

## **Global Collecting Centre**

### **Annual Report 2016**



#### ***GCC Germany***

Deutscher Wetterdienst  
GCC

Bernhard-Nocht-Str. 76  
20359 Hamburg  
Germany  
email: [gcc@dwd.de](mailto:gcc@dwd.de)  
[www.dwd.de/gcc](http://www.dwd.de/gcc)



## **Met Office**

#### ***GCC United Kingdom***

Met Office  
GCC

S9 Saughton House  
Broomhouse Drive  
Edinburgh, EH11 3XQ  
Scotland, UK  
email: [gcc@metoffice.gov.uk](mailto:gcc@metoffice.gov.uk)

### **Summary**

2016 marks the 23<sup>rd</sup> year of GCC operation, 23 years of successful and effective data management. 16 Contributing Members submitted 716,251 observations to the GCCs in 2016 (see Figure 1), with the majority of observations made in the last two years and the oldest records dating back to 2005.

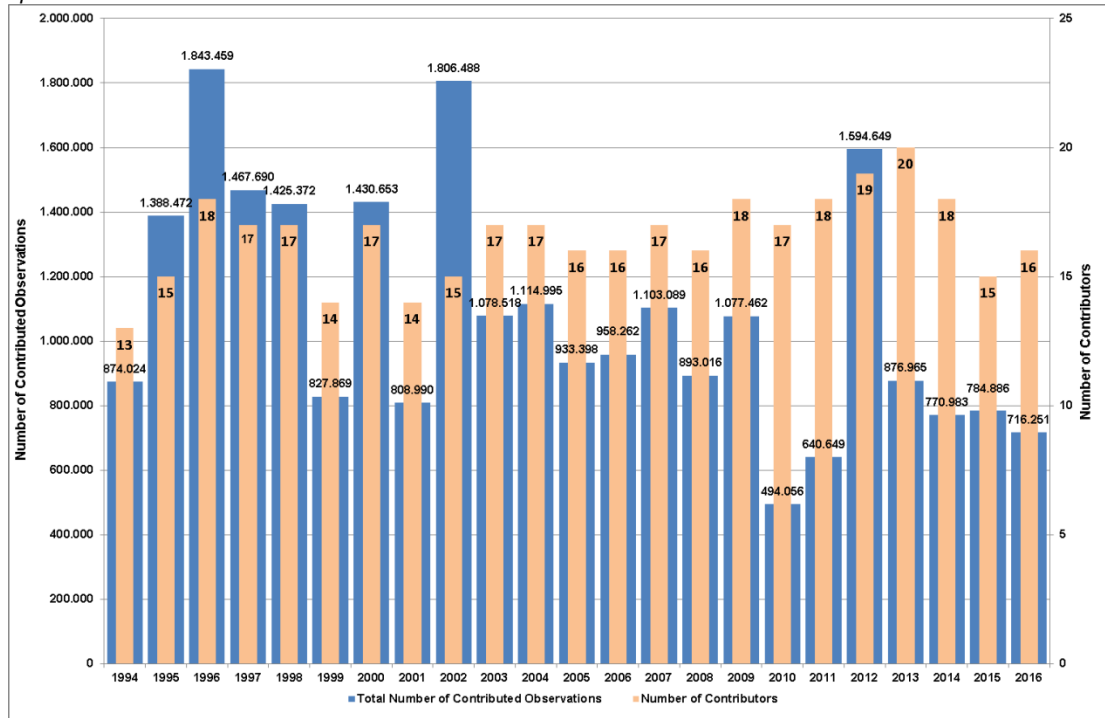
Both GCCs have been identified as 'Data Collection & Production Centres' (DCPCs) for the WMO Information System (WIS) and are able to provide 24.9 million MQCS-checked and flagged observations received by the GCCs from 1996 to 2016.

All data, original and MQC-checked, are available on the German WIS GIS  
[http://gisc.dwd.de/GISC\\_DWD/toSimpleSearch.do](http://gisc.dwd.de/GISC_DWD/toSimpleSearch.do).

### **Background**

The two Global Collecting Centres (GCCs) for JCOMM's Marine Climatological Summaries Scheme (MCSS) were set up in 1993 to improve the data flow and quality of delayed-mode Voluntary Observing Ship (VOS) data. Data is received regularly by the GCCs (Figure 1 and Appendix A) from the MCSS Contributing Members (CMs) (Appendix B). This is then quality ensured to the Minimum Quality Control Standard (MQCS-7) and quarterly made available to Responsible Members (RMs) via FTP. For further information about the MCSS and GCCs work, terms of reference, data format and QC standards, see WMO Manual 558 and WMO Guide 471.

