)	Japan	2014 February		News report
JLZS	Yushin Maru (Whaler)	Japan	2014 February		News report

APPENDIX J

Ships present in Antarctic waters



APPENDIX K

SUBMISSION TO THE IMO NCSR SUB-COMMITTEE

**E**

SUB-COMMITTEE ON NAVIGATION,
COMMUNICATIONS AND SEARCH AND
RESCUE
1st session
Agenda item 27

NCSR 1/27/3
25 April 2014
Original: ENGLISH

ANY OTHER BUSINESS

Participation in the WMO Voluntary Observing Ships' Scheme

Submitted by Canada, Iceland, Norway, Sweden and the United States

SUMMARY

<i>Executive summary:</i>	This document provides information on the World Meteorological Organization (WMO) Voluntary Observing Ship (VOS) Scheme and encourages enhanced participation in the VOS Scheme in the Arctic
<i>Strategic direction:</i>	5.2
<i>High-level action:</i>	5.2.4
<i>Planned output:</i>	No related provisions
<i>Action to be taken:</i>	Paragraph 9
<i>Related document:</i>	MSC.1/Circ.1293

Background

1 The Maritime Safety Committee, at its eighty-fifth session, approved and circulated MSC.1/Circ.1293 regarding participation in the WMO VOS Scheme.¹ This circular invited Member States to take note of the information provided in MSC.1/Circ.1293 and consider increased participation in the VOS Scheme for ships in the Arctic.

2 The VOS Scheme is an international programme comprising Member States of the WMO whose ships take, record, and transmit marine meteorological and oceanographic observations while at sea.² These VOS meteorological reports provide vital real-time feedback on ocean weather conditions to weather forecasters who use the data to improve the quality of the forecasts and warnings issued through the SafetyNET Maritime Safety Information (MSI) and international NAVTEX services for mariners at sea.

¹ MSC.1/Circ.1293 is available at:
http://www.imo.org/blast/blastDataHelper.asp?data_id=24475&filename=1293.pdf.

² Additional information about the VOS Scheme can be found at:
<http://www.bom.gov.au/jcomm/vos/vos.html>.

3 One of the continuing major problems facing meteorology is the scarcity of data from vast areas of the world's oceans, including the Arctic, in support of basic weather forecasting, the provision of marine meteorological and oceanographic services and climate analysis, and research. While meteorological satellites substantially help overcome these challenges, data from more conventional platforms (in particular VOS data) will remain essential for the foreseeable future, to provide ground-truthing for satellite observations, and to provide important information that satellites cannot easily observe (notably pressure measurements).

4 VOS observations contribute to marine safety and efficiency by providing real-time reports for weather forecasting and historical data for planning and design. VOS data support a wide range of applications, including: the analysis of weather systems and storm tracking; the provision of high-quality maritime safety services; national and local weather forecasts; ground-truthing of satellite-derived data; validating coastal observations; climate research, modelling and forecasts; and gathering Arctic ice information.³ In addition, VOS data supplement other data collection methods (satellites, drifting buoys and floats, radar) and includes certain measurements not yet obtainable by other means.⁴ VOS data also support other industries and users, including: fishing, transport, coastal engineering, search and rescue (SAR), and offshore oil and gas exploration and recovery. Participation in the VOS Scheme is entirely voluntary and no charges are incurred by the ship, shipowner, or ship operator as the expense of meteorological instruments and, in most cases, of the observation transmission, are borne by a national meteorological service.

5 The Organization and the Arctic Council have given various Arctic issues, namely climate change and impacts from increased shipping, high priority. It has been recognized that *improvements in Arctic marine infrastructure are needed to enhance safety and environmental protection in support of sustainable development*.⁵ VOS reports are critical for safety-related services for ships at sea and significantly contribute to global climate studies. Accordingly, it is essential that the volume of data provided by ships recruited to the VOS Scheme be maximized and, as such, the number of ships participating in the VOS Scheme increased wherever and whenever possible.

How to join the International VOS Scheme

6 States interested in participating in the International VOS Scheme are advised to contact their National Meteorological Service (NMS), their local Port Meteorological Officers (PMO), or a VOS Panel⁶ representative to learn about the participation requirements. Ship operators interested in participating are advised to contact their NMS or a local PMO to nominate their ship for recruitment into the VOS Scheme.

7 One possible future method of VOS Scheme participation is through the Drifting Buoy Donation Program, an initiative proposed at the December 2010 International PMO conference. WMO Member States that are interested in starting a VOS programme would be assigned a United States partner as a point of contact and could receive a drifting buoy to mount on board a VOS ship. Expanding this programme was discussed at the 6th Meeting of the Ship Observing Team (SOT-VI) that took place in Hobart, Australia, 11 to 15 April 2011.⁷

³ See, The WMO Voluntary Observing Ship Programme: An Enduring Partnership, available at: http://www.bom.gov.au/jcomm/vos/documents/vos_brochure.pdf.

