

# **Global Collecting Centres for Marine Climatological Data**

## **Annual Report 2006**

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### **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 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) where any queries/data requests regarding these areas should be directed.

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 Fleet (VOF) data (see marine data-flow diagram in Appendix C).

It is the responsibility of each Contributing Member (CM) to collect data from their voluntary observing ships, 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 end of March, June, September and December), 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 of failure of one, total data-flow continues.

For further details of the GCCs work see websites above.

#### **1.2 Introduction to GCC 2006**

This 2006 report marks the 13<sup>th</sup> year of GCC operation.

The GCC report highlights the activities, new developments and future plans over the past year. Section 2 details Voluntary Observing Ship data received throughout 2006. This includes the amounts of data received, problems encountered and also details of the quality of these data. The distribution of all data is described in section 3. Then future development within the GCCs and the summary is reported in section 4 & 5. At the end of the report section 6 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 2006**

In 2006 the total number of observations received by the GCCs was 958,059 (see Table I). This is a 3% increase on 2005 collections. The contributions came from 16 countries (including one country contributing for the first time) and although this is the same number as last year, it still represents less than 50% of the 41 total CMs. A detailed analysis in Table II displays all CMs and their contributions since the GCCs began. Half of countries submitting data in 2006 did so only once or twice throughout the year. The GCCs would ask that CMs send their observations more regularly, preferably on a quarterly basis.

The majority of data received by the GCCs are via email and anonymous FTP transfer. It arrives in IMMT format but submissions are still widely spread between IMMT-1, 2 & 3 (17% IMMT-1, 19% IMMT-2, 64% IMMT-3). IMMT-3, formally ratified at JCOMM-II in September 2005, is preferred. On occasion a CM may submit a data file of varying length and in 2006 this occurred on 5 occasions. This can be problematic for the GCCs as it hinders processing, therefore, submissions are requested to be in one IMMT format only.

The volume of data received over the past thirteen years varies significantly and is observed in blue in figure 1. However, a notably smoother variation can be seen as when considering only unique data (non-duplicate) in purple. This shows that in some years there have been significantly large submissions of duplicated data, however, since 2003 this has been less evident with duplicates making up a very small percentage of the total. For some CMs this is still an issue 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. The new 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 by the GCCs each month during 2006, but it is noted that there was considerably more data received in the first half of the year (figure 2). The distribution of observing periods within 2006 continues to span more than a decade (figure 3 & 4). It can be seen that data has been received from as far back as 1993, and that 55% of observations were from 2005 and 2006 alone. The GCCs appreciate prompt submission of data, however, old data is still important and represents a valuable addition to the global database.

There is an escalating problem with an increased number of ships reporting under the anonymous callsign of 'SHIP' or similar. This is often done because of security concerns however this should not be an issue in non-real-time. When callsigns are masked it is not possible for GCCs and RMs to fully quality control these data; comparisons with real-time prove extremely difficult and identifying whether observations have been duplicated becomes impossible. This issue will be discussed at the Joint WMO-IMO Consultative Meeting (February 2007) and at the ETMC meeting (March 2007). In the meantime, the GCCs would ask CMs, where possible, to ensure masked callsigns are converted back to true IDs prior to submission and to inform the GCCs of the real-time callsign for comparison.

## 2.2 VOF Data Processing

To ensure that data meet the JCOMM agreed Minimum Quality Control Standards (latest version MQCS-V), they are processed through a series of GCC programs. Processing draws attention to invalid dates & positions, out-of-range values and invalid coding (i.e. '/' instead of blank) etc. 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 processing there are some instances where simple errors within the date, time, position or identifier (elements 2-8, 42) are noted. Although simple, errors of this sort can be detrimental to the validity of the whole observation, but these can normally be 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. 0.03% (282) of observations received in 2006 fell into this category.

Correct positioning is an issue still to be considered, with on-land observations being reported. The areal distribution map in figure 5 shows the main shipping lanes between continents with much data concentrated at the coasts. The locations of observations on-land are highlighted in red. There were 194 observations reported on-land in 2006 which is an improvement on 327 in 2005.

### 2.2.1 VOF Data Processing – Detailed Analysis

A detailed analysis of GCC 2006 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 has decreased in 2006 to 0.01% (2005: 0.08%).

In the reporting & coding for precipitation, it is interesting to see that for all VOSclim and 'automatic' ships the correct coding for inclusion of precipitation, iR = 3 or 4, is used. However, for 10% of VOS this is left blank. This coding is incorrect even if the element has not been recorded. The GCCs suggest that a change in the compilation of observations at source would be the best way to deal with this type of problem.

The MQC software compares flags already set on the data by CMs to those the MQCS-V would set. This showed that in 2006, 1.8% of observations did not have flags set at all. This figure is five times less than 2005 (9.3%), indicating that the sharp increase the previous year was anomalous. Further analysis identifies 84,020 (0.44%) occasions where flags conflicting with MQCS-V require resetting to a level of 6 or 7 where necessary (see extract from GCC 1994 report in Appendix B for details). This is a large rise in changes compared to 2005 (0.02%)

There is evidence to show that the percentage of elements reported blank has varied frequently over past years. However, it is seen in 2006 that there has been a reduction in reported blanks for all elements (excluding precipitation) and in some cases a decrease of 10-20%. Figure 6a shows the percentage of reported blank elements for 2004 to 2006. Figure 6b details blank elements for VOS, automated stations and VOSclim ships. The most commonly reported blank elements were still precipitation, swell direction and height of lowest cloud, with most frequent 'blank' reports submitted from automated stations. This is considerable but as automated stations are accounting for less of the total observations (2006: 3%, 2005: 7%, 2004: 33%) this is not as concerning. To demonstrate the reduction of the blank reported elements, it is interesting to look at figures 6c, 6d and 6e which display VOShips, automated stations and VOSclim-Ships separately for the past two years.

Detailed bilateral correspondence was conducted with some 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 at the end of each quarter. The collectives are checked by MQCS-V, meaning the quarterly dispatched data are in IMMT-3 format, even though they were contributed in other versions by the CMs. The original format is coded in element 65 (IMMT version).

The dispatched data comprises of three files; the 'good' file holding all reports which passed the MQC successfully, 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'.

It has been noted that occasionally CMs have resent data within later datasets. These duplicates cannot be rejected by the GCCs if they are submitted during different quarters and are therefore only noticed by the RMs during further processing. 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.

RMs not only receive data for their area of responsibility but they all now also 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.

### **4. Developments**

2<sup>nd</sup> Session of ETMC: ETMC meeting in March 2007 is due to finalise the revised IMMT-4 and MQCS-VI. In the revised IMMT-4, if the record originated from an electronic logbook with embedded MQCS, the coding number "4" for the source of observation (element 40) is reserved only for this. The MQCS-VI will raise the upper limit of SLL (maximum height of deck cargo above summer load line) to allow for increasing ship size and cargo deck height. The IMMT-4 will also propose to separate element 91 (s<sub>L</sub>hh) into two elements 91 (s<sub>L</sub>) and 92 (hh) and remove the QC indicator for s<sub>L</sub> (element 98). Due to these adjustments the element numbers from characters 146 to 155 will be affected and increased by 1.

MQCforCM Software: GCC MQCforCM version III is now available and can be obtained by contacting the GCCs. This new software includes changes to checks according to MQCS-V, checking present weather codes from automatic stations, checking of VOSlim additional elements, the addition of new flags in the IMMT-3 format and also the choice to separate duplicate records. All countries who had the previous version of MQCforCM have now been sent the update.

Recording Observations: The KNMI electronic logbook, TurboWin, is being encouraged on all manual reporting European ships and due to its embedded MQCS software, this should lead to some improvement of data quality.

Quarterly Exchange of data by FTP: The UK GCC has moved over to using FTP for transferring data in line with GCC Germany. Therefore, the quarterly exchange to all RMs will now be carried out in this way.

## 5. Summary

To summarise, the GCCs continue to receive data from a number of CMs regularly and the quality of this data appears to be improving with reduced dregs, reduced on-land positions, reduced number of blank elements, reduced number of observations with no flags and an increasing number of observations in IMMT-3 format. However, countries having trouble submitting data should contact the GCCs to make them aware of their difficulties and take action in working toward addressing these issues.

