

Global Collecting Centres for Marine Climatological Data

Annual Report 2008

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Contents:

1. Introduction
2. Voluntary Observing Ships (VOS)
3. Dispatch of Data
4. Developments
5. Summary
6. VOSclim Data 2008

1. Introduction

1.1 Origin of the GCCs

In 1963, the WMO Commission for Marine Meteorology (CMM) established the Marine Climatological Summaries Scheme (MCSS). Their objective was to develop and maintain a joint effort of all maritime nations in the collection of marine data and the production of climatological statistics. To achieve this, eight Responsible Members (RMs) were appointed; Germany, Hong Kong, India, Japan, Russia, The Netherlands, UK and USA. Each of the eight RMs were assigned a specific area of responsibility (see Appendix A) for which they were to manage and archive the data. Any queries/data requests regarding these areas are to be directed to the appropriate RM.

In 1993, the WMO CMM agreed there was a need to improve the flow and quality control of global marine data. As a result, two Global Collecting Centres (GCCs) were established; one based at the DWD Germany and the other at the Met Office UK. The GCCs are a collecting, processing and distribution point for all marine Voluntary Observing Ship (VOS) data (see marine data-flow diagram in Appendix C).

It is the responsibility of each Contributing Member (CM) to collect data from VOS, apply a minimum quality control and regularly submit these to both GCCs. The GCCs ensure these data meet the Minimum Quality Control Standards (MQCS) and, four times a year (at the beginning of April, July, October and January), re-distribute the data to the eight RMs. It is important that the GCCs work in close co-operation and apply identical procedures. This ensures that even in the event one centre's failure, the data flow can continue unaffected.

For further details of the GCCs' work see websites above.

1.2 Introduction to GCC 2008

This 2008 report marks the 15th year of GCC operation.

The GCC report is split into six sections that highlight data processing/quality information, new developments, future planning and MCSS activities over the past year. Section 2 details VOS data received throughout 2008 which includes the amounts of data received, data quality and problems encountered while GCC processing. Section 3 describes the distribution of all data received. Future development within the GCCs and the report summary is contained within section 4 & 5. Section 6, at the end of the report, provides information on contributions to JCOMM's VOSclim project, detailing volumes and quality of data received from VOSclim registered ships.

2. Voluntary Observing Fleet (VOF)

2.1 VOF Data Contributions 2008

In 2008 the total number of observations received by the GCCs was 878,886 (see Table I) which is a 20% decrease on 2007 collections. The contributions came from 16 countries which is a similar amount to previous years. A detailed analysis in Table II displays CMs and their contributions since the GCCs began (N.B. See section 4 for information on this years reduced total CMs). Many of the countries submitting data in 2008 did so only once or twice throughout the year. The GCCs remind CMs to send their observations regularly, preferably on a quarterly basis.

In 2008 it is interesting to see that 50% of the data the GCCs received came from automated, fixed stations or data buoys (Observing platform coding 4 and 5 – IMMT element 41). This is a huge increase on previous years amounts (2007:14%, 2006: 3%) and can be observed in figure 3.

The majority of data received by the GCCs arrive by email and anonymous FTP transfer. They arrive in IMMT format with most submissions in 2008 received in the preferred IMMT-3 (6.5% IMMT-1, 3.1% IMMT-2, 90.4% IMMT-3). On occasion a CM may submit a data file of varying length and this can be problematic for the GCCs as it hinders processing. Due to this, submissions are requested to be in one IMMT format only.

The volume of data received over the past fifteen years varies significantly and is observed in blue in figure 1. A notably smoother variation can be seen when only considering data distributed to RMs (in purple). This displays that in some years there have been significantly large submissions of problem data, however, since 2003 this has been less evident with this issue only accounting for a very small percentage of the total. For some CMs this is still a problem that should be addressed and by checking the data prior to submission these problems could be dealt with before the GCCs receive the data. [N.B. Version III consolidated MQC-software, which allows the separation of duplicates, is available free of charge to all CMs through the GCCs.]

Data was received each month by the GCCs during 2008 (figure 2) with the distribution of observing periods spanning two decades (figure 4 & 7). Data was received from as far back as 1988 and although data is widely spread 50% of observations were from 2007 and 2008 alone. Figure 5 displays the number of ships sending data for each year reported with, predictably, most ships sending observations for 2007 and 2008. The GCCs appreciate prompt submission of data, however, old data is still important and welcomed as a valuable addition to the global database.

It has been previously mentioned in the 2007 GCC Annual Report that there is a continuing problem with an increased number of ships reporting under the anonymous/masked callsign of 'SHIP' (or similar). This is still an issue and is often done so because of security concerns, however this should not be a problem for non-real-time data. When callsigns are masked it is not possible for GCCs and RMs to fully quality control these data; comparisons with real-time, verifying positions and identifying duplicates can prove extremely difficult. Please ensure masked callsigns are converted back to true IDs prior to submission and that the GCCs are informed of the real-time callsign for comparison. Where possible, the GCCs would ask CMs to submit their delayed mode only when it is no longer sensitive and not requiring masking.

2.2 VOF Data Processing

To ensure that data meets the JCOMM agreed Minimum Quality Control Standards (latest version MQCS-V), data are processed through a series of GCC programs. Processing draws attention to invalid dates, positions, out-of-range values, invalid coding (i.e. '/' instead of blank) and missing indicators. At the final stage of processing, elements are given flags related to their quality and these are compared to flags set by the CM.

During GCC processing there are some instances where simple errors within the date, time, position or identifier (IMMT elements 2-8, 42) are noted. Although simple, errors of this sort can be detrimental to the validity of the whole observation, but these are normally corrected after consultation with the CM. Checking of data by the CM before submission would save time and help alleviate this problem. On occasion, however, some errors are not corrected and these data are then rejected from the dataset to a 'dregs' file. Occurrences of this sort are mostly due to duplicated data - 605 observations (0.07%) received in 2008 fell into this category (see section 3 for further detail on this value).

Correct positioning is still an issue to be considered, with on-land observations being reported. The areal distribution map in figure 6 shows the main shipping lanes between continents with much data concentrated at the coasts. The locations of observations reported erroneously on-land are highlighted in red. In 2008 there were 405 (0.05%) observations reported on-land which is much less than was reported during 2007 (0.15%).

2.2.1 VOF Data Processing – Detailed Analysis

A detailed analysis of GCC 2008 processing identified further issues in the reporting of observations. Some data are still submitted with FM13 coding of "/" or "-" instead of a blank as required by IMMT. The use of invalid coding increased a little in 2008 to 0.06% of occasions (2007: 0.04%).

In the reporting & coding for precipitation, it is interesting to see that for all automated stations and all VOSclim ships the correct coding for inclusion of precipitation, iR = 3 or 4, is used. However, still 1% (2007: 2%) of VOS ships leave the whole group blank. This coding is incorrect even if the element has not been recorded.

The MQC software compares flags already set on the data by CMs to those the MQCS-V would set. This showed that in 2008 the percentage of observations from CMs without any flags set significantly increased since 2007 to 4.1% (2007: 1.8%). Further analysis identifies 8,953 (0.04%) occasions where flags conflicting with MQCS-V required resetting to a level of 6 or 7 (see extract from GCC 1994 report in Appendix B for details of flag values).

There is evidence to show that the percentage of elements reported blank has varied frequently over past years (figure 8a). The most commonly reported blank elements are still precipitation,

swell direction and height of lowest cloud. It was observed in 2007 that there had been an increase in most elements being reported as blank. Results from 2008 show an increase again of around 10% for most elements. Figure 8b & 8d provides evidence that the increase is most likely due to the increase in observations from automated systems where many elements are regularly not reported.

Throughout the year detailed two-way email correspondence was conducted with many CMs on the improvement of data quality and resolving of problems.

3. Dispatch of Data

During the year, four data collectives are dispatched via FTP server to RMs, one after the end of each quarter. The collectives are checked by MQCS-V, and thus the quarterly dispatched data are in IMMT-3 format. The data's original IMMT format may be different and is coded in IMMT element 65.

The dispatched data comprises of three files; the 'good' file holding all reports which successfully passed the MQC, the 'dregs' containing data which were rejected due to errors in organisational information and the third 'msgs' or 'warn' file holding information on the 'dregs' observations and other problems arising within the file. It is the responsibility of each RM to decide how to proceed with these data, either omitting or correcting the 'dregs' and other data.

RMs not only receive data for their area of responsibility but they all now receive the full global dataset quarterly. Requests for data/summaries can be made directly to any of the RMs, however, the cost of processing is sometimes charged.

It has been reported by some RMs that occasionally CMs have resubmitted data within later datasets. If data are resubmitted during different quarters/years these duplicates cannot be rejected by routine GCC processing. They can only be identified by the RMs during further quality processing. Not only does this generate extra work for the GCCs and RMs, it can also significantly affect the yearly statistics within the Annual Report. It has been noted that this is the case for over 18,000 observations in 2008 alone which is considerably more than the 605 dregs identified during the quarterly exchange process.

Please can CMs refrain from re-submitting data, however, if it is necessary then please make GCCs aware of this to allow replacement within the database.

