

Global Collecting Centres for Marine Climatological Data

Annual Report 2005

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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 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 will ensure that, even in the event of failure of one, total data-flow continues.

1.2 Introduction to GCC 2005

This 2005 report marks the 12th 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 2005. This includes the amounts of data received, problems encountered and also details the quality of these data. Section 3 provides information on contributions to JCOMM's VOSCLim project. As in section 2, this details volumes of data and any issues arisen

¹ <http://www.dwd.de/en/FundE/Klima/KLIS/int/GCC/GCC.htm> (address to be revised during 2006)

from the VOSclim ships. The distribution of all data is described in section 4 and finally, future development within the GCCs is reported in section 5.

2. Voluntary Observing Fleet (VOF)

2.1 VOF Data Contributions 2005

In 2005, the total number of observations received by the GCCs was 933,398 (see Table I). This is a 16% decrease on 2004 collections. The contributions came from 16 countries and although this is similar in number to 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. More than half of countries submitting data in 2005 only did so 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 (42% IMMT-1, 47% IMMT-2, 11% 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, this can be problematic for the GCCs as it hinders processing. Therefore, submissions are requested to be in only one IMMT format.

The volume of data received over the past twelve years varies significantly. This is observed in figure 1. In figure 2 however, a notably smoother variation can be seen as only unique data (non-duplicate) have been displayed. This implies that in some years there have been significantly large submissions of duplicated data. The problem has not been as evident in 2005, with the number of duplicates making up around 0.1% of observations. Although this is a considerable reduction on last year it is still an issue that some CMs need to address. By checking the data prior to submission these problems could be dealt with before the GCCs receive the data. [N.B. A consolidated MQC-software is available free of charge to all CMs through the GCCs.]

Data was received by the GCCs each month during 2005, but it is noted that there was considerably more data received in the first half of the year (figure 3). The distribution of observing periods within 2005 continues to span more than a decade (figure 4 & 5). It can be seen that data has been received from as far back as 1993, and that 67% of observations were from 2004 and 2005 alone. The GCCs appreciate the prompt submission of data, however, although the percentage of old data is small it still represents a valuable addition to the global database.

2.2 VOF Data Processing

To ensure that data meet the JCOMM agreed Minimum Quality Control Standards, 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. 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 the data by the CM before submission would save time and help alleviate this problem. On occasion, however, some errors cannot be corrected and these data are then rejected from the dataset to a 'dregs' file. Occurrences of this sort are mostly due to duplicated data. As stated above, 0.1% (906) of observations received in 2005 fell into this category.

Correct positioning is an issue still to be considered, with many 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 on-land are highlighted in red. There were 327 observations reported on-land in 2005 which is an improvement on 474 in 2004.

2.2.1 VOF Data Processing – Detailed Analysis

A detailed analysis of GCC 2005 processing identified further issues in the reporting of observations. There has been an increase in contributions from several CMs using invalid coding. For 0.08% of data the FM13 coding of "/" or "-" is used in the observation instead of a blank as required by IMMT, this is a considerable increase on 2004. 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 18% 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 confirmed that in 2005, 9.3% of observations did not have flags set at all. This figure is five times larger than last year (2004: 1.8%). Analysis further identifies 24,114 (0.02%) 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).

There is evidence to show that the percentage of elements reported blank has varied frequently over past years. Figure 7a shows the percentage of reported blank elements for 2003 to 2005. Figure 7b details blank elements for VOS, automated stations and VOSclim ships. It is interesting to see that for several elements there have been significant changes since 2004. Wind wave period and height appear to be reported more often, with the sharp increase in blanks during 2004 proving to be anomalous. The most commonly reported blank elements were precipitation, swell direction and height of lowest cloud, with most frequent 'blank' reports submitted from automated stations.

Detailed bilateral correspondence was conducted with some CMs on the improvement of data quality and resolving of problems.

3. VOSclim

3.1 VOSclim Contributions 2005

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 of how the data have been obtained. These data will be available in delayed mode and should be 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.

In 2005, VOSClim submissions were received from six of the nine CMs. The GCCs received 38,890 observations from VOSClim ships (Table III & IV), contributing to 4% of the total submissions. However, the number with additional VOSClim elements was disappointing with only 8,276 observations containing these. This is less than a quarter of total VOSClim ship submissions.

It is seen that there are many observations received from non-VOSClim ships containing the additional elements. In fact, these amounted to another 5,991 observations in 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 issues involved with setting up VOSClim data exchange. Any countries having such problems are encouraged to contact the GCCs to make them aware of this.

It must be noted that failure of VOSClim participants to regularly collect and submit data may be detrimental to the success of the project.

3.2 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 10 observations (0.03%) 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. Comparable to VOF, this occurred on 0.03% of occasions.

In figure 7b it can be seen that most reported blank elements for VOSClim 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 and wet-bulb temperature, 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 VOSClim data in the newer formats. On occasion, data has been submitted to the GCCs from VOSClim ships without inclusion of extra elements and then, at a later date, these have been re-submitted with VOSClim elements added. The GCCs would ask CMs to please hold submission until full observations can be sent, else RMs would receive a great deal of duplicated data.

4. Dispatch of Data

During the year, four data collectives are dispatched 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'.

Additionally at the end of each quarter, all observations received from VOSclim ships are dispatched to the Data Assembly Center in the USA. This is forwarded in the same way as to RMs. For details of the number of observations sent refer to Table II and figure 8.

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.