There is still a delay between our received and controlled data in the archives of the RMs and those only 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.
- Convert masked callsigns (i.e. 'SHIP') back to original prior to submission.
- 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 any 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.
- Any CM not yet received the updated 'MQCS for CMs' (version 3) can do so by contacting the GCCs.

With increasing demand from climate research, marine forecasting, satellite calibration, climate modeling and maritime industries, marine data is highly sought after. Therefore, CMs can appreciate the importance of their submissions they make and the value this adds to the global marine database.

The GCCs would like to thank the CMs for their data that was submitted and for their co-operation during 2006. As always, all members are invited to provide further feedback which may benefit the whole system and integrity of the marine database.

## **6. VOSClim Data 2006**

### **6.1 VOSClim Project**

The VOSClim Project is an ongoing pilot within JCOMM's Voluntary Observing Ships' Scheme. It aims to provide 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>

Since the project commenced, nine CMs have recruited VOSClim ships. There are currently 169 active VOSClim ships worldwide.

### **6.2 VOSClim Contributions**

In 2006 VOSClim submissions were received from five of the nine CMs. The GCCs received 84,013 observations from VOSClim ships (Table III & IV), contributing to 9% of the total submissions. (2005 and 2004: 4%, 2003: 1%) However, the number with additional VOSClim elements was considerably less with 53,459 observations containing these. It is encouraging to see there has been a significant rise in contributions from VOSClim ships (particularly since more ships are being recruited) and especially the numbers of observations containing the additional elements.

There are still a considerable number of observations received from non-VOSClim ships containing the additional elements. Although this amount is less than 2005 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 with 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. It should be noted that failure of VOSClim participants to regularly collect and submit data may be detrimental to the success of the project.

As mentioned in section 2.1 the 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 VOSClim Data Processing & Analysis**

As with the VOF contributions, data are processed through a series of programs to ensure it passes the MQCS. VOSClim data has proved to be of a higher standard

compared with VOF. Only 14 observations (0.02%) in 2006 were rejected into the 'dregs' file and all observations had corresponding flags reported.

There were still observations, however, where flags were inconsistent with the MQCS-V and were subsequently reset. This occurred on 0.07% of occasions which is again considerably less than for VOF ships. The area distribution map in figure 8 shows VOSClm ships prefer the main shipping lanes between continents, but are also spread ocean wide. There was 36 observations reported on-land by VOSClm ships in 2006.

It has been seen that reporting of SLL is an issue for the MQCS. 1.2% of VOSClm data was reported with SLL greater than the MQCS limit of 32m. This is due to ships and the deck cargo height growing larger and so the MQCS-V limits must be adapted to the new generation of ships.

In figure 6b it can be seen that most reported blank elements for VOSClm were the same as those for VOF. However, it is interesting to see that compared to VOF, wind speed and direction, wind wave height and period, have a significantly higher occurrence of blank reports. While, for sea and dewpoint temperature and pressure tendency there are notably less blank elements reported than VOF.

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 re-submitted 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**

VOSClm data is dispatched to RMs as part of the quarterly exchange and in addition to this all observations received from VOSClm ships are dispatched quarterly to the Data Assembly Center in the USA. For details of the number of observations sent refer to Table III and figure 7.

#### **6.5 Summary**

In summary, 2006 saw a significant rise in submissions from VOSClm ships and in particular an increase in ships reporting the additional elements. It is also encouraging to see that data quality proves to be better than for VOF.

There are still four CMs who have not contributed VOSClm ship submissions to the GCCs. The GCCs would be grateful if you would make contact if there are problems with making these submissions.

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

- All VOSClm ship data submissions should include additional VOSClm elements.
- CMs that have not yet submitted observations from VOSClm ships are encouraged to do so at their earliest convenience or contact GCCs if having trouble.
- Convert masked callsigns (i.e. 'SHIP') back to original prior to submission.
- 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-VOSClm ships reporting VOSClm additional elements, please take action to join the project.

The GCCs would like to thank CMs for their VOSClm data that has been submitted in 2006 and their continual co-operation. As we are sure you are aware, the data from the project is invaluable for climate change studies and research.

## Abbreviations

<b>CM</b>	Contributing Member
<b>CMM</b>	Commission for Marine Meteorology
<b>DAC</b>	Data Assembly Center
<b>DWD</b>	Deutscher Wetterdienst
<b>ETMC</b>	Expert Team on Marine Climatology
<b>GCC</b>	Global Collecting Centre (MCSS / JCOMM)
<b>IMMT</b>	International Maritime Meteorological Tape
<b>IMO</b>	International Maritime Organization
<b>JCOMM</b>	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
<b>KNMI</b>	Koninklijk Nederlands Meteorologisch Instituut
<b>MCSS</b>	Marine Climatological Summaries Scheme
<b>MQC</b>	Minimum Quality Control (WMO Standard)
<b>MQCS-V</b>	Minimum Quality Control Standards (Version 5, July 2004)
<b>RM</b>	Responsible Member
<b>SLL</b>	maximum height of deck cargo above summer load line (IMMT-2 & IMMT-3 element 90)
<b>UK</b>	United Kingdom
<b>VOF</b>	Voluntary Observing Fleet
<b>VOS</b>	Voluntary Observing Ship
<b>VOSClim</b>	VOS Climate (Subset for High Quality Data - Project)
<b>WMO</b>	World Meteorological Organization

**Table I: GCC Observations 2006**

<b>Country Name</b>	<b>1st Q</b>	<b>2nd Q</b>	<b>3rd Q</b>	<b>4th Q</b>	<b>Total</b>
Argentina	192	209		9	410
France	72011		55274		127285
Germany	168124	35659	29787	28143	261713
Hong Kong, China	1221	356	379	733	2689
India		2060	2509		4569
Israel			9197		9197
Japan	5307	10909	8157	8251	32624
Malaysia			3011		3011
Netherlands	14792	11875	16503		43170
New Zealand				14211	14211
Norway		8460			8460
Poland				972	972
Russian Federation	25296	25114	25812	25149	101371
Singapore				831	831
South Africa	762	577		764	2103
United Kingdom		307059	20672	17712	345443
<b>16 Countries</b>	<b>287705</b>	<b>402278</b>	<b>171301</b>	<b>96775</b>	<b>958059</b>

**Table II: Number of Contributions by CMs per Quarter (1994 - 2006)**

MCSS-Member	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Number of Years with Contributions
Argentina								1		1 2	1 1 1	1 1 1 1	1 1 1	5
Australia							3		1	1	1	1	1	5
Belgium														0
Brazil	1	1	1 1 1	1 1										4
Canada														0
Croatia				1	1	1	1	1						5
Denmark							3 2		1		2 2			4
Egypt														0
Finland														0
France	1 1	1 1	1 1	1	1			6 3		1	2	1 1 1	2 1	10
Germany	1 4 2 4	3 3 4 3	2 4 2 1	1	18 3 2	1 4 2	1 2 1 2	1 1 1 2	1 1 2	1 3 1 6	10 1 2 5	3 5 3 1	5 3 3 3	13
Greece														0
Hong Kong, China	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 2 1	1 1 1 1	1 1 1 1	1 1 1	1 1 1 1	13
Iceland														0
India	1 2 1	1	1	1 1 1	1 1	2 1 1	1 2 1 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	2 1	2 1	13
Ireland			1	1	1 2				2					4
Israel		2	1	1	1	1	1	1	1	1	1	1	1	12
Italy														0
Japan	(6)	1 1	1 2	1 1	1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 2	2 1 1	1 1 1 1	1 1 1 1	13
Kenya														0
Korea							1							1
Malaysia	1		1	1	1	1		2	1	1 1	2 1	1 1	2	11
Mexico														0
Netherlands	1	2	2 1	1	2 2	2 1 1	1 1 1 1	1		1 3	1 1	3 1	1 1 1	11
New Caledonia	1	1 1 1 1	1 1	1 1 1	1		1							6
New Zealand													1	1
Norway	5 4	2 2 2	2	6 3 3 6	3 3 9	3 3 6	1 3 3 3	3 3	6 3 3	3 3 3	3	21	3	13
Pakistan														0
Philippines														0
Poland	1	2 1 1	1 1 1 1	1 2	1 2	1 1 1 1	2 1	1	1 1 1	1 1	1 1	1 1	1	13
Portugal														0
Russian Federation		2 1 1	4 2	3 6 1 1	1 1 1 5	2 2 2 2	2 2 2 2	2 3 2 2	2 2 2 2	2 2 2 2	2 2 2 2	2 2 2	2 2 2 2	12
Singapore		1 1	1 1	1	1 1					1 1	1	1	2	8
South Africa						4 1 1	1 2	5 2 2 1	2 3 2	4 4 2 4	2 5 4 2	4 4 3 2	3 3 3	8
Spain														0
Sweden			1											1
Thailand														0
Uganda														0
Uni.Rep. Tanzania														0
United Kingdom	3 1 1	1 1 1 1	1 1 1	1 1 2	1 1 1 1	1 1 1 1	1		3	3 2	5 1		16 2 2	11
United States	2 2 1	1	6	1 2	3 1 1	1 1	1 3			3 2 4 2 2				9
	13	15	18	17	17	14	17	14	15	17	17	16	16	