4. Developments & Activities

TT-DMVOS: The JCOMM Data Management Coordination Group (DMCG) have previously agreed that maintaining the delayed-mode VOS data flow is important, but the way in which this is done through the MCSS needs to be modernised. As recommended, a new Task Team on Delayed-Mode Voluntary Observing Ship data (TT-DMVOS) was officially established at the ETMC meeting in 2007. The team has been tasked with improving the data flow to suit modern user needs, establishing requirements for the IMMT format and the MQCS, investigating the reconciliation of IMMT and IMMA formats, establishing a more detailed QC (HQC), and creating a web site to share any relevant information. A task list was agreed by members during August 2007 and work has commenced. For details of the TT-DMVOS refer to the JCOMM website:

http://www.jcomm.info/index.php?option=com_oe&task=viewGroupRecord&groupID=158

During May 2008 the GCCs chaired a meeting which took place alongside CLIMAR-III with eleven other members of the task team (see photo on page 6). The meeting proved to be

very useful with much discussion of user requirements and possible future data flows. The discussions have continued since the meeting and a provisional future data flow will soon be presented at JCOMM-III in late-2009.

The GCCs are planning to meet during March 2009 in Hamburg, Germany to coordinate work in line with the WIS and to initiate work on an HQC and joint GCC website.

CM Data Questionnaire: In an effort to provide an up-to-date CM membership list the GCCs sent a Marine Climatological Data Questionnaire to marine meteorological services throughout the world during December 2007. The purpose of the questionnaire was to seek information on whether each country ran a Voluntary Observing Ship Fleet and if they are currently contributing their observations to the MCSS and, if not, whether they require help in doing so. The aim was to encourage all countries to contribute their data and to increase the amount of checked observations within the archives. The results of this questionnaire were presented at CLIMAR-III and highlighted that the actual meteorological services willing to contribute their data to the MCSS amounts to 26 (see table 1). This is significantly less than the 41 CMs previously thought to be part of the scheme. During 2008 16 countries submitted data but the remaining 10 countries hope to be in a position to contribute to the scheme soon. The GCCs will approach these 10 countries during 2009 to provide support/advice to help them in submitting their data.

RM Questionnaire: Shortly after the task team meeting in Poland in May 2008 a questionnaire for the RMs was produced and circulated. The purpose of the questionnaire was to gather information on tasks the RMs currently carry out, whether they would like to continue their role as RM and if they would like to contribute to the modernised MCSS in the future. All RMs responded with valuable comments that are being considered while designing the future data flow.

GCCs to become DCPCs: As plans for a WMO Information System (WIS) progress NMS's were asked in 2008 to nominate potential DCPC's (Data Centres/Production Centres) that will be involved. Both GCC Germany and GCC UK have been nominated by their respective NMS's.

For further information on WIS: <http://www.wmo.ch/pages/prog/www/WIS-Web/home.html>

5. Summary

To summarise, the GCCs continue to receive data from a number of CMs regularly and the quality remains good. However, there could potentially be many more observations received by the GCCs each year. CMs having trouble submitting data should contact the GCCs for help in addressing these issues.

There are still delays between our received and controlled data in the archives of the RMs and the collected and flagged data in other real-time international datasets. We would like to encourage all countries to submit their observations, and if their ships do not record in a logbook they should submit their MQCS checked GTS data. This will give RMs the opportunity to check data with higher quality control for their archives and further processes.

There are some points from the report that need consideration from CMs.

- Observations should be submitted regularly on a quarterly basis.
- Each observation should only be submitted once. But if there is a requirement to resubmit this should be highlighted to the GCCs.
- Masked callsigns (i.e. 'SHIP') should be converted back to original prior to submission, if possible.
- Data files should be sent in one IMMT format only – IMMT-3 preferably.

- By applying MQCS to data prior to submission CMs can identify and rectify significant problems, in particular, issues within date, time and position.
- With improved compilation of observations, the presence of '/' and incorrect/missing flags could be addressed before submission.

During 2008 there was good advances made with modernising the current MCSS. Further work is planned for 2009/2010 and progress will be reported at JCOMM-III.

There is increasing demand from areas in climate research, marine forecasting, satellite calibration, climate modeling and maritime industries for marine data. Therefore, it is hoped CMs will appreciate the importance of their submissions and the value they add to the global marine database.

The GCCs would like to thank the CMs for their data that was submitted during 2008 and for their continued co-operation. As always, all members are invited to provide further feedback which may benefit the whole system and integrity of the marine database.

TT-DMVOS/TT-MOCS Meeting, 10th May 2008.



From left to right: Takafumi Umeda, Martin Rutherford, Bridget Thomas, Etienne Charpentier, Scott Woodruff, Val Swail, Reinhard Zöllner, Liz Kent, Bob Keeley, Eric Freeman & Nicky Scott.

6. VOSClim Data 2008

6.1 VOSClim Project

The VOSClim Project is an ongoing pilot within JCOMM's Voluntary Observing Ships' Scheme. It aims at providing a high-quality subset of marine meteorological data with detailed information on how the data have been obtained. These data are available in delayed mode and are of great value to both operational marine forecasting and global climate studies.

The IMMT-2 format, which allowed delayed mode submission of VOSClim elements (element 87-93), came into effect in January 2003. The more recent IMMT-3 format, which allows flags to be set on these additional elements (element 94-101), was formally accepted at the second session of JCOMM in September 2005.

For further details and information, refer to the VOSClim project website <http://www.ncdc.noaa.gov/oa/climate/vosclim/vosclim.html>

As of 31st December 2008 there were 10 CMs in total with 255 recruited VOSClim ships worldwide.

6.2 VOSClim Contributions

In 2008 VOSClim submissions were received from nine of the ten CMs. The GCCs received 48,583 observations from VOSClim ships (Table III, IV & V), contributing to 6% of the total submissions (2007: 6%, 2006: 9%, 2005 and 2004: 4%, 2003: 1%) (see figure 9). It is interesting to see in figure 10, that the CMs still contribute observations from 2001 to 2006, but most data were observed in 2007 and 2008. Figure 11 shows the number of ships sending data for each year reported with, predictably, most ships sending observations for 2007 and 2008. The number of observations containing additional VOSClim elements, however, was considerably less (35,987) than the total submitted. Nevertheless it is encouraging to see the number of observations remains high and are being submitted regularly from most of the CMs in the project.

There are still a considerable number of observations with additional elements received from non-VOSClim ships (see Table V - amounting to 23,517 in 2008). CMs are asked to encourage ships already reporting these elements (and other vessels) to join the VOSClim project.

The GCCs understand there can be software issues involved when initially processing VOSClim data which can delay submission to the GCCs. Any CMs having such problems are encouraged to make GCCs aware of this, because advice may be available to help.

As mentioned in section 2.1 masking of ship callsigns is becoming a considerable international problem and it also has serious implications to the VOSClim project. The UK Met Office's Real Time Monitoring Centre commitment for VOSClim is unable to be properly fulfilled as VOSClim ships reporting under a masked callsign cannot be effectively identified. As a consequence, their VOSClim data will not be sent to the Data Assembly Centre (DAC) at the National Climatic Data Center and monitored. The GCCs would ask CMs, where possible, to ensure masked callsigns are converted back to true IDs prior to submission to the GCCs.

6.3 VOSClm Data Processing & Analysis

As with VOS contributions, observations are processed through a series of programs to ensure they pass the MQCS. VOSClm data still seems to be of higher standard compared with VOS. Only 4 observations (0.01%) in 2008 were rejected into the quarterly 'dregs' file and all observations had corresponding flags reported to the common weather elements, however, there were only 54.9% with flags attached to the VOSClm elements.

The area distribution map in figure 13 shows that VOSClm ships prefer the main shipping lanes between continents, but are also spread ocean wide. There were 25 (0.06%) observations reported on-land by VOSClm ships in 2008 which is a similar proportion to VOS. However, there were still observations where the common weather flags were inconsistent with the MQCS-V and were subsequently reset. This occurred on 0.02% of occasions which is a little less than for VOS.

In recent years it has been seen that reporting of SLL (IMMT element 90) is an issue for the MQCS. In the first half of 2008 10% of VOSClm data were reported with SLL greater than the MQCS limit of 32m. This is most likely due to new ships and their deck cargo height being larger than before and so the MQCS-V limits have to be adapted for this new generation of ships. In August 2008 the ETMC agreed that the GCCs were allowed to use a corrected MQCS-V with a higher limit of SLL. After raising this limit to 40m no record was inconsistent with the MQCS-V criteria in the 3rd and 4th quarter of 2008.

In figure 8b it can be seen that for many elements (including wet-bulb temperature, visibility, cloud types/amounts, wind wave height/period and height of lowest cloud) VOSClm observations contain elements reported blank significantly more often than for VOF ships. Figure 12 displays an increase in reported blank elements from VOSClm compared to 2007.

The GCCs are aware that some CMs are having problems sending VOSClm data in the newer formats. On occasion data has been submitted to the GCCs from VOSClm ships without inclusion of extra elements and then at a later date, these have been resubmitted with the VOSClm elements added. The GCCs would ask CMs to please hold submission until full observations can be sent, else RMs receive a great deal of duplicated data.

6.4 Dispatch of Data

As a result of an action from the TT-DMVOS, the way in which VOSClm data is now distributed has changed. Since July 2008 the complete quarterly dataset containing VOSClm data has been dispatched to RMs and to the Data Assembly Center in the USA. Previously, VOSClm data were extracted from the quarterly file and sent to the DAC, however, this was not always possible to do accurately if the VOSClm ship log was not up-to-date. As a result of this change in process, the DAC can take ownership of calculating VOSClm observations and statistics. For details of quarterly VOSClm observations refer to information within Table III & V (provided by the Data Assembly Center in the USA).