5. Developments

2nd Session of JCOMM: JCOMM met for the second time during September 2005 in Halifax, Canada. At this meeting both IMMT-3 and MQCS-V were adopted and are to be fully implemented by January 2007. MQCS-V has, however, been phased in since July 2004 and from 3rd quarter 2005 the GCC quarterly exchange has been performed using MQCS-V in the IMMT-3 format.

MCSS Questionnaire: A MCSS questionnaire was distributed by the WMO in October 2005. Results were to be sent to the ETMC Chair, Prof. Mirosław Mielus (Poland). However, at the 2nd session of JCOMM in September 2005 there was a revision of Expert Teams and the ETMC Chair is now Scott Woodruff (USA). The questionnaire results are yet to be published.

MQCforCM Software: GCC Germany has created and checked the new software, MQCforCM version 3. However, due to resource and software issues at the GCC UK there has been a delay with final testing. This testing is now underway and it is hoped distribution will follow shortly. This new software will include changes to checks according to MQCS-V, checking present weather codes from automatic stations, checking of VOSclim additional elements and the addition of new flags in the IMMT-3 format.

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

6. Summary

To summarise, the GCCs continue to receive data from a number of CMs regularly and generally the quality of this data appears to be improving with time. 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 are some points from the report that need consideration from CMs.

For VOS data;

- Observations should be submitted regularly on a quarterly basis.
- 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.

For VOSClim Ship data;

- All VOSClim ship data submissions should include additional VOSClim elements.
- CMs that have not yet submitted observations from VOSClim ships are encouraged to do so at their earliest convenience.
- 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.

With increasing demand from climate research, marine forecasting, satellite calibration climate modeling and maritime industries, marine data is highly sought after. Therefore, CMs can understand the importance of 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 2005. As always, all members are invited to provide further feedback which may benefit the whole system and integrity of the marine database.

Abbreviations

CM	Contributing Member
CMM	Commission for Marine Meteorology
DWD	Deutscher Wetterdienst
GCC	Global Collecting Centre (MCSS / JCOMM)
IMMT	International Maritime Meteorological Tape
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
KNMI	Koninklijk Nederlands Meteorologisch Instituut
MCSS	Marine Climatological Summaries Scheme
MQC	Minimum Quality Control (WMO Standard)
MQCS-V	Minimum Quality Control Standards (Version 5, July 2004)
RM	Responsible Member
UK	United Kingdom
VOF	Voluntary Observing Fleet
VOS	Voluntary Observing Ship
VOSClim	VOS Climate (Subset for High Quality Data - Project)
WMO	World Meteorological Organization

Table I:**GCC Observations 2005**

Country Name	1st Q	2nd Q	3rd Q	4th Q	Total
Argentina	133	297	68	42	540
Australia	47963				47963
Denmark	52315				52315
France	37854	39779	56347		133980
Germany	57035	229872	45418	40847	373172
Hong Kong, China	2344	1328	1700	1505	6877
India		8351	1591	3501	13443
Israel			9002		9002
Japan	11478	11388	12901	11822	47589
Malaysia			1915	994	2909
Netherlands		47235	16510		63745
Norway			67358	8263	75621
Poland		1168		1563	2731
Russian Federation	25013	25603	25032	25368	101016
Singapore		288			288
South Africa	815	399	445	548	2207
16 Countries	234950	365708	238287	94453	933398

Table II: Number of Contributions by CMs Each Quarter (1994 - 2005)

MCSS-Contributing Member	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Number of Years with Contributions
Argentina								1					4
Australia							3		1	1	1	1	5
Belgium													0
Brazil	1	1	1	1		1	1						4
Canada													0
Croatia				1	1	1	1	1					5
Denmark							3	2	1			2	4
Egypt													0
Finland													0
France	1	1	1	1	1	1		6	3	1		2	9
Germany	1	4	2	4	3	3	4	3	2	4	2	1	12
Greece													0
Hong Kong, China	1	1	1	1	1	1	1	1	1	1	1	1	12
Iceland													0
India	1	2	1	1	1	1	1	1	1	1	1	1	12
Ireland				1	1	1	2			2			4
Israel		2	1	1	1	1	1	1	1	1	1	1	11
Italy													0
Japan	(6)	1	1	1	2	1	1	1	1	1	1	1	12
Kenya													0
Korea							1						1
Malaysia	1			1	1	1	1	2	1	1	2	1	10
Mexico													0
Netherlands	1	2	2	1	2	2	1	1	1	1	1	1	10
New Caledonia	1	1	1	1	1	1	1	1					6
New Zealand													0
Norway	5	4	2	2	2	6	3	3	6	3	3	3	12
Pakistan													0
Philippines													0
Poland	1	2	1	1	1	1	1	2	1	1	1	1	12
Portugal													0
Russian Federation		2	1	1	4	2	3	6	1	1	1	1	11
Singapore		1	1	1	1	1	1	1			1	1	7
South Africa						4	1	1	1	2	5	2	7
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	10
United States	2	2	1	1	6	1	2	3	1	1	1	3	9
Total Countries	13	15	18	17	17	14	17	14	15	17	17	16	

Table III:**Observations from VOSCLim-Ships / Observations with VOSCLim-Elements**
2005

Country Name	1st Q		2nd Q		3rd Q		4th Q		Total	
Australia	3928	0							3928	0
France	1464	0	10647	0	5508	0			17619	0
Germany	2608	2608	1490	1401	1067	1060	1309	1308	6474	6377
India			2841	0	399	0	1029	0	4269	0
Japan					4439	0			4439	0
Netherlands			1509	1247	652	652			2161	1899
6 Countries	8000	2608	16487	2648	12065	1712	2338	1308	38890	8276