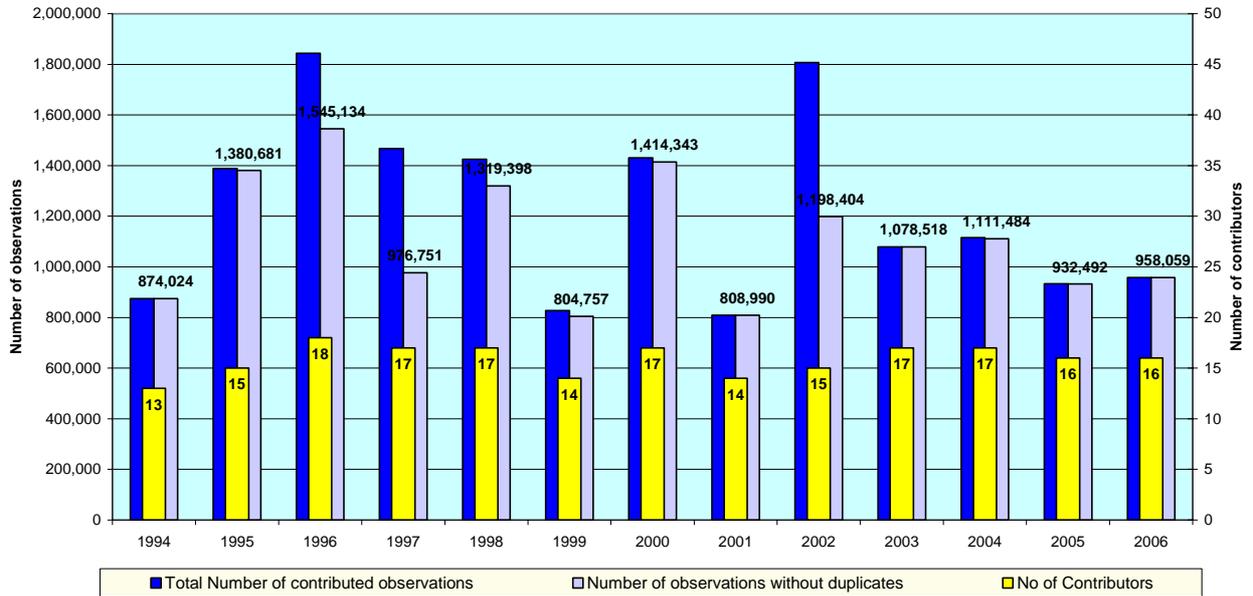
**Table III:****Observations from VOSClm Ships / Observations with VOSClm Additional Elements 2006**

<b>Country Name</b>	<b>1st Q</b>		<b>2nd Q</b>		<b>3rd Q</b>		<b>4th Q</b>		<b>Total</b>	
France	12041	0			6526	0			18567	0
Germany	3260	3249	1808	1537	2303	2009	2181	1976	9552	8771
India			888	792	1791	0			2679	792
Netherlands	293	204	571	368	1147	545			2011	1117
United Kingdom			43849	35940			7355	6839	51204	42779
<b>5 Countries</b>	<b>15594</b>	<b>3453</b>	<b>47116</b>	<b>38637</b>	<b>11767</b>	<b>2554</b>	<b>9536</b>	<b>8815</b>	<b>84013</b>	<b>53459</b>

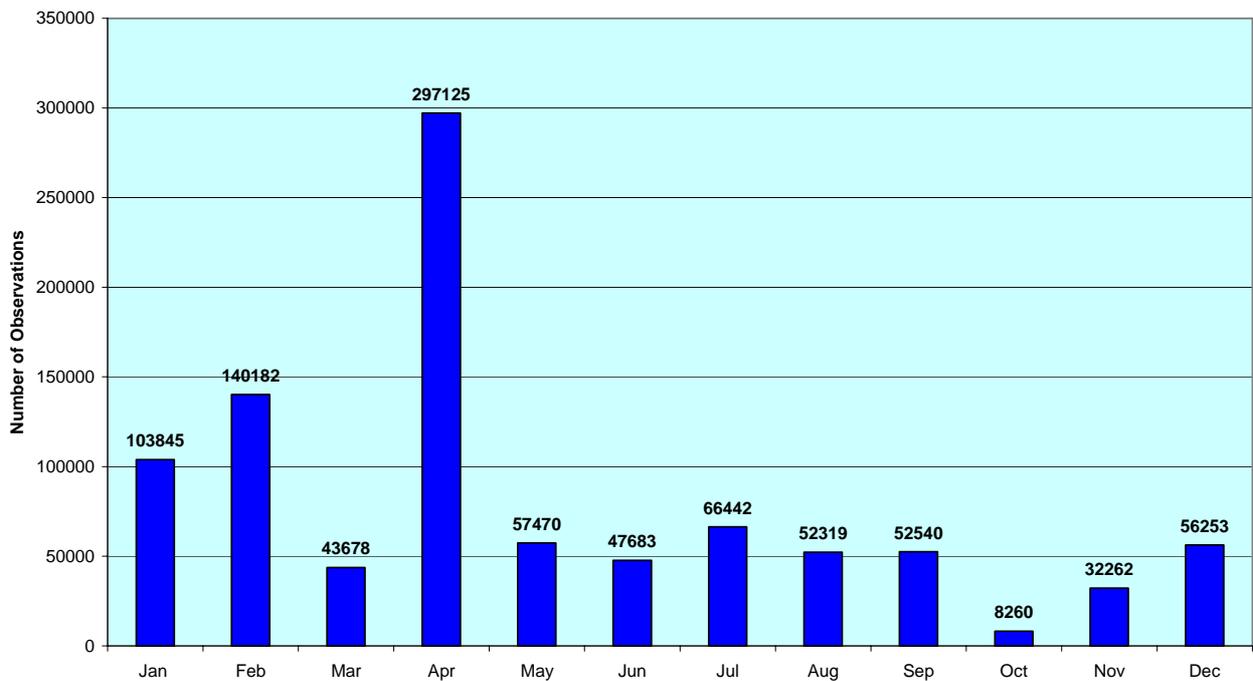
**Table IV:****Observations from VOSClm Ships / Observations with VOSClm Additional Elements (2003 - 2006)**

<b>Country Name</b>	<b>2003</b>		<b>2004</b>		<b>2005</b>		<b>2006</b>	
Australia	2078	0	3397	0	3928	0	0	0
Canada	0	0	0	0	0	0	0	0
France	0	0	30637	0	17619	0	18567	0
Germany	5675	5166	5345	5176	6474	6377	9552	8771
India	1332	0	3077	0	4269	0	2679	792
Japan	0	0	818	0	4439	0	0	0
Netherlands	215	0	603	0	2161	1899	2011	1117
United Kingdom	0	0	1017	0	0	0	51204	42779
USA	278	0	0	0	0	0	0	0
	<b>9578</b>	<b>5166</b>	<b>44894</b>	<b>5176</b>	<b>38890</b>	<b>8276</b>	<b>84013</b>	<b>53459</b>