As mentioned in section 3 it has been reported by some RMs that occasionally CMs have resubmitted data within later datasets. This is also an issue for VOSClm data and can only be identified by the RMs during further quality processing. In 2008 alone, 2366 VOSClm observations were resubmitted in different quarters. This is considerably more than the 4 dregs mentioned in section 3 which were identified during the quarterly exchange process.

6.5 Summary

In summary, 2008 saw nine out of the ten CMs making submissions from VOSClim ships and it is encouraging to see that data quality generally proves to be better than for VOS.

There is still one CM yet to contribute their VOSClim ship submissions to the GCCs. The GCCs would like to provide help to the CM with making these submissions so please make contact.

There are some points from the report that need consideration from CMs.

- All VOSClim ship data submissions should include additional VOSClim elements.
- CMs with data not yet submitted from VOSClim ships are encouraged to send the data at their earliest convenience or contact GCCs if having trouble.
- Convert masked callsigns (i.e. 'SHIP') back to original prior to submission, if possible.
- Please do not split observations to enable submissions to be made possible. If CMs experience problems in exchanging the newer IMMT formats, wait until it is possible to do so before sending observations.
- For non-VOSClim ships reporting VOSClim additional elements, please take action to join the project.

The GCCs would like to thank the CMs for their VOSClim data that has been submitted in 2008 and the continual co-operation. As you are in no doubt aware, the data from the project is extremely important for climate change studies and research.

Abbreviations

CM	Contributing Member
CMM	Commission for Marine Meteorology (the forerunner to JCOMM)
DAC	Data Assembly Center
DWD	Deutscher Wetterdienst
ETMC	Expert Team on Marine Climatology
GCC	Global Collecting Centre (MCSS / JCOMM)
IMMA	International Maritime Meteorological Archive Format
IMMT	International Maritime Meteorological Tape Format
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
MCSS	Marine Climatological Summaries Scheme
MQC	Minimum Quality Control (WMO Standard)
MQCS-V	Minimum Quality Control Standards (Version 5, July 2004)
NMS	National Meteorological Service
RM	Responsible Member
SLL	maximum height of deck cargo above summer load line (IMMT-2 & IMMT-3 element 90)
TT-DMVOS	Task Team on Delayed Mode VOS Data
UK	United Kingdom
VOF	Voluntary Observing Fleet
VOS	Voluntary Observing Ship
VOSClim	VOS Climate (Subset for High Quality Data - Project)
WIS	WMO Information System
WMO	World Meteorological Organization

Table I: CM Observations 2008

Country Name	1st Q	2nd Q	3rd Q	4th Q	Total
Argentina	0	0	2	0	2
Australia	14,314	21,663	11,671	12,637	60,285
Brazil	0	0	0	0	0
Canada	0	0	0	0	0
Croatia	0	0	0	0	0
France	0	12,820	0	0	12,820
Germany	146,216	150,062	163,510	128,890	588,678
Greece	0	0	0	0	0
Hong Kong, China	630	587	523	788	2,528
India	1,981	0	659	0	2,640
Ireland	0	0	0	0	0
Israel	0	0	0	0	0
Japan	5,961	0	9,099	6,015	21,075
Kenya	0	0	0	0	0
Malaysia	475	1,282	0	741	2,498
Netherlands	18,895	0	21,409	0	40,304
New Zealand	0	0	0	7,061	7,061
Nigeria	0	0	0	0	0
Norway	24,222	11,468	0	0	35,690
Poland	0	0	0	1,104	1,104
Russian Federation	12,009	12,031	12,054	12,028	48,122
Singapore	0	0	0	0	0
South Africa	214	444	0	0	658
Sweden	0	0	0	0	0
United Kingdom	17,978	2,027	0	4,234	24,239
USA	0	18,791	8,346	4,045	31,182
16/26 Countries	242,895	231,175	227,273	177,543	878,886

Table II: Contributions by CMs by year (1994 – 2008)

MCSS-Member	ISO Alpha-2 code																Number of Years with Contributions 1994 - 2008
		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Argentina	AR								X		X	X	X	X	X	X	7
Australia	AU							X		X	X	X	X		X	X	7
Brazil	BR	X	X	X	X												4
Canada	CA																0
Croatia	HR				X	X	X	X	X								5
France	FR	X	X	X	X	X			X		X	X	X	X	X	X	12
Germany	DE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15
Greece	GR																0
Hong Kong, China	HK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15
India	IN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15
Ireland	IE			X	X	X				X							4
Israel	IL		X	X	X	X	X	X	X	X	X	X	X	X	X		13
Japan	JP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15
Kenya	KE																0
Malaysia	MY	X		X	X	X	X		X	X	X	X	X	X	X	X	13
Netherlands	NL	X	X	X		X	X	X	X		X	X	X	X	X	X	13
New Zealand	NZ													X	X	X	3
Nigeria	NG																0
Norway	NO	X	X	X	X	X	X	X	X	X	X	X	X	X		X	14
Poland	PL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15
Russian Federation	RU		X	X	X	X	X	X	X	X	X	X	X	X	X	X	14
Singapore	SG		X	X	X	X					X	X	X	X			8
South Africa	ZA						X	X	X	X	X	X	X	X	X	X	10
Sweden	SE			X													1
United Kingdom	GB	X	X	X	X	X	X	X		X	X	X		X	X	X	13
United States	US	X	X	X	X	X	X	X		X	X				X	X	11

Table III: Observations from VOSclim-Ships / Observations with VOSclim-Elements 2008

Country Name	1st Q		2nd Q		3rd Q		4th Q		Total	
Australia	1,369	148	3,378	1,679	1,269	233	2,403	1,362	8,419	3,422
Canada	0	0	0	0	0	0	0	0	0	0
France	0	0	12,275	12,275	0	0	0	0	12,275	12,275
Germany	3,828	3,281	3,884	3,070	3,712	3,160	2,602	2,434	14,026	11,945
India	1,353	0	0	0	171	0	0	0	1,524	0
Japan	0	0	0	0	1,029	1,029	0	0	1,029	1,029
Netherlands	4,916	3,143	0	0	4,356	3,710	0	0	9,272	6,853
New Zealand	0	0	0	0	0	0	464	463	464	463
United Kingdom	1,337	0	191	0	0	0	0	0	1,528	0
USA	0	0	46	0	0	0	0	0	46	0
Countries	12,803	6,572	19,774	17,024	10,537	8,132	5,469	4,259	48,583	35,987

Table IV: Observations from VOSclim Ships / Observations with VOSclimElements (2003 - 2008)

Country Name	2003		2004		2005		2006		2007		2008	
Australia	2078	0	3,397	0	3,928	0	0	0	27,431	18,519	8,419	3,422
Canada	0	0	0	0	0	0	0	0	0	0	0	0
France	0	0	30,637	0	17,619	0	18,567	0	9,512	0	12,275	12,275
Germany	5675	5166	5,345	5,176	6,474	6,377	9,552	8,771	10,364	9,959	14,026	11,945
India	1332	0	3,077	0	4,269	0	2,679	792	1,773	465	1,524	0
Japan	0	0	818	0	4,439	0	0	0	3,026	3,026	1,029	1,029
Netherlands	215	0	603	0	2,161	1,899	2,011	1,117	5,254	4,928	9,272	6,853
New Zealand	0	0	0	0	0	0	0	0	455	342	464	463
United Kingdom	0	0	1,017	0	0	0	51,204	42,779	8,902	7,486	1,528	0
USA	278	0	0	0	0	0	0	0	198	0	46	0
	9578	5166	44,894	5,176	38,890	8,276	84,013	53,459	66,915	44,725	48,583	35,987

Table V: Total Number of Observations from VOSclim Ships / Number of Observations with VOSclim Elements from VOSclim Ships / Number of Observations with VOSclim Elements from not listed ships 2008

Country Name	1st Q			2nd Q			3rd Q			4th Q			Total		
Australia	1,369	148	0	3,378	1,679	158	1,269	233	77	2,403	1,362	77	8,419	3,422	312
Canada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	0	0	0	12,275	12,275	545	0	0	0	0	0	0	12,275	12,275	545
Germany	3,828	3,281	1,702	3,884	3,070	5,061	3,712	3,160	8,349	2,602	2,434	3,380	14,026	11,945	18,492
India	1,353	0	0	0	0	0	171	0	0	0	0	0	1,524	0	0
Japan	0	0	0	0	0	0	1,029	1,029	0	0	0	0	1,029	1,029	0
Netherlands	4,916	3,143	836	0	0	0	4,356	3,710	3,331	0	0	0	9,272	6,853	4,167
New Zealand	0	0	0	0	0	0	0	0	0	464	463	1	464	463	1
UK	1,337	0	0	191	0	0	0	0	0	0	0	0	1,528	0	0
USA	0	0	0	46	0	0	0	0	0	0	0	0	46	0	0
9 Countries	12,803	6,572	2,538	19,774	17,024	5,764	10,537	8,132	11,757	5,469	4,259	3,458	48,583	35,987	23,517