Table IV:**Observations from VOSCLim-Ships / Observations with VOSCLim-Elements**
2003 - 2005

Country Name	2003		2004		2005	
Australia	2078	0	3397	0	3928	0
Canada	0	0	0	0	0	0
France	0	0	30637	0	17619	0
Germany	5675	5166	5345	5176	6474	6377
India	1332	0	3077	0	4269	0
Japan	0	0	818	0	4439	0
Netherlands	215	0	603	0	2161	1899
UK	0	0	1017	0	0	0
USA	278	0	0	0	0	0
	9578	5166	44894	5176	38890	8276

Figure 1 - Yearly Contributions 1994 - 2005

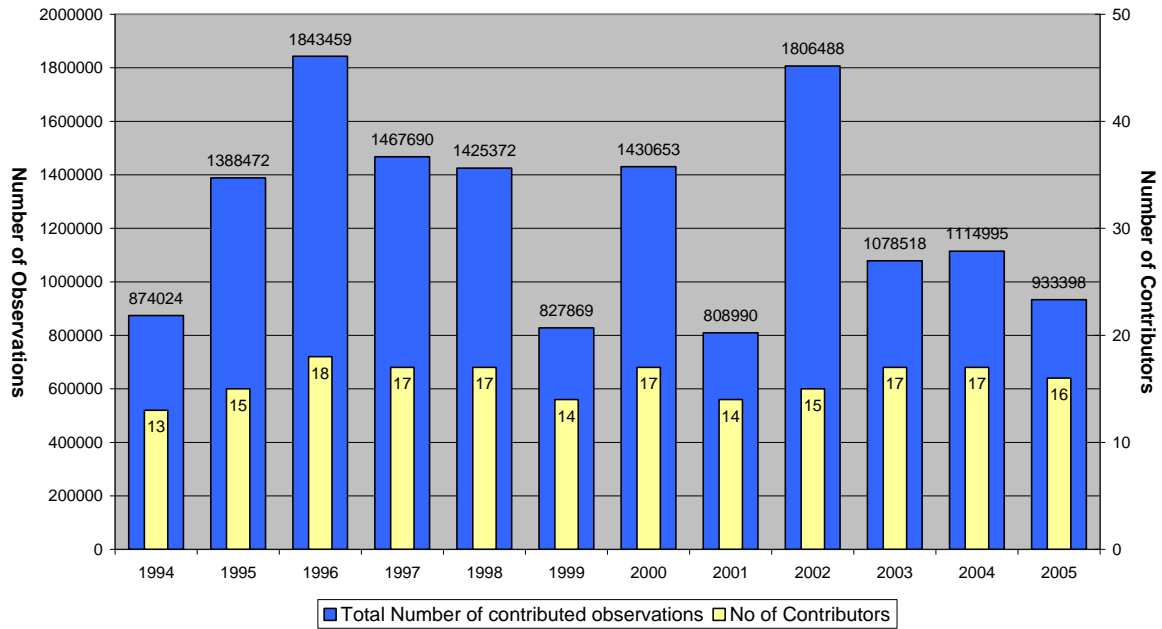


Figure 2 - Non-duplicated Contributions 1994 - 2005

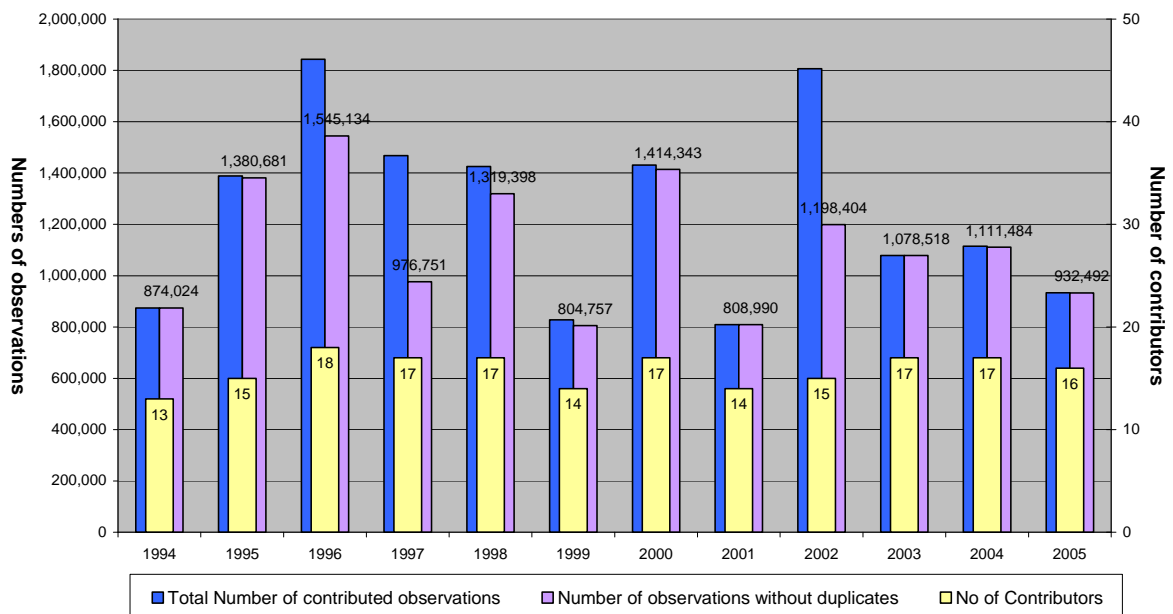