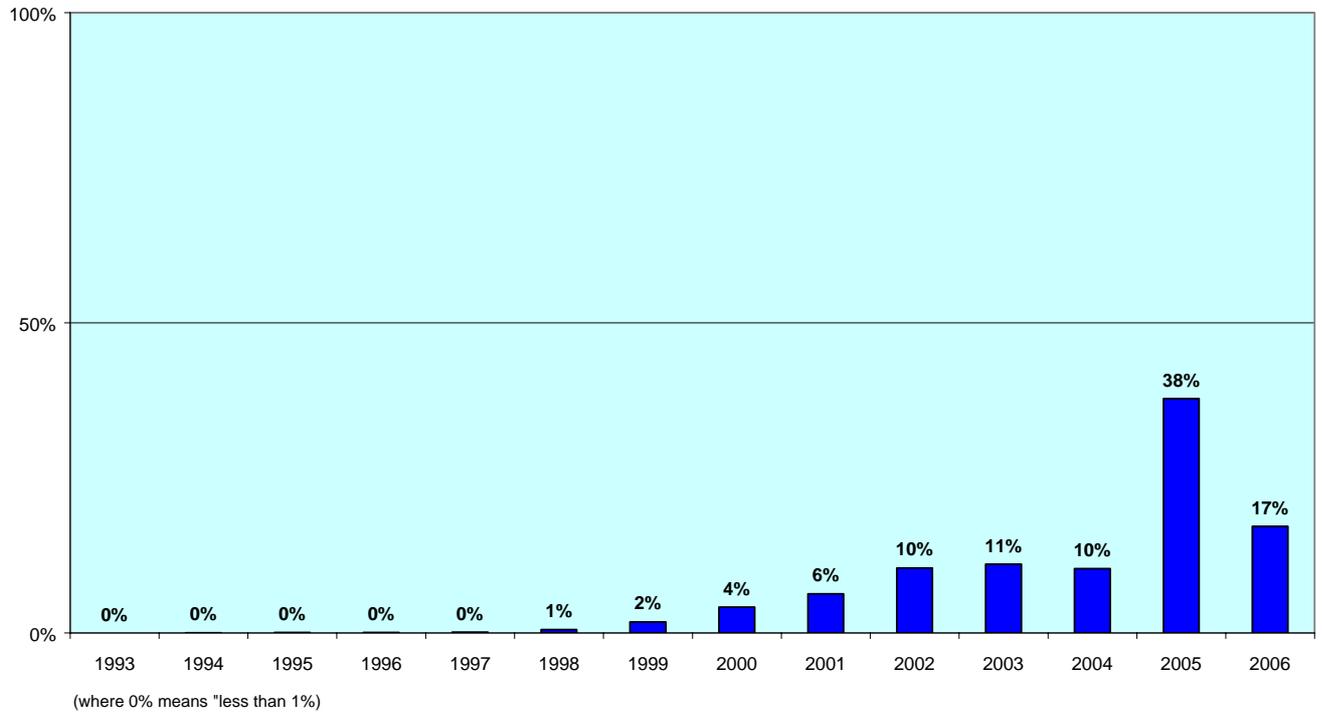
**Figure 1: Contributed and Distributed Observations 1994 - 2006**



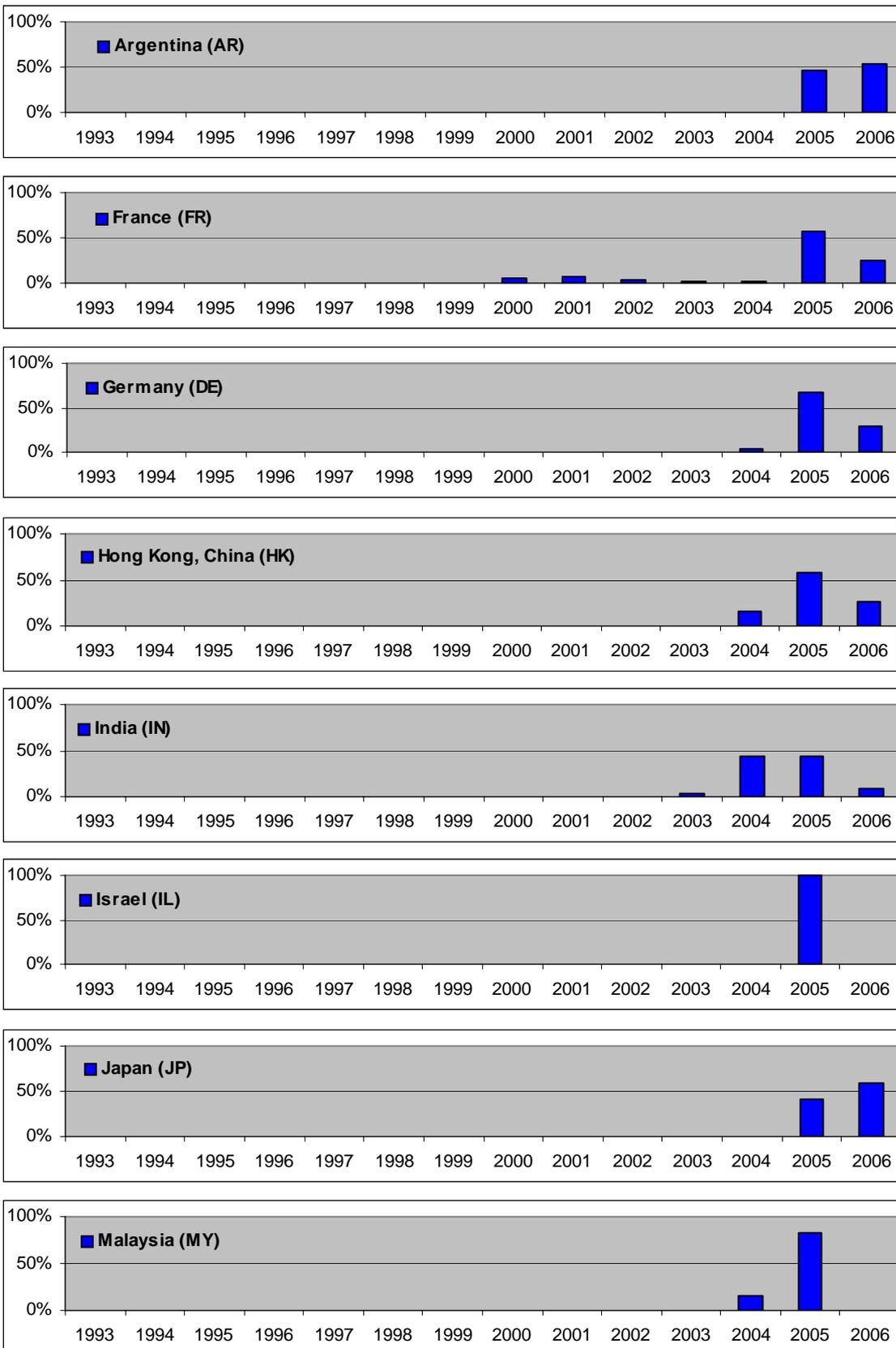
**Figure 2: Number of Contributions Received by Month 2006**