Figure 1: Contributed and Distributed Observations 1994 - 2008

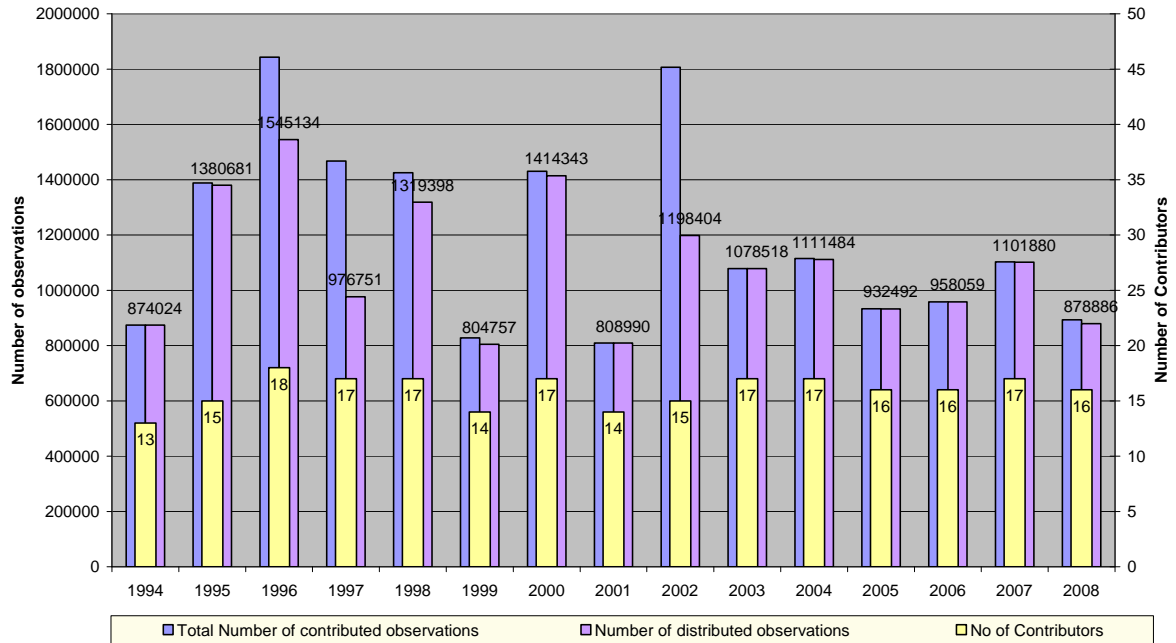


Figure 2: Number of Observations Received by Month 2008

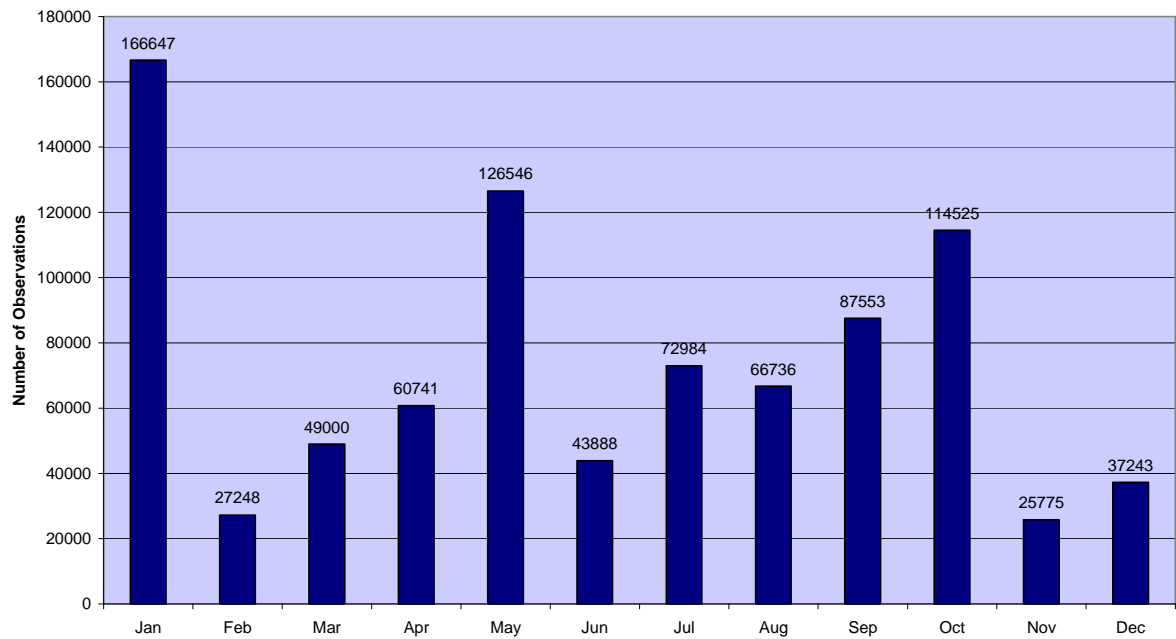


Figure 3: Percentage of Observing Platform Type (2006 - 2008)