Figure 3 - Number of Contributions Received by Month 2005

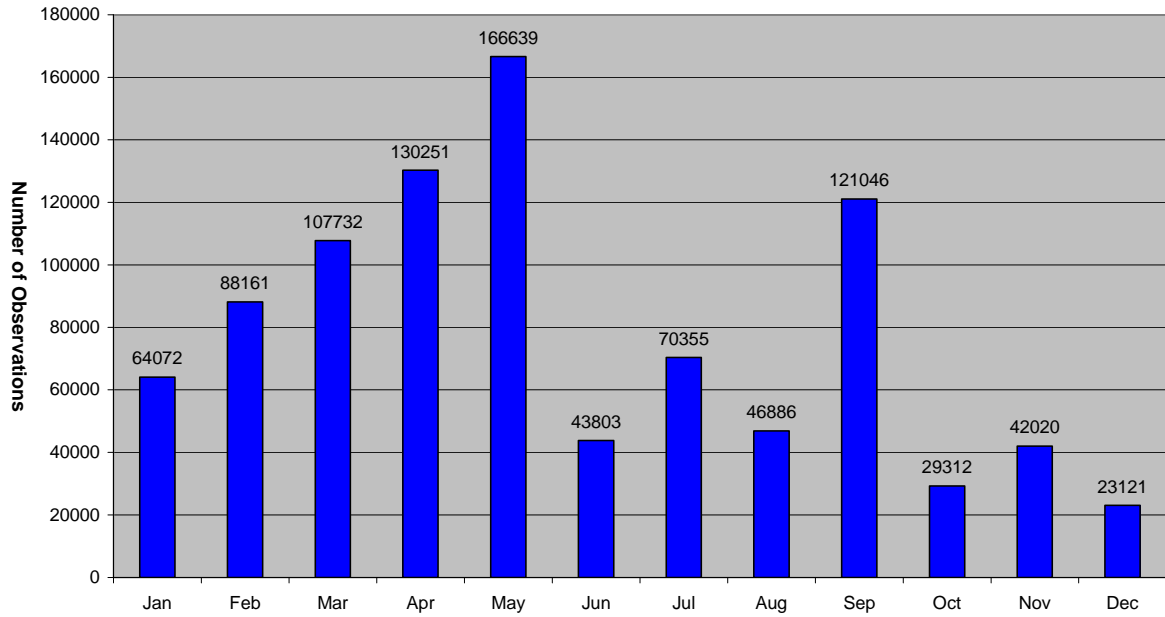


Figure 4 - Distribution of Data Received in 2005

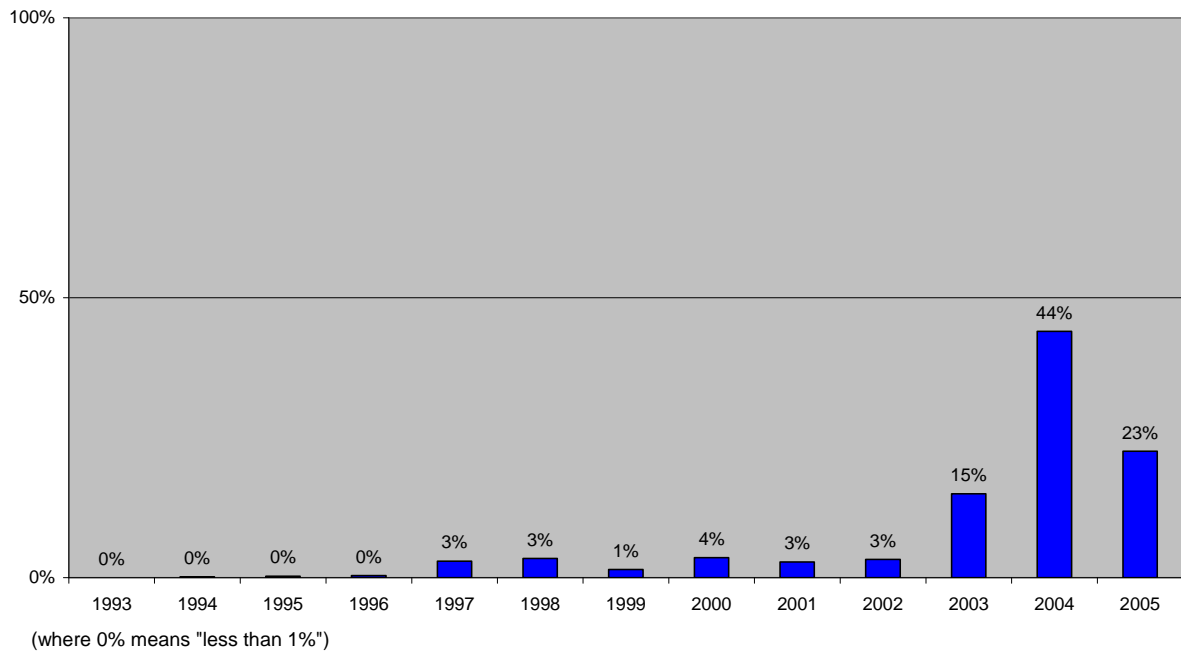


Figure 5 – Distribution of Data by Country

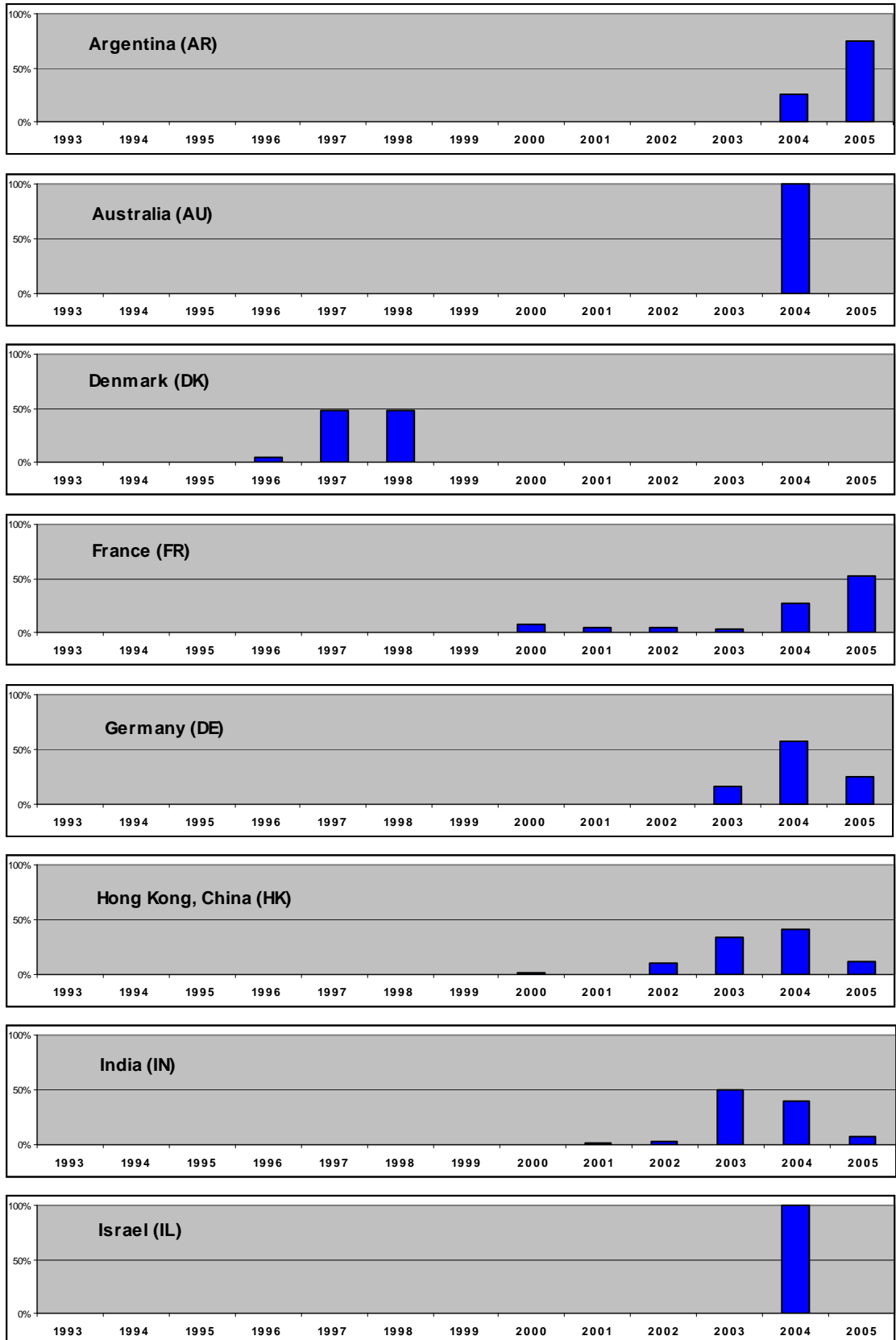
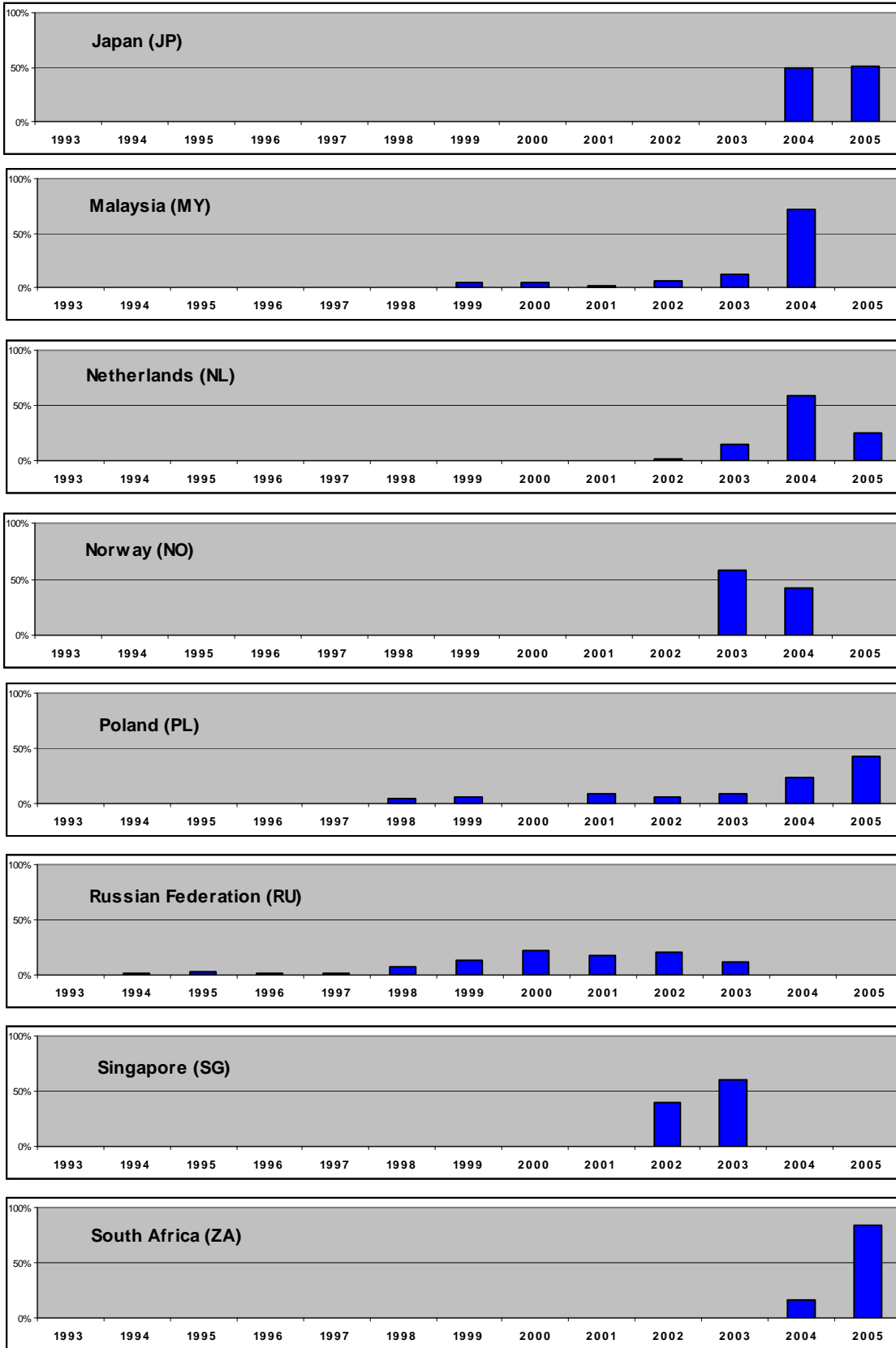