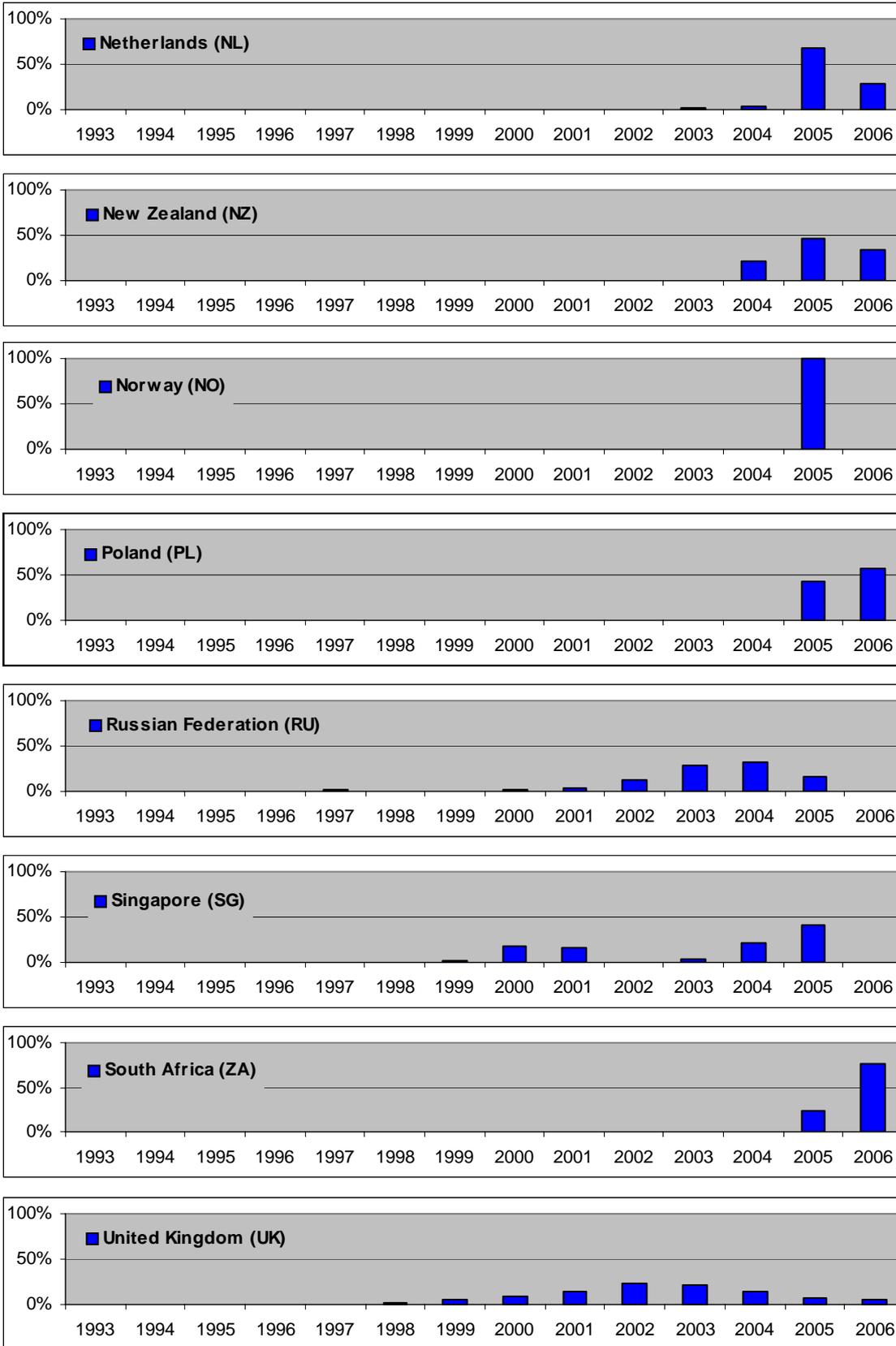
**Figure 3: Distribution of Data Received in 2006**