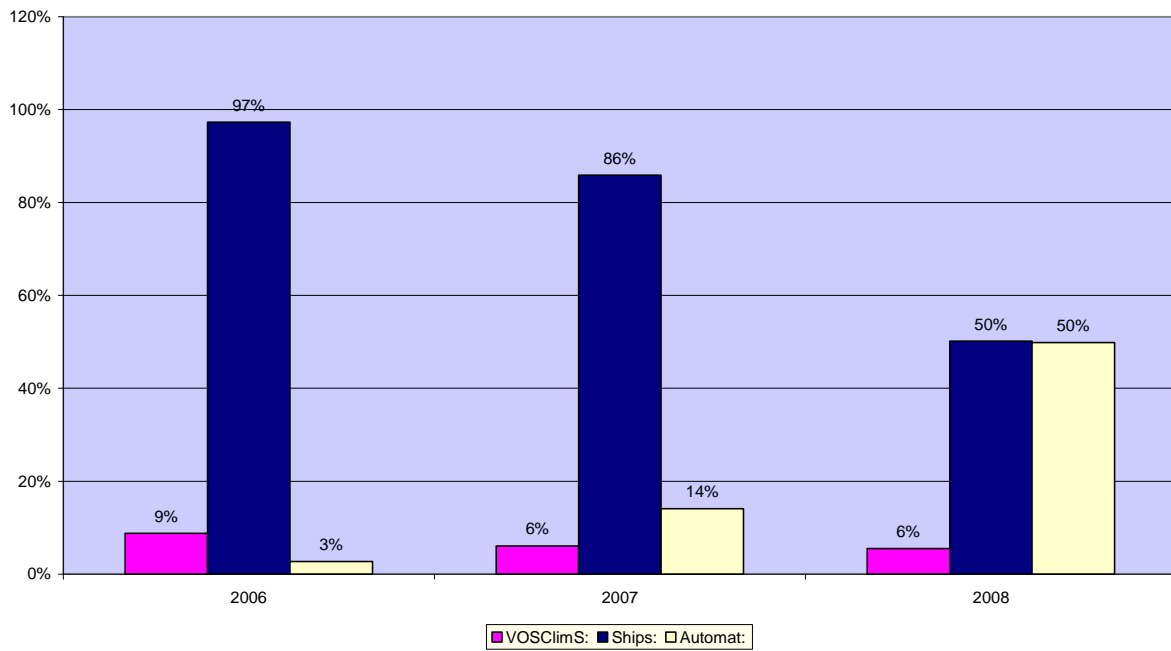


Figure 4: Distribution of Data Received in 2008

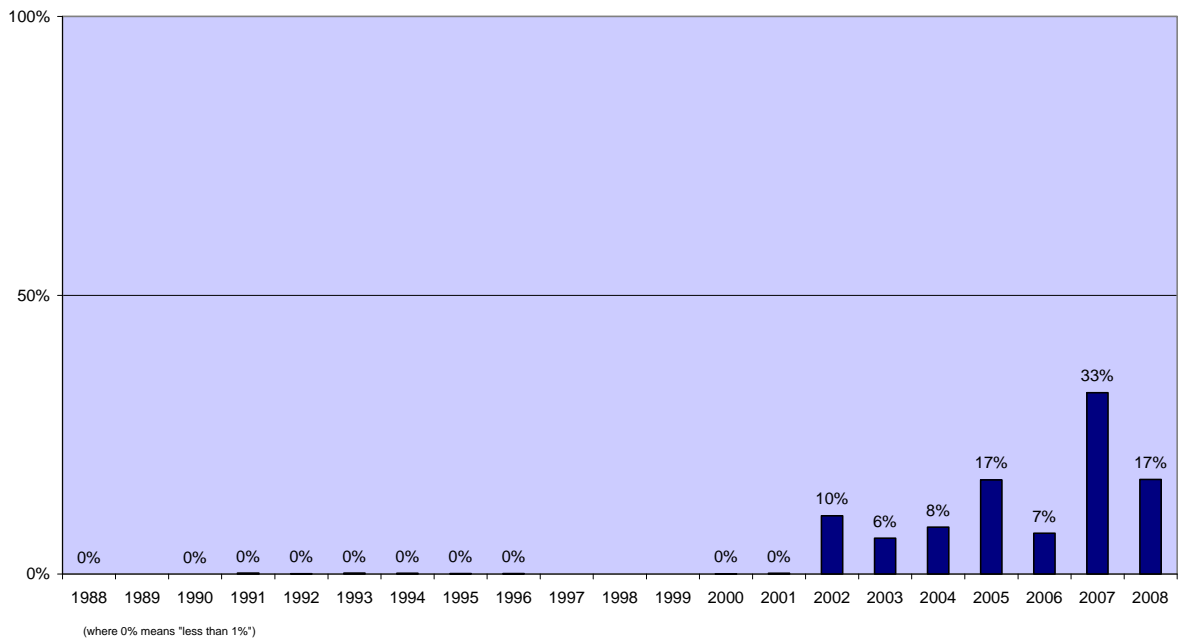


Figure 5: Number of Ships contributing in 2008

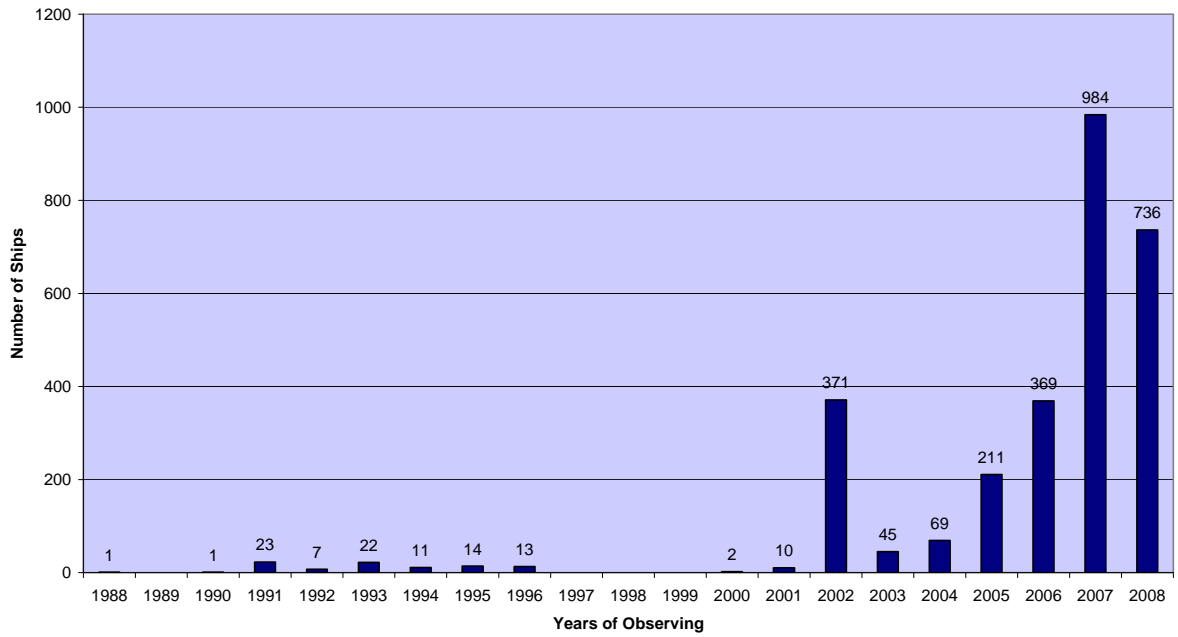


Figure 6: Distribution of Reported Positions 2008

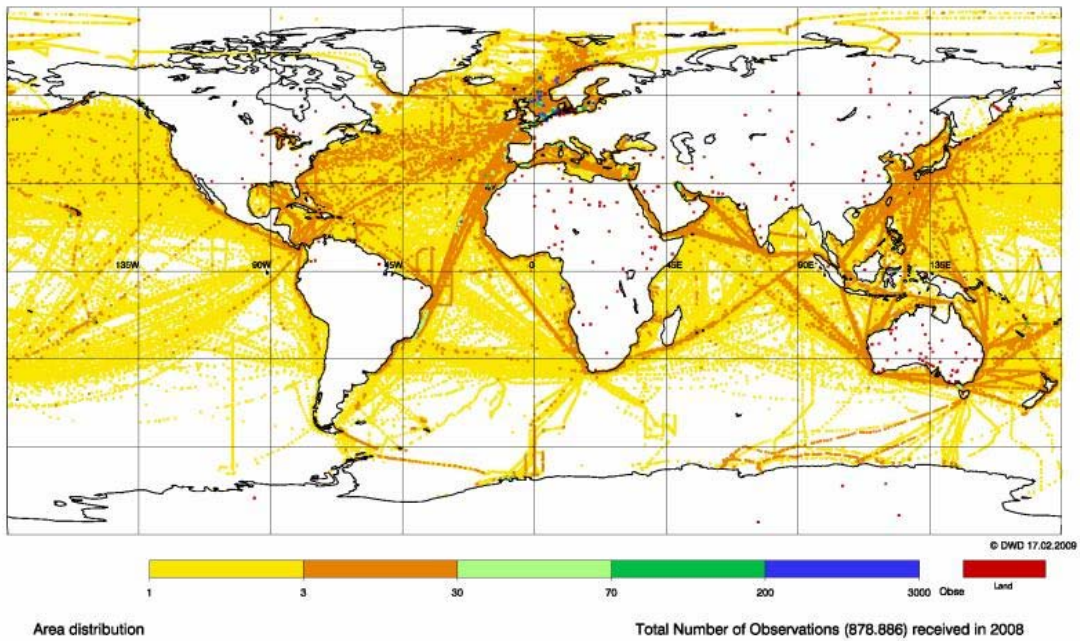


Figure 7: Distribution of Data by Country

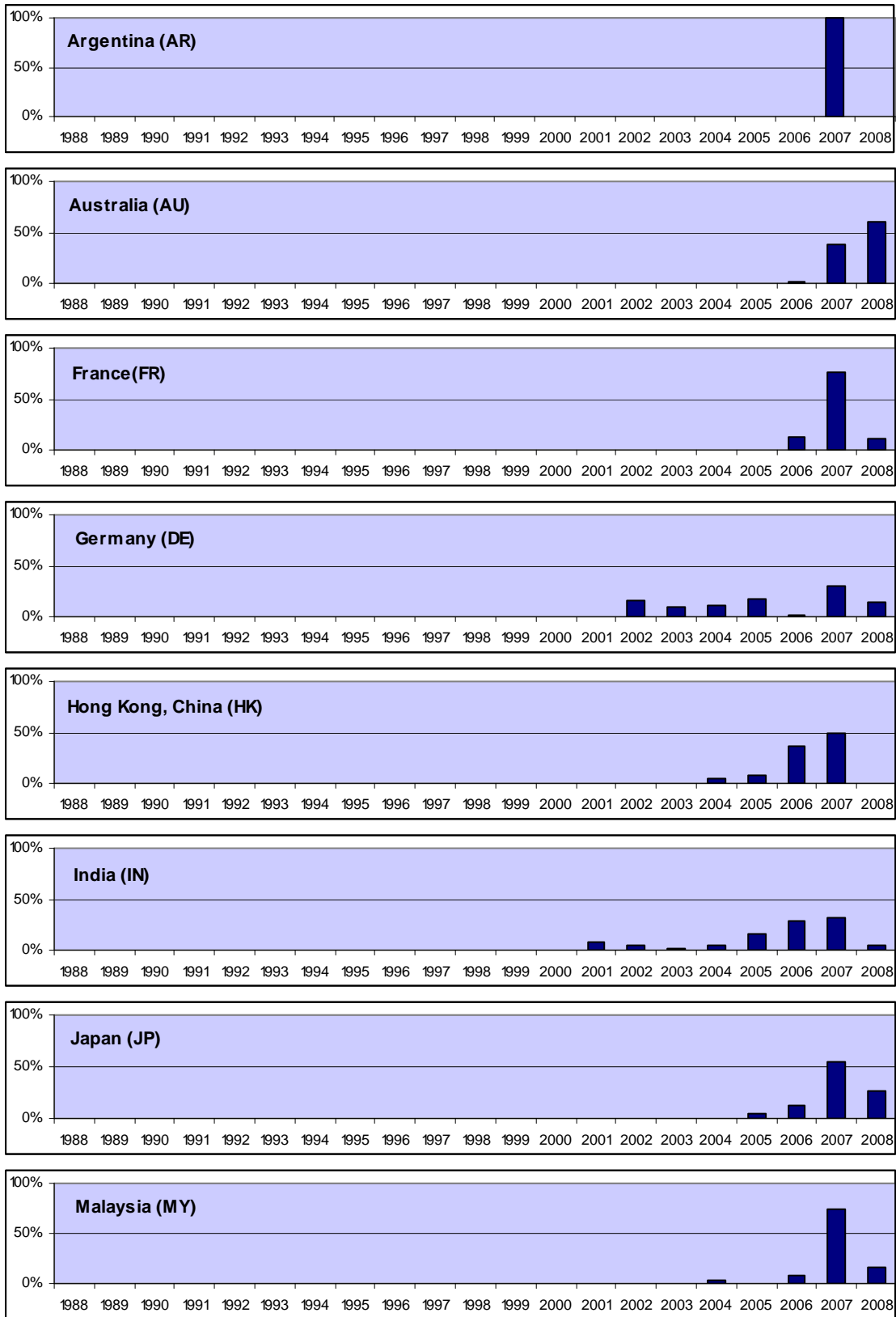


Figure 7 (continued): Distribution of Data by Country