Figure 5 cont. – Distribution of Data by Country



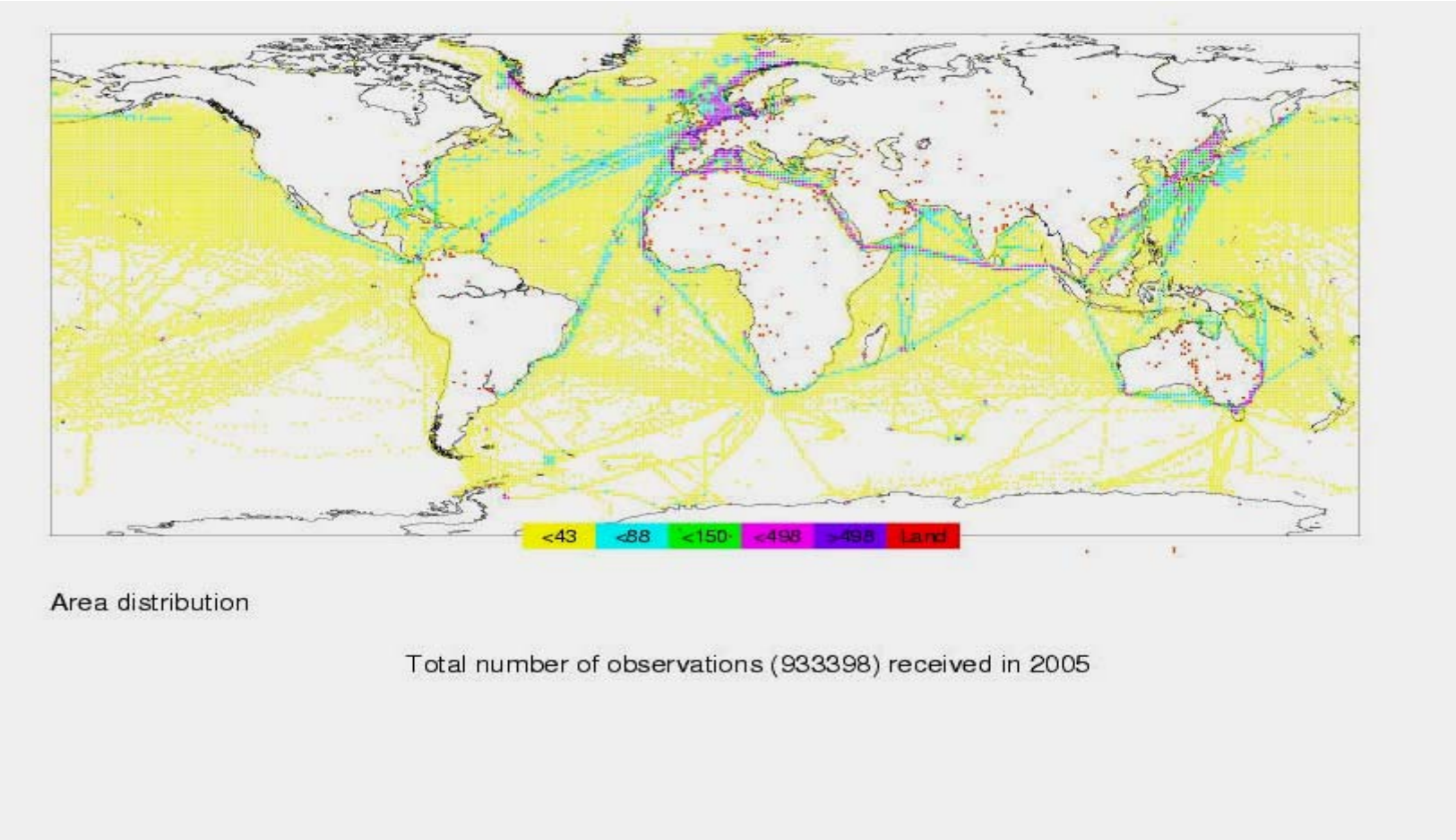


Figure 6 - Areal Distribution of Reported Positions