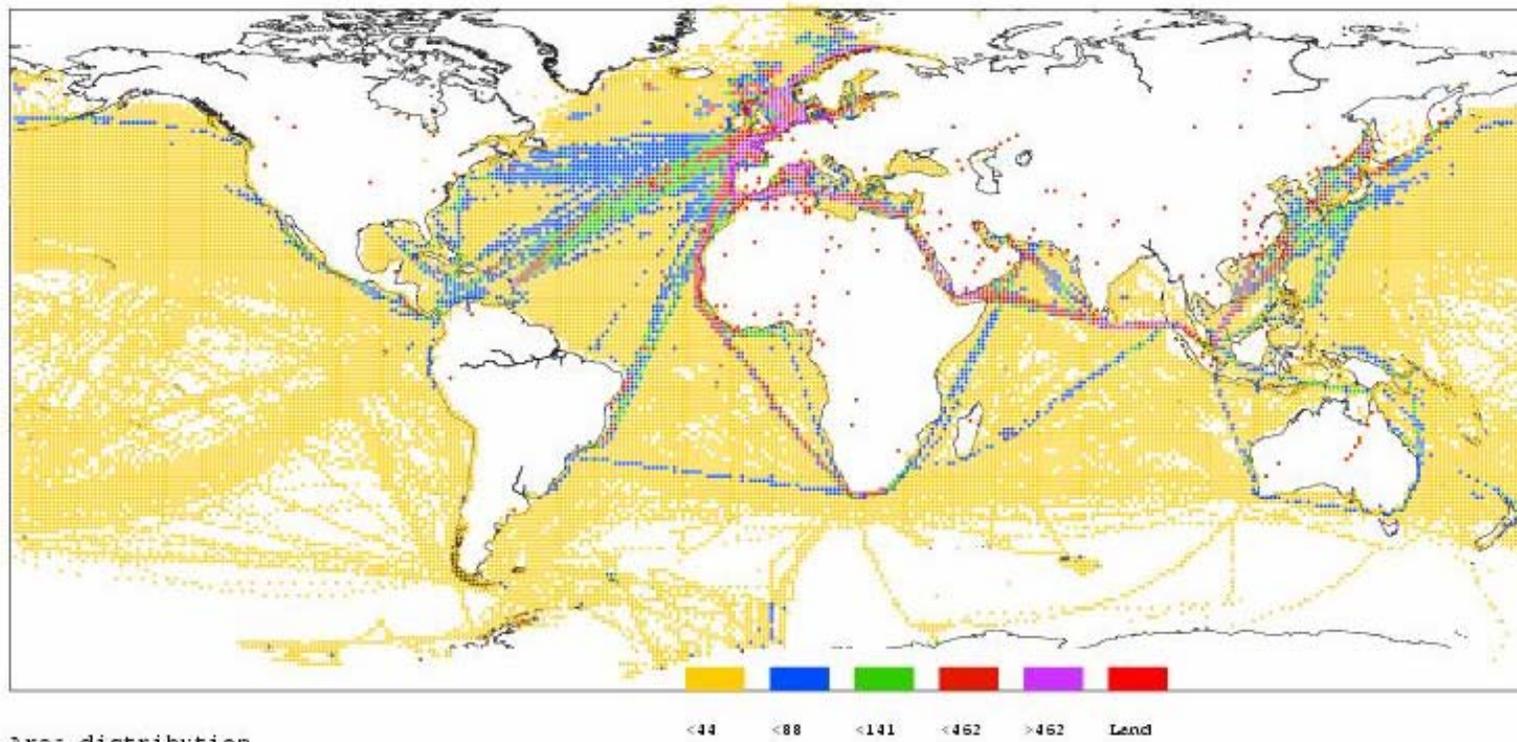


**Figure 4: Distribution of Data by Country**



**Figure 4 (continued): Distribution of Data by Country**

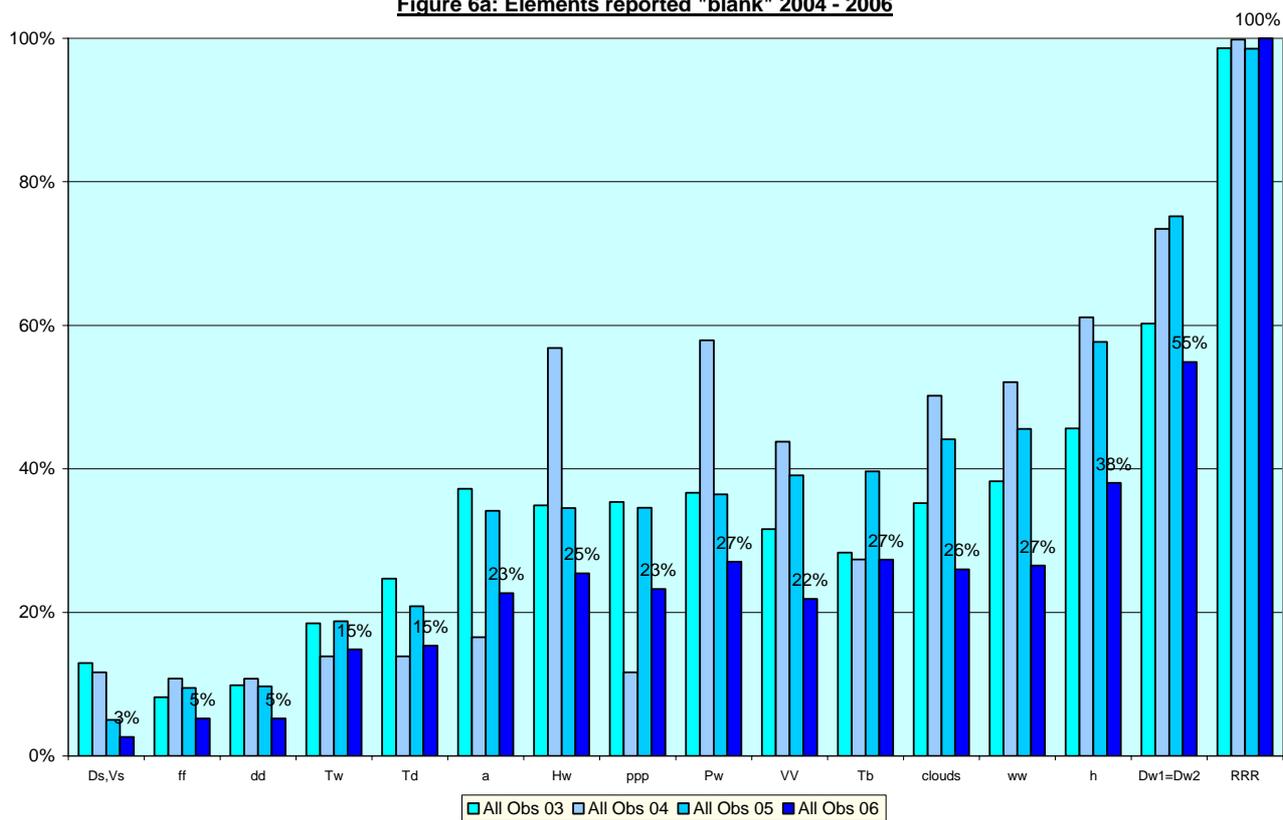




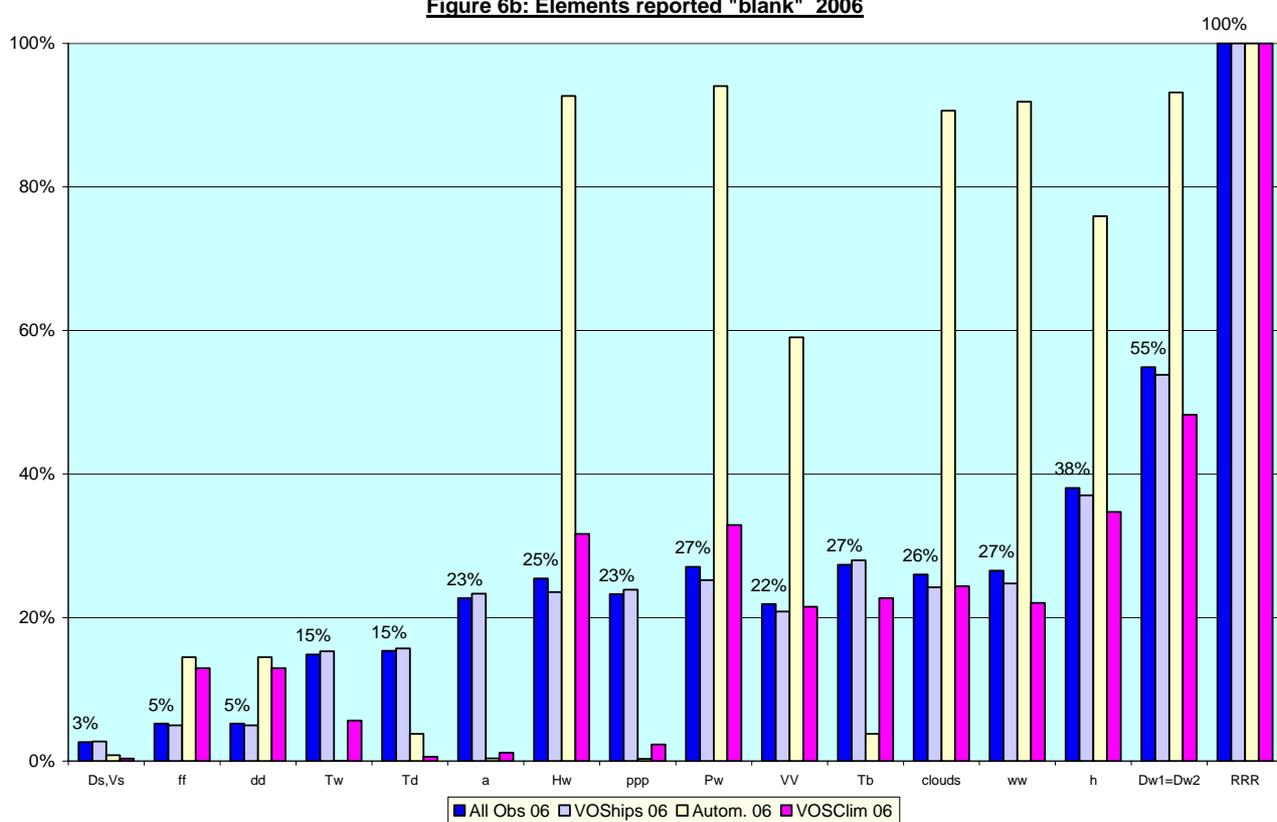
Total Number of observations (958059) received in 2006

**Figure 5: Areal Distribution of Reported Positions 2006**

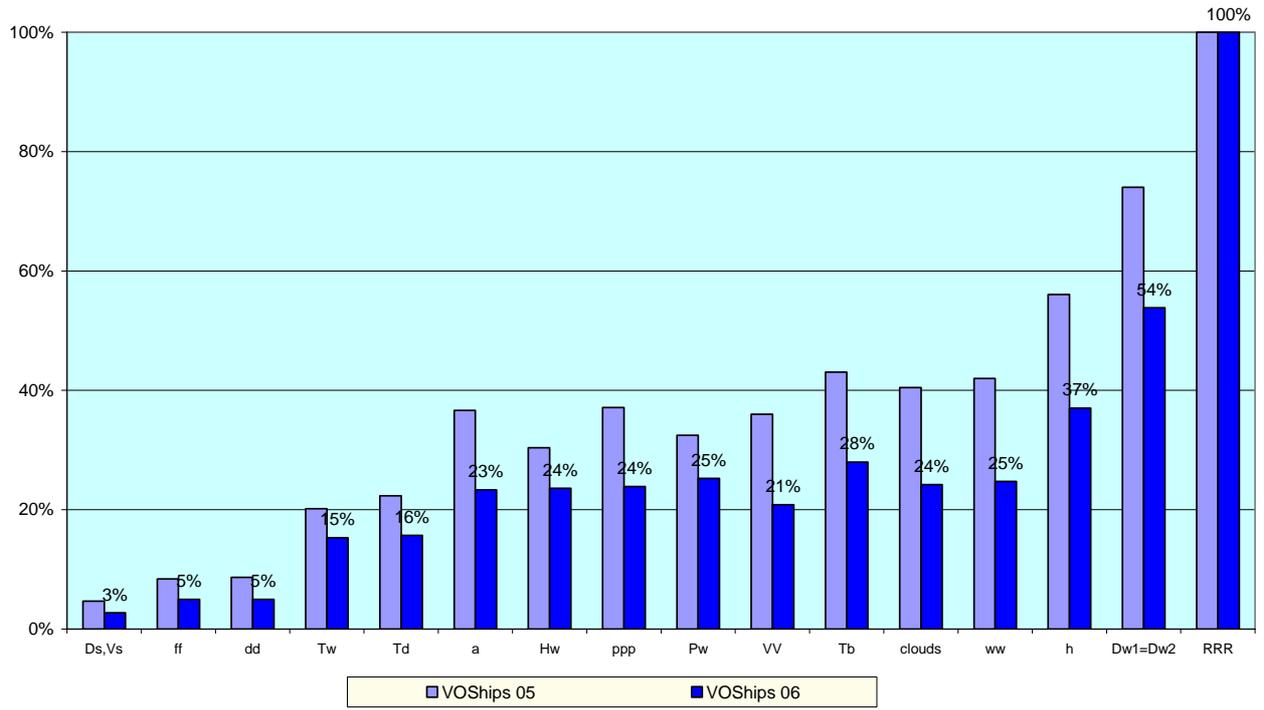
**Figure 6a: Elements reported "blank" 2004 - 2006**