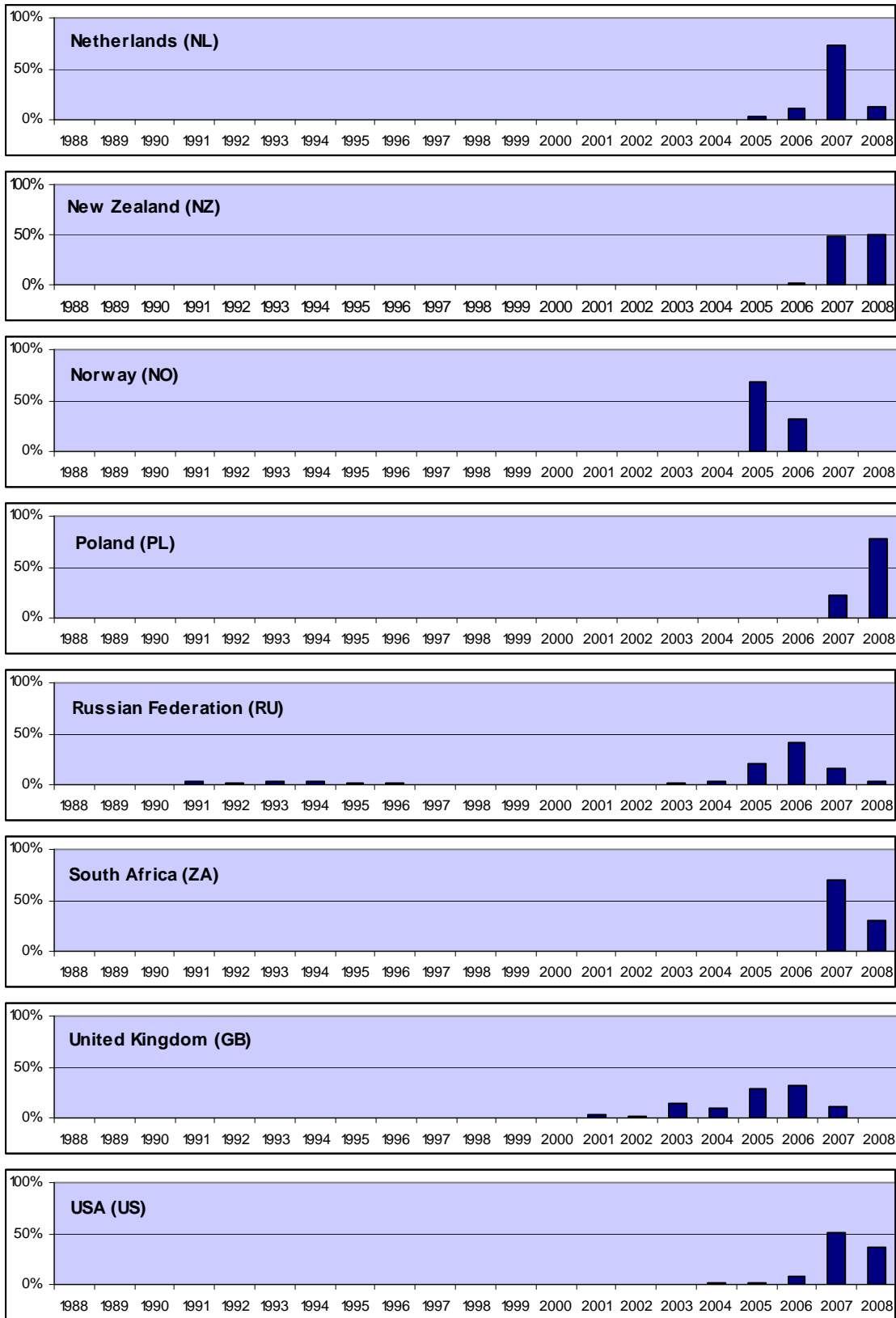


Figure 8a: Elements reported "blank" 2006 - 2008

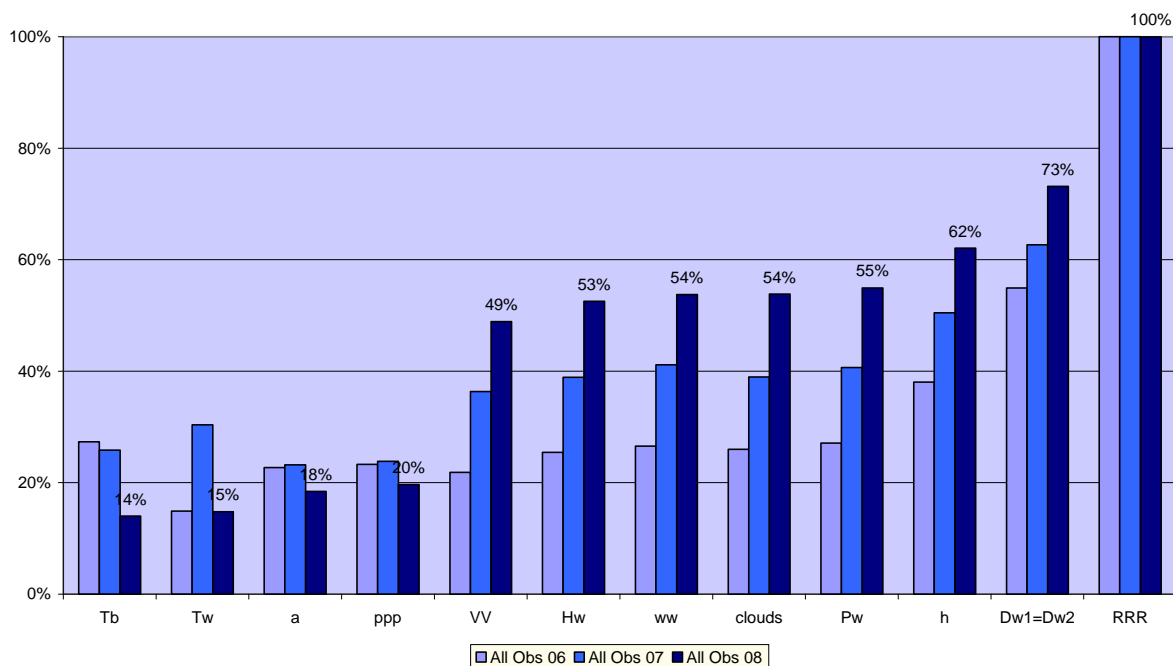


Figure 8b: Elements reported "blank" 2008

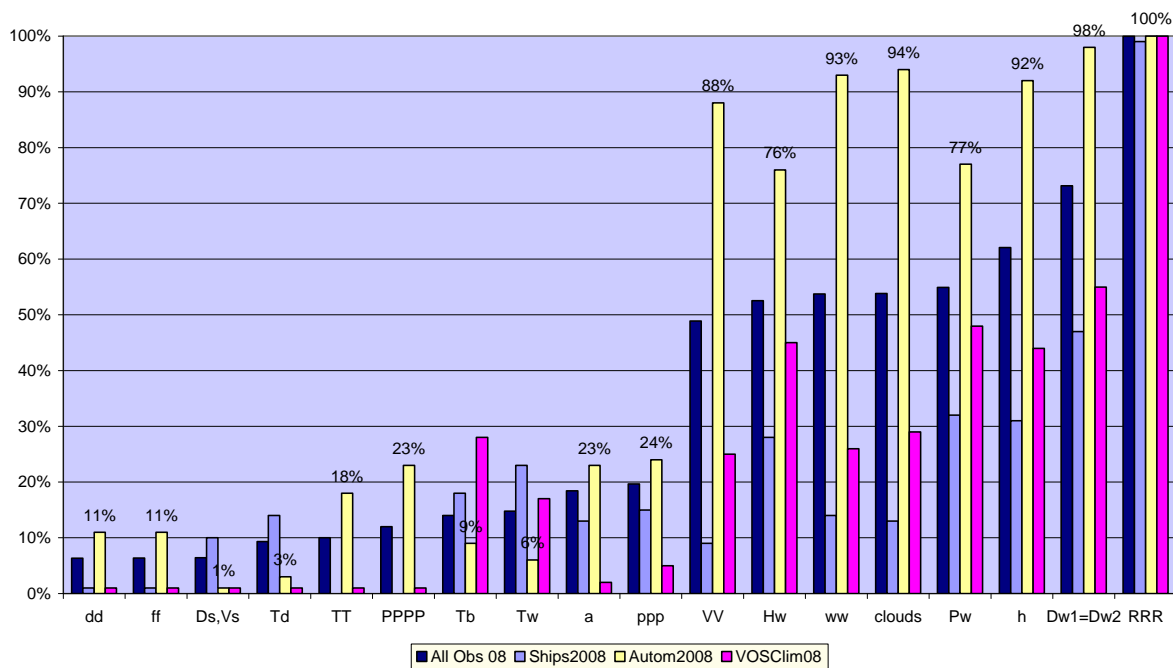


Figure 8c: Elements reported "blank" from VOS Ships 2007 - 2008

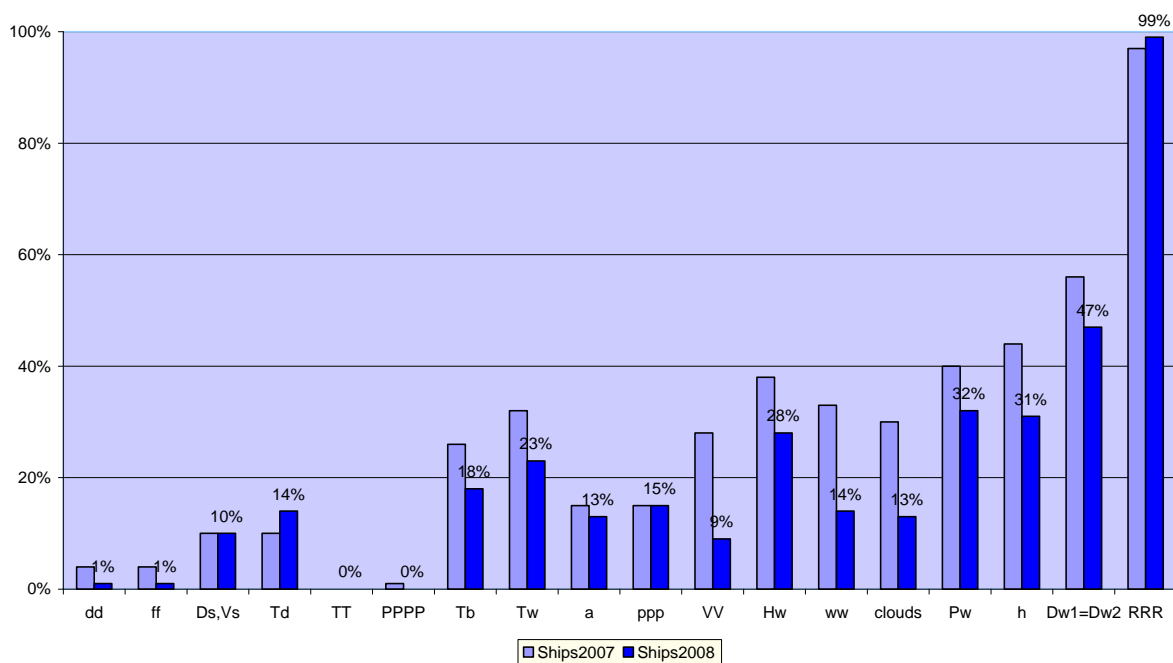


Figure 8d: Elements reported "blank" from Automated or Fixed sea stations or data buoys 2007 + 2008