Figure 7a - Elements reported Blank 2003 - 2005

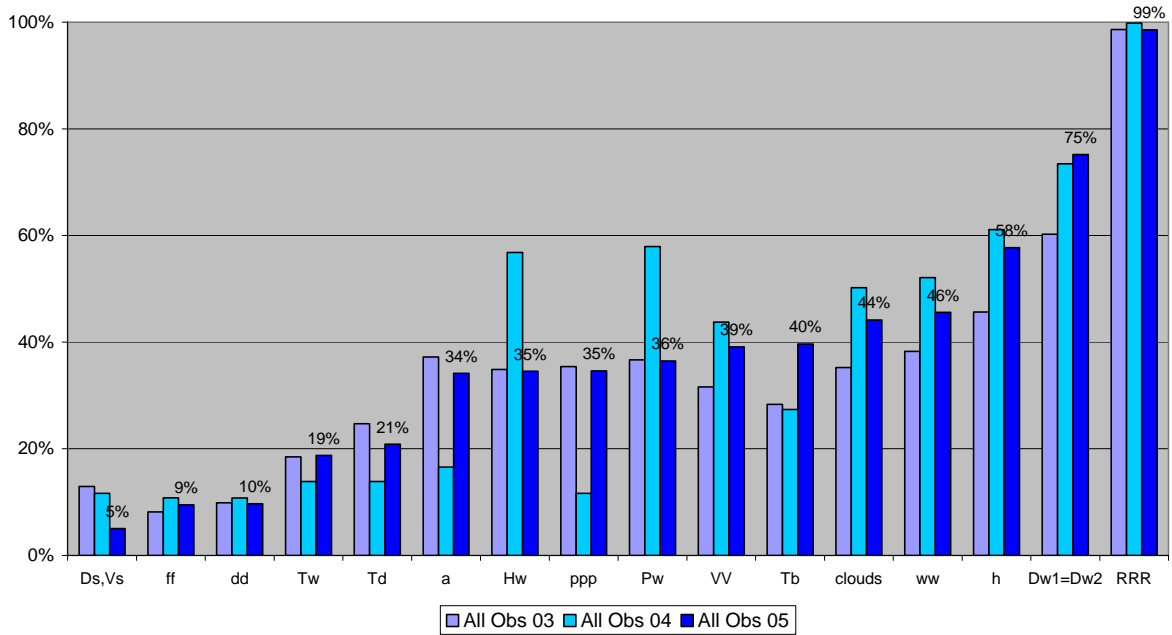
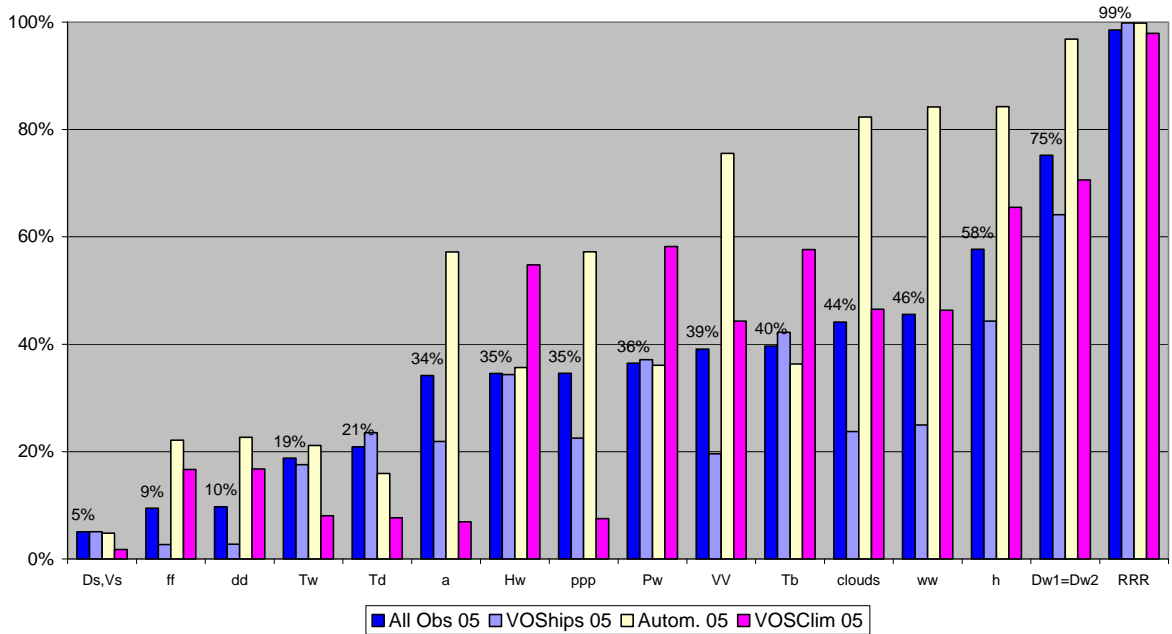