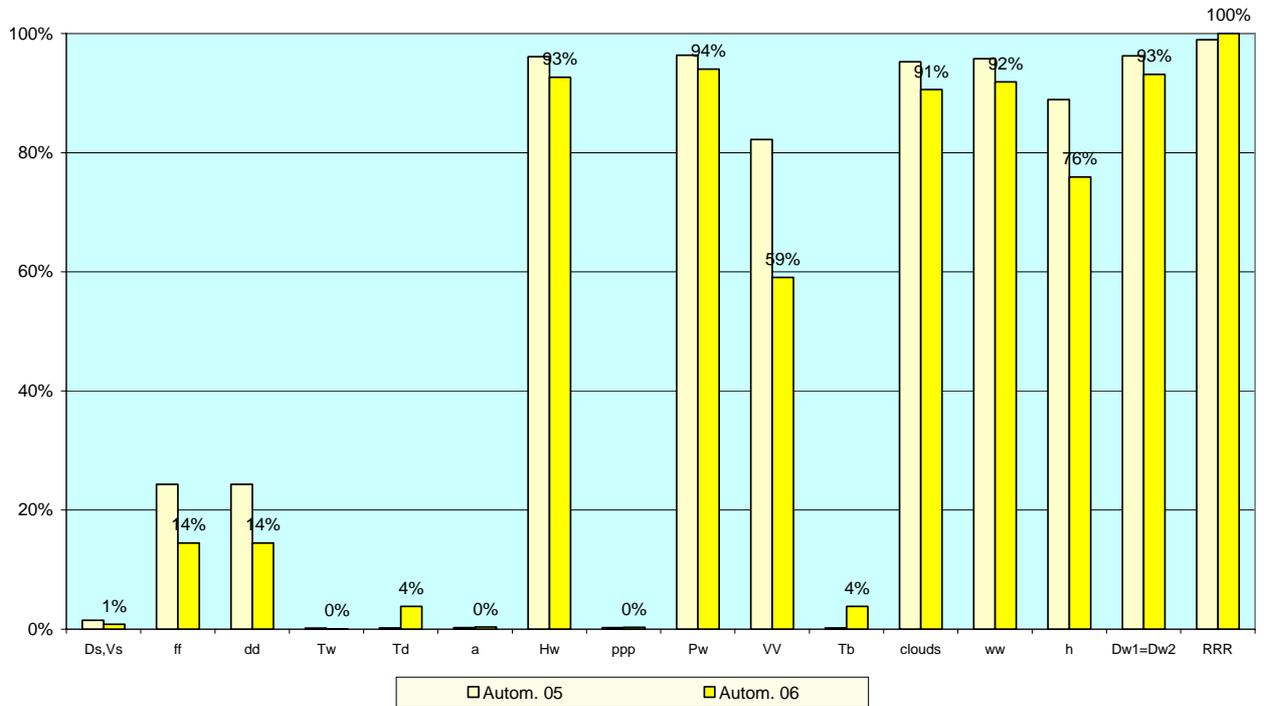
**Figure 6b: Elements reported "blank" 2006**



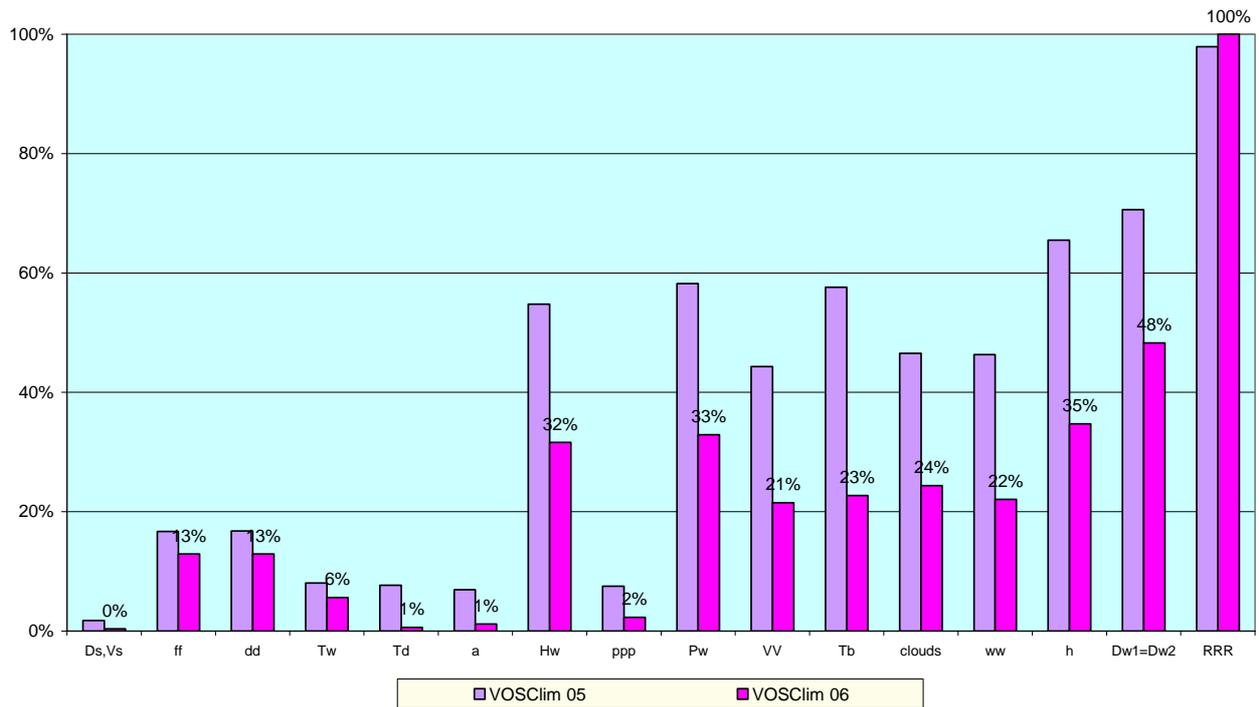
**Figure 6c: Elements reported blank from VOS-Ships 2005-2006**



**Figure 6d: Elements reported blank from Automated Stations 2005 - 2006**



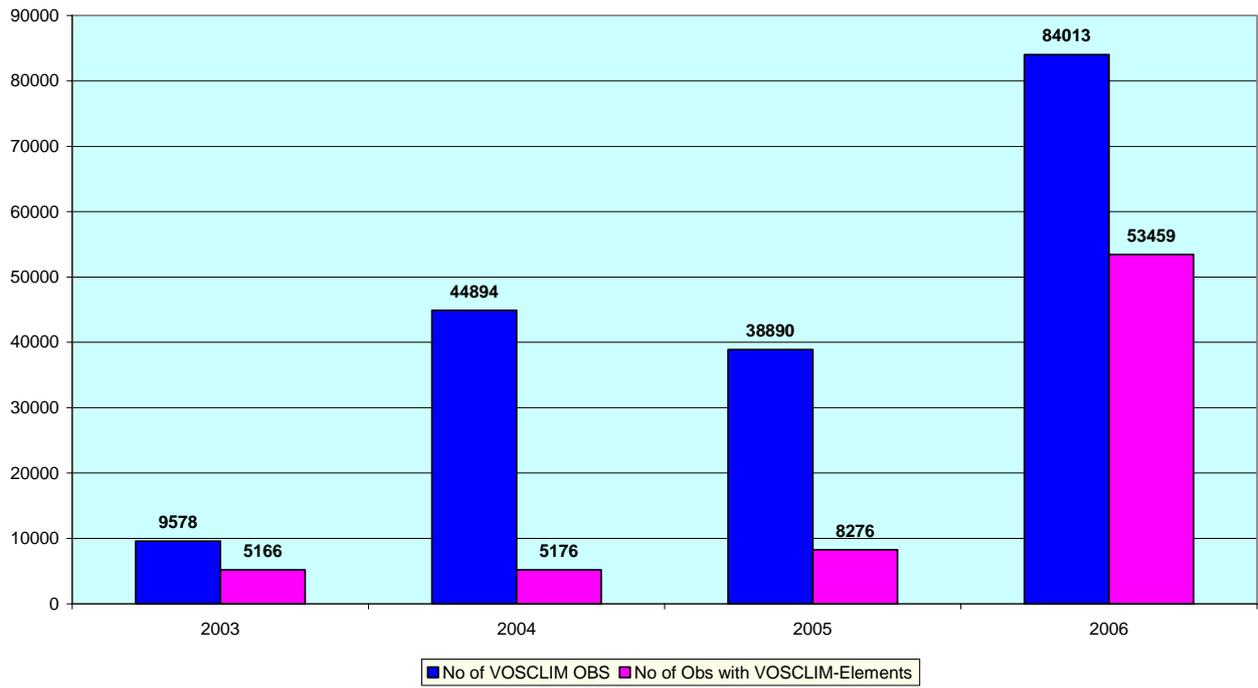
**Figure 6e: Elements reported blank from VOSclim-Ships 2005 - 2006**