⁴ E.g. air temperature and dew point.

⁵ This has been recognized in Recommendation III of the 2009 Arctic Marine Shipping Assessment Report, available at: http://www.pame.is/images/stories/AMSA_2009_Report/AMSA_2009_Report_2nd_print.pdf.

⁶ Further information on the VOS panel and a directory of VOS Panel representatives is available at: [http://www.jcomm.info/index.php?option=com_oe&task=viewGroupRecord&groupID=108./](http://www.jcomm.info/index.php?option=com_oe&task=viewGroupRecord&groupID=108/)

⁷ The Final Report of this meeting is available at: http://www.bom.gov.au/jcomm/vos/documents/sot6_report.pdf.

Participation of Arctic States in VOS

8 All eight Arctic States participate in the VOS Scheme either directly by equipping ships so they can be active in the programme or indirectly by providing funding and/or data. Twenty other States have VOS programmes that support the VOS Scheme.⁸ Table 1 summarizes Arctic State contributions to the VOS Scheme for 2011.

Table 1: Arctic States' VOS Scheme Contributions⁹

	Number of Actively Participating Vessels	Number of VOS Observations per year (2011)	Number of ship reports (weekly/daily)
United States	1,000	350,000	1,750/250
Sweden ¹⁰	27	8,400	812/116
Canada ¹¹	50 (in 2011)	238,836	-
Russian Federation	Unknown	Unknown	Unknown
Norway	5	30,650	-
Finland ¹²			
Iceland ¹³	4	1,660	
Denmark/Greenland /Faroe Islands ¹⁴			
Total	4,000	1,400,000	2,500+/375+

Action requested of the Sub-Committee

9 The Sub-Committee is invited to consider the information set out in this document and to encourage increased participation in the VOS Scheme by all flag States, in particular, those with vessels which sail in Arctic waters.

⁸ The participating States are: Japan, United Kingdom, Ireland, Germany, France, Australia, Netherlands, New Zealand, Spain, Greece, Hong Kong, China, Republic of Korea, Malaysia, Poland, South Africa, Croatia, Brazil, The Gambia, Indonesia and Thailand. EUMETNET also has a programme that supports the VOS Scheme.

⁹ EUMETNET'S E-SURFMAR (the Surface Marine Observation Programme) delivers marine observations from VOS operated by EUMETNET members, including five Arctic States (Norway, Sweden, Denmark, Iceland and Finland).

¹⁰ Swedish Meteorological and Hydrological Institute (SMHI), Port Metrological Officer Johan Svalmark (Data current as of 11 June 2012).

¹¹ The Meteorological Service of Canada (MSC) maintains a network of Automatic Voluntary Observing Ships (AVOS) which uses Iridium telecommunications system to disseminate real time data. Regardless of the location of the ship, all AVOS ships report and disseminate hourly real time data to the GTS. Total number of AVOS observations made to the GTS in 2012 is 299,002 (51 AVOS) and in 2013 is 340,210 (56 AVOS). MSC aims to recruit an additional 15 to 20 vessels over the next 3 to 5 years, with at least 15 that will focus on operating in Arctic waters.

¹² Finland does not have a VOS programme but the Finnish Meteorological Institute (FMI) financially supports E-SURFMAR.

¹³ E-SURFMAR Project, Administrator Pierre Blouch (19 June 2012).

¹⁴ Denmark/Greenland/Faroe Islands has no VOS programme but the Danish Meteorological Institute (DMI) financially supports E-SURFMAR and has installed four automated weather stations funded by E-SURFMAR on Danish-flagged ships sailing between Denmark and Greenland (the Royal Arctic Line). These stations reported 18,300 observations in 2011. E-SURFMAR Project, Administrator Pierre Blouch (19 June 2012).

APPENDIX L

EXTRACT FROM THE REPORT TO THE IMO MARITIME SAFETY COMMITTEE BY THE IMO NCSR SUB-COMMITTEE

Participation in the WMO Voluntary Observing Ships' Scheme

27.10 The Sub-Committee recalled that MSC 85 had approved and circulated MSC.1/Circ.1293 regarding participation in the WMO Voluntary Observing Ships' (VOS) Scheme, inviting Member States to consider increased participation in the VOS Scheme for ships in the Arctic.

27.11 The Sub-Committee considered the information provided by the United States et al. (NCSR 1/27/3) relating to the WMO VOS Scheme and to encourage increased participation in the VOS Scheme by all flag States, in particular, those with vessels sailing in Arctic waters.

27.12 Having noted additional oral information provided by the WMO observer, in particular, that the Arctic was only one of several areas in the world where data was not forthcoming, and that WMO planned to submit a paper providing information on areas where it seeks to increase participation in the WMO VOS scheme, the Sub-Committee invited Member States to consider increased participation in the VOS Scheme, in particular, those with vessels which sail in Arctic waters.