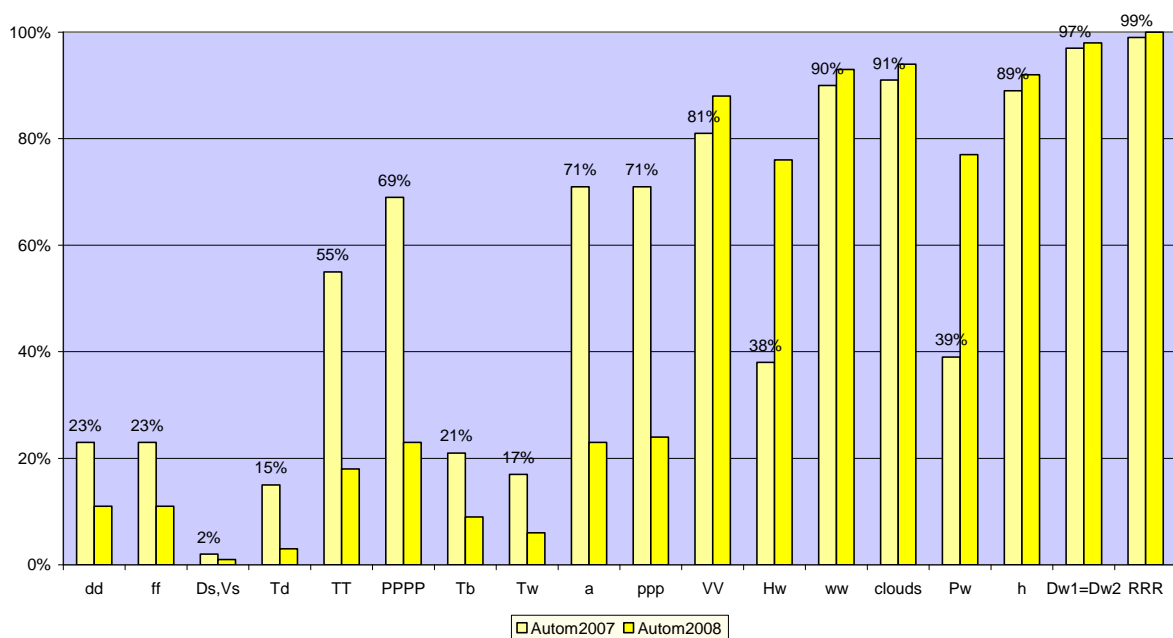


Figure 9: VOSCLim-Input 2003 - 2008

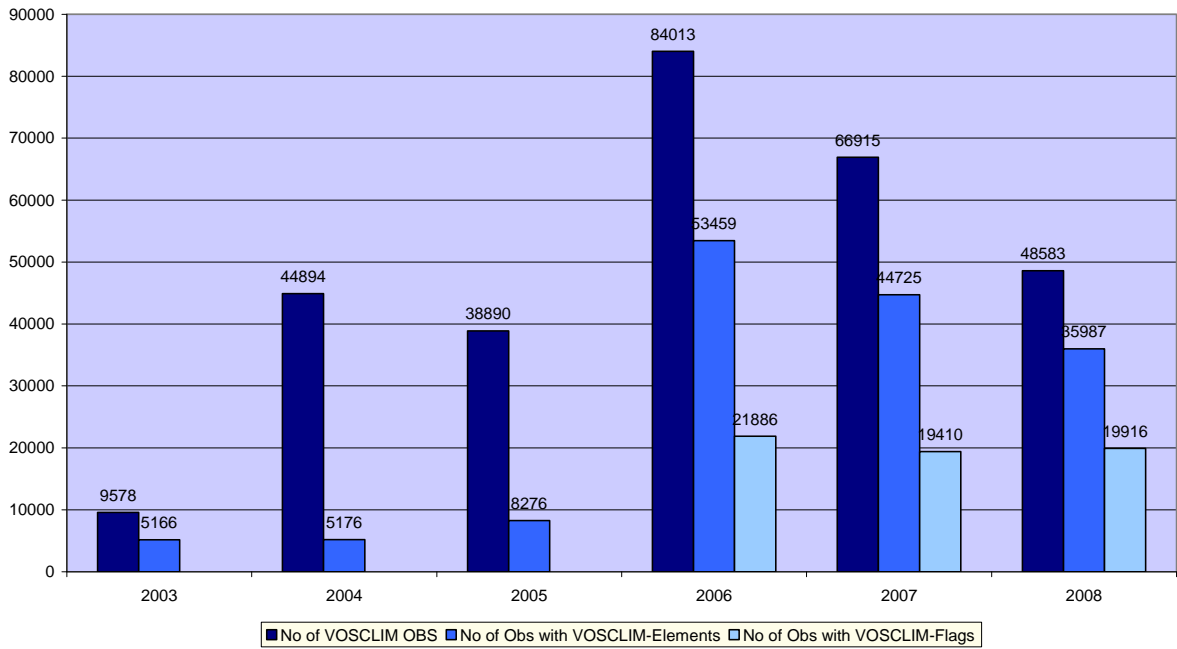


Figure 10: Distribution of VOSCLim Data Received 2008

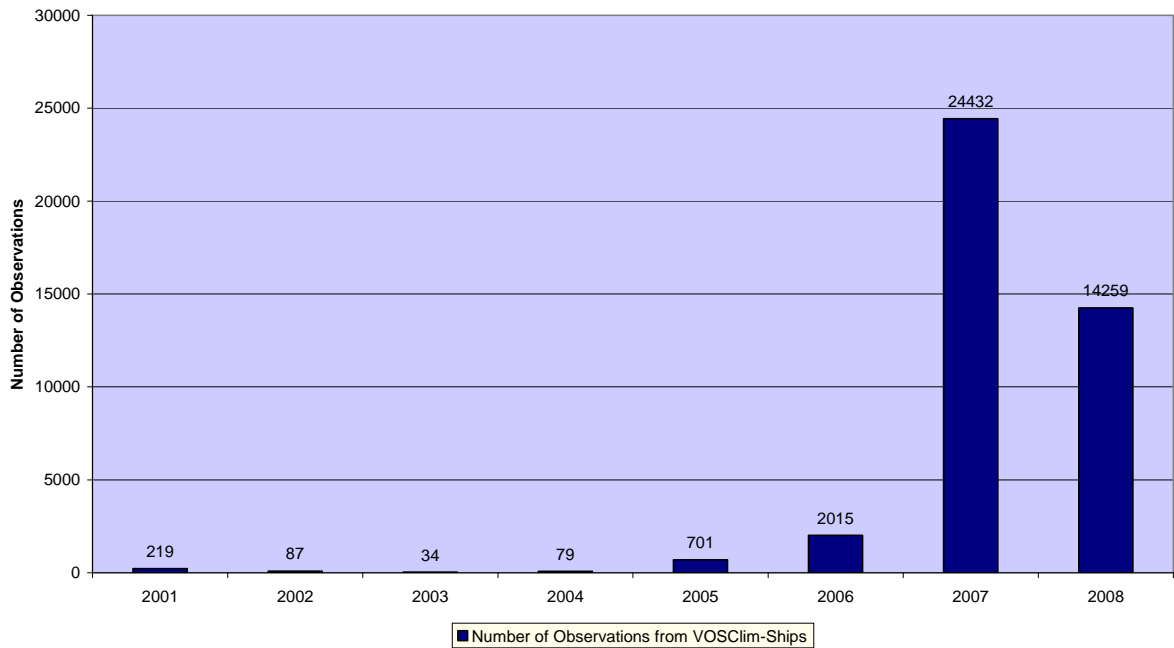


Figure 11: Number of VOSclim Ships contributing in 2008

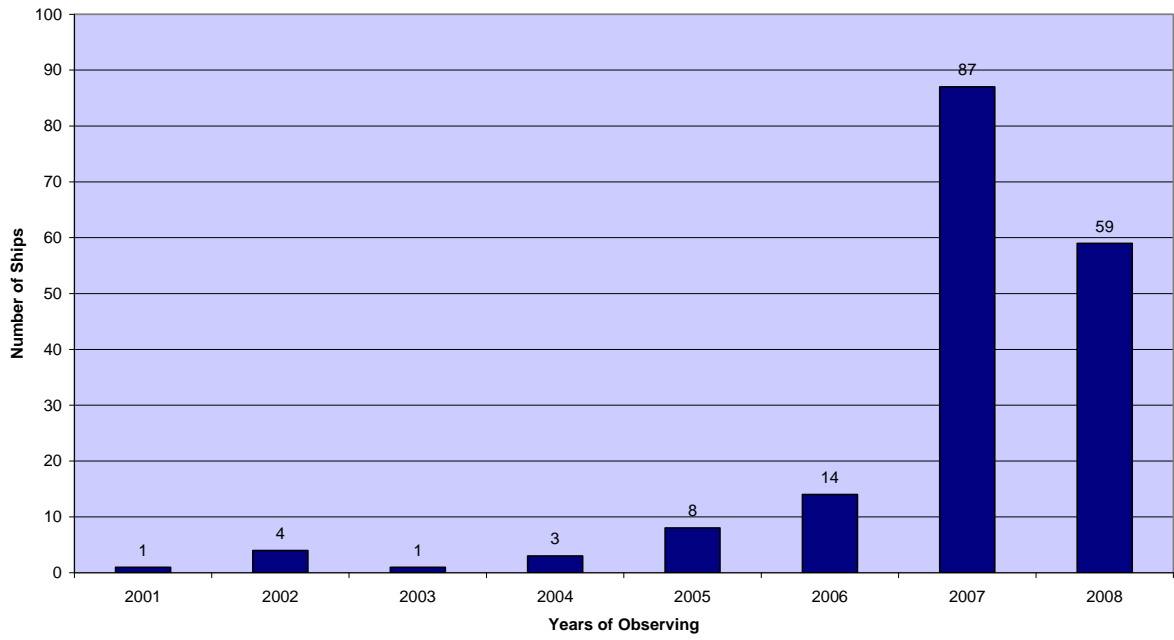


Figure 12: Elements reported "blank" from VOSclim Ships (2007-2008)

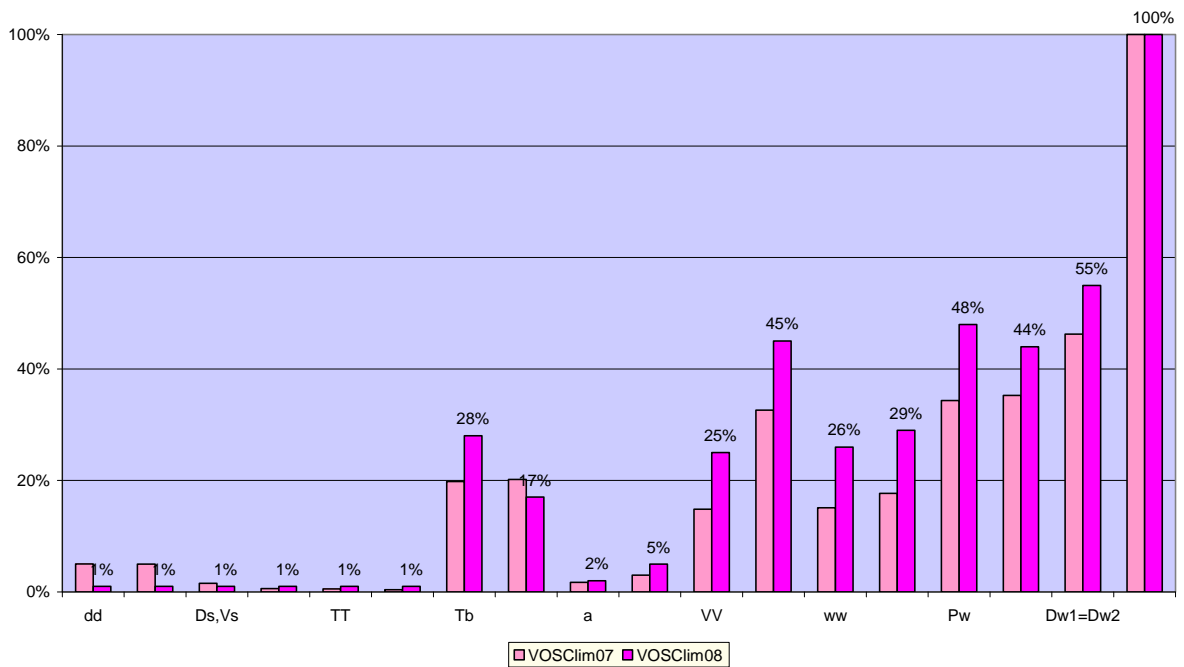
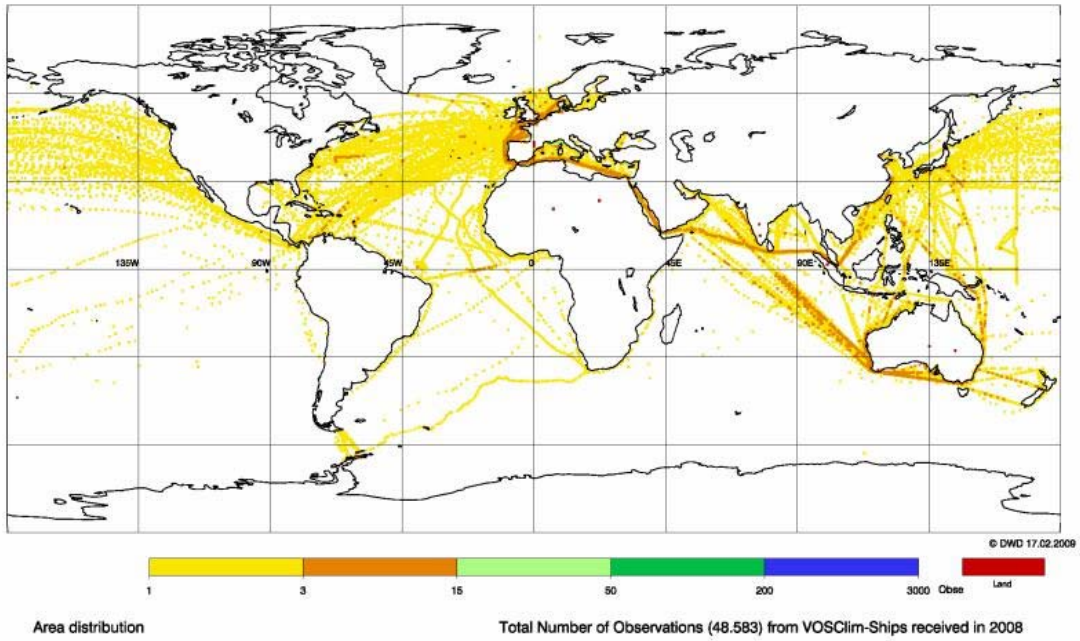
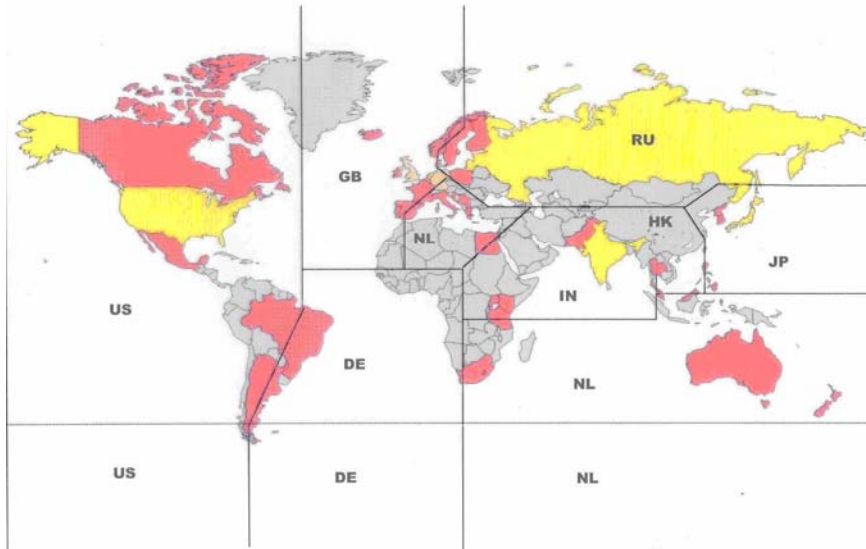


Figure 13: VOSclim Ship Areal Distribution of Reported Positions 2008



Appendix A: Responsible Member Countries

Countries under the MCSS



Appendix B: Extract from 1994 GCC Report

“A special problem arises if original flags claim ‘correct’ (flag=1) or ‘value corrected by quality control’ (flag=5) but the MQC check flags as erroneous or dubious. This discrepancy may be real, because MQC is not a sophisticated, high-quality check routine. This discussion led to the view that such cases may be of interest, especially with respect to climatological extreme values, and so should be highlighted. In order to direct attention to such events the following procedure was applied by GCCs, using the available flag values of 6 and 7.

** flag is set to “6” if the original flag is set “1” (correct) and the value will be classed by MQC as inconsistent, dubious, erroneous or missing,*

** flag is set to “7” if the original flag is set “5” (amended) and the value will be classed by MQC as inconsistent, dubious, erroneous or missing.*

Otherwise, no original flag will be overwritten.”

Appendix C: Marine Data-Flow