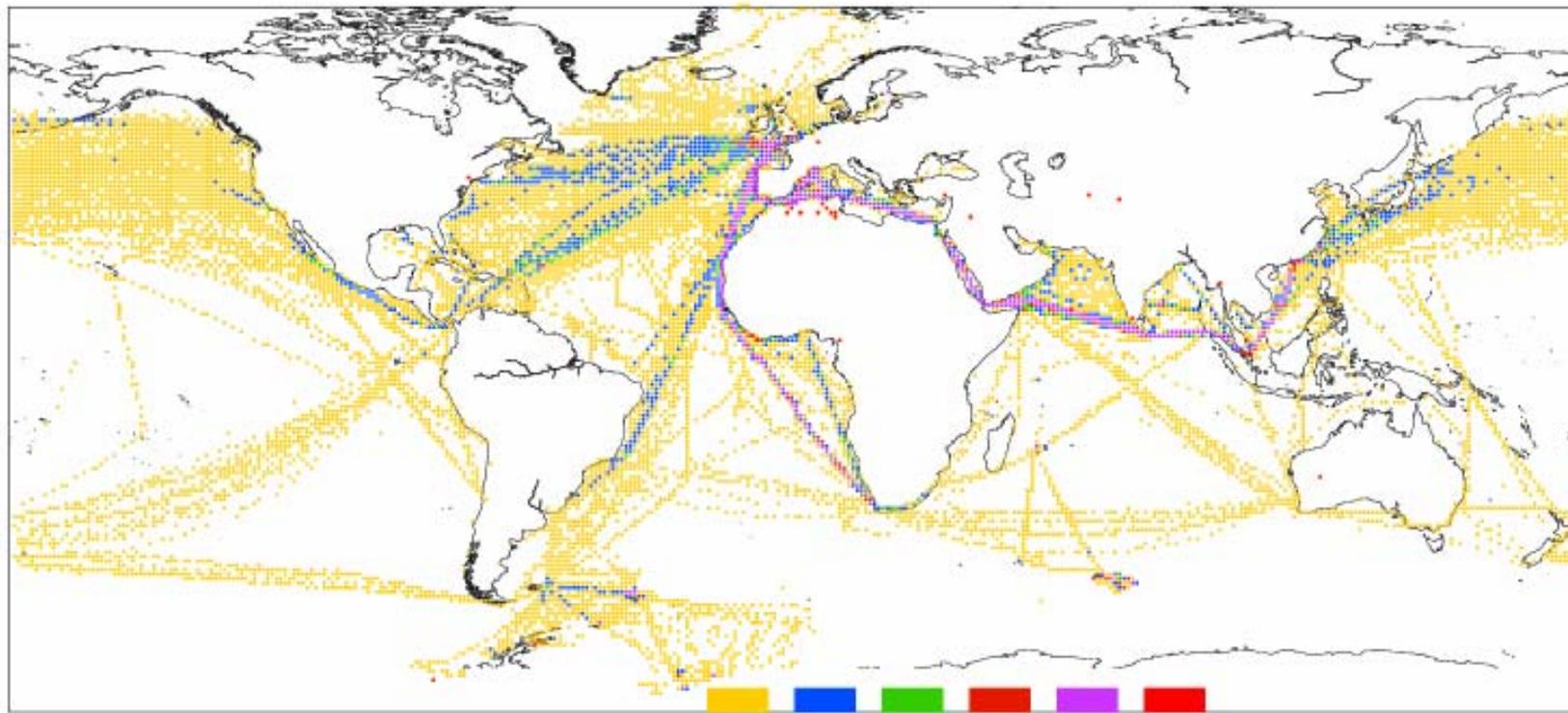


**Key**

- |     |                                                 |         |                                            |
|-----|-------------------------------------------------|---------|--------------------------------------------|
| Ds  | = True Ship Direction (Element 54)              | Clouds  | = All Clouds (Elements 12, 46-49)          |
| vs  | = Average Speed (Element 55)                    | ww      | = Present Weather (Element 21)             |
| ff  | = Wind Speed (Element 15)                       | h       | = Height of clouds (Element 10)            |
| dd  | = True Wind Direction (Element 13)              | Dw1/Dw2 | = Swell Direction 1 & 2 (Elements 34 & 56) |
| Tw  | = Sea Surface Temperature (Element 29)          | RRR     | = Precipitation Amount (Element 48)        |
| Td  | = Dew-point Temperature (Element 19)            |         |                                            |
| a   | = Pressure Tendency Characteristic (Element 52) |         |                                            |
| Hw  | = Wind Wave Height (Element 33)                 |         |                                            |
| ppp | = Pressure Tendency Amount (Element 53)         |         |                                            |
| Pw  | = Wind Wave Period (Element 32)                 |         |                                            |
| VV  | = Visibility (Element 11)                       |         |                                            |
| Tb  | = Wet-bulb Temperature (Element 51)             |         |                                            |

**Figure 7: VOSCLim - Input 2003 - 2006**





Area distribution

<9   <18   <27   <40   >40   Land

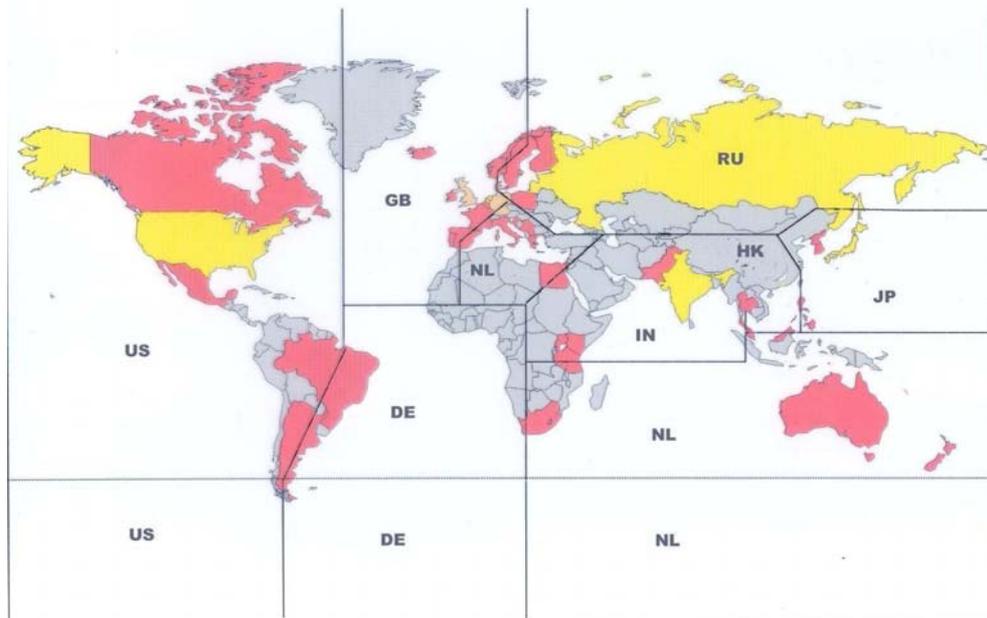
Total number of observations (84013) from VOSCLIM-ships received 2006

**Figure 8: VOSCLIM Ship Areal Distribution of Reported Positions 2006**

## Appendix A: Responsible Member Countries

### Countries under the MCSS

41 contributing members (2002)



## 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