Figure 7b - Elements reported blank 2005

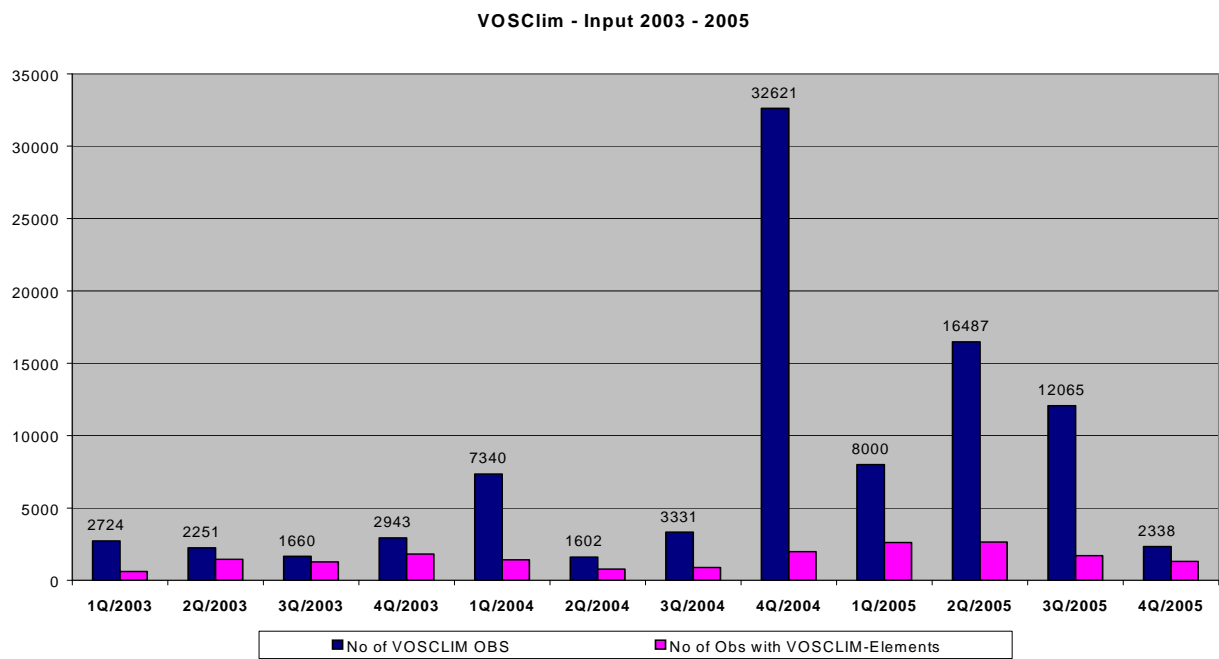


Key

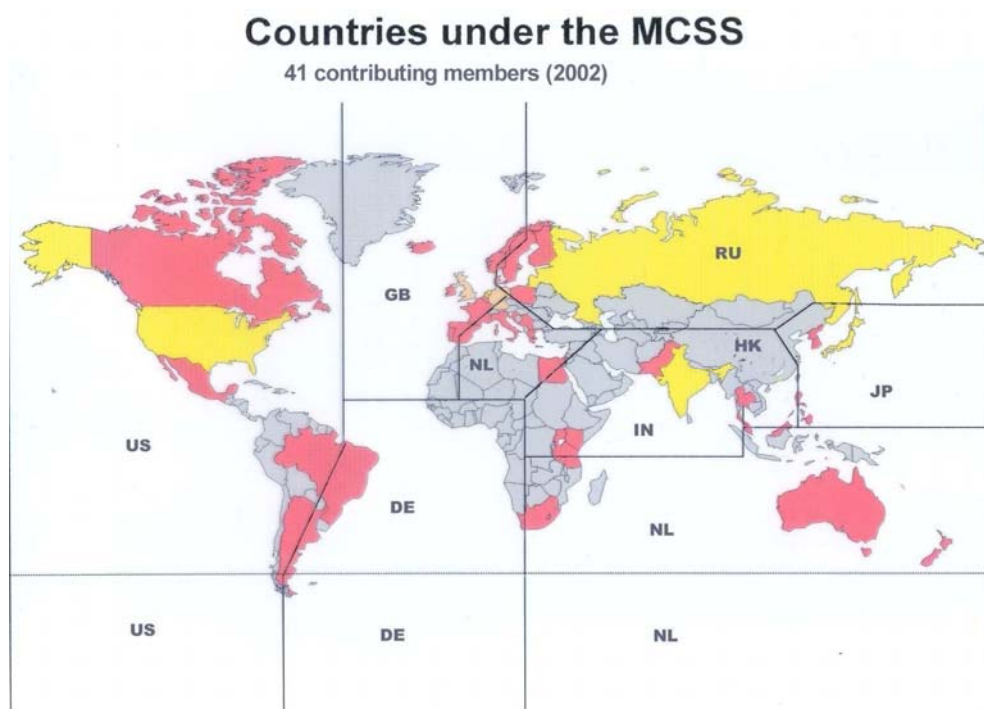
- Ds = True Ship Direction (Element 54)
- vs = Average Speed (Element 55)
- ff = Wind Speed (Element 15)
- dd = True Wind Direction (Element 13)
- Tw = Sea Surface Temperature (Element 29)
- Td = Dew-point Temperature (Element 19)
- a = Pressure Tendency Characteristic (Element 52)
- Hw = Wind Wave Height (Element 33)
- ppp = Pressure Tendency Amount (Element 53)
- Pw = Wind Wave Period (Element 32)
- VV = Visibility (Element 11)
- Tb = Wet-bulb Temperature (Element 51)

- Clouds = All Clouds (Elements 12, 46-49)
- ww = Present Weather (Element 21)
- h = Height of clouds (Element 10)
- Dw1/Dw2 = Swell Direction 1 & 2 (Elements 34 & 56)
- RRR = Precipitation Amount (Element 48)

Figure 8 - VOSCLim Input (2003 – 2005)



Appendix A: Responsible Member Countries



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