Figure 1: Numbers of contributed observations and active Contributing Members by year since GCCs began to operate



**VOS Data Volumes 2016**

- 716,251 observations were received and processed by the GCCs.
- 16 CMs contributed data out of a total of 27 registered Members/Member States (Figure 2).
- 858 Voluntary Observing Ships (VOS) made observations in 2016.
- The observation dates of the contributed data ranged from 2005 to 2016, however, 95% of the data were observed in the last two years, 2015 and 2016.
- 12% of the received observations were coded in IMMT-3 format, 65% in IMMT-4 format and 23% in the most recent IMMT-5 format.

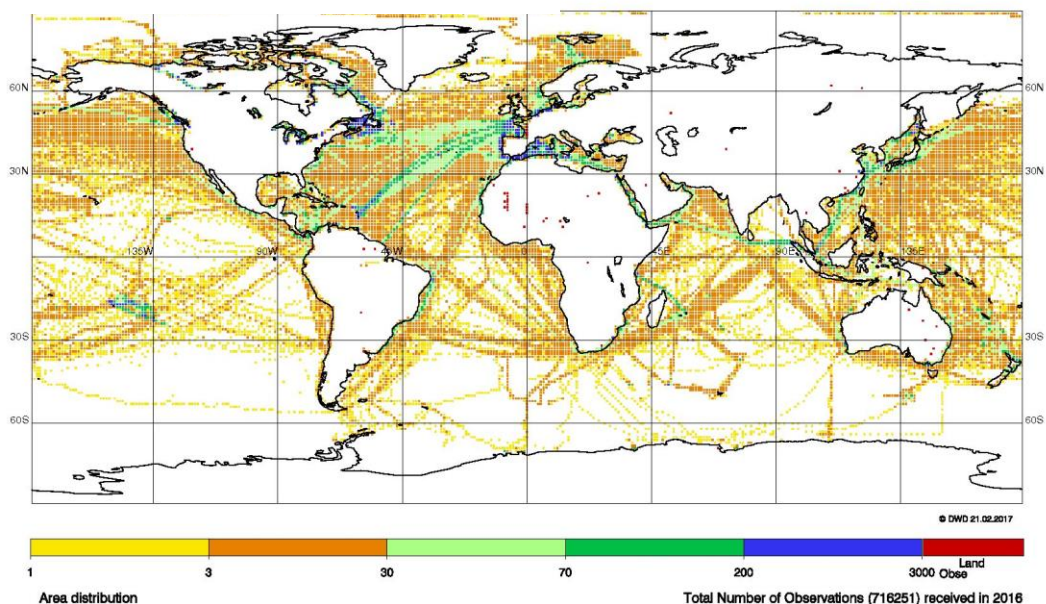
Figure 2: Number of observations by CMs for each quarter of 2016 (CMs without any contribution in 2016 are marked in red)

Number of CM Observations 2016					
Country Name	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
Argentina					
Australia	101	3,333	2,828	3506	9,768
Brazil					
Canada			99,988	194,557	294,545
Croatia					
France	70,270		63,886	29,683	163,839
Germany	20,761	29,012	23,841	21,797	95,411
Greece					
Hong Kong, China	556	892	1,168	1,100	3,716
India					
Ireland	358			54	412
Israel	70	45	215	84	414
Italy					
Japan	1,589	4,730	3,188	1,857	11,364
Kenya					
Malaysia					
Netherlands	3,053			6,990	10,043
New Zealand			10,639		10,639
Nigeria					
Norway	7,982	11,675	10,413	10,893	40,963
Poland				783	783
Russian Federation	3,000	2,765	2,894	2,887	11,546
Singapore					
South Africa		427	282	302	1,011
Sweden					
United Kingdom		17,052	24,869	6,617	48,538
USA	1,515	2,368	4,641	4,735	13,259
16 of 27 Contributing Countries	109,255	72,299	248,852	285,845	716,251

## VOS Data Quality 2016

- When evaluated against the MQCS, the majority of the reported elements were again found to be of good quality. Such elements were assigned a QC Flag of '1' meaning 'element appears correct'. For example, frequently reported elements such as air pressure, wind direction, wind speed and sea surface temperature were flagged with a '1' in over 99% of cases, and air temperature in 94% of cases. More than 600 air temperatures observed in winter failed the MQC check: "If latitude is greater than 45 degrees and air temperature less than -25 °C then element appears to be doubtful." They were flagged with '3' (doubtful) although they were correct.
- There were 850 observations (0.1%) showing on-land positions. These are plotted as red dots in Figure 3.
- The TurboWin coding problem of the previous year persists leading to a number of IMMT-4 and -5 files being submitted with erroneous relative humidity values. These data were identified and the corrected files made available on the German WMO Information System (WIS) Global Information System Centre (GISC). Until the coding problem is resolved, the GCCs will correct the data before processing and distribution.
- No previously exchanged datasets had to be corrected in 2016.
- Quarterly analysis of the exchanged datasets identified 63 duplicate observations (0.009%) that were rejected by the MQCS. Analysis of the yearly dataset highlighted that the number of duplicate observations rejected increased to 2472 (0.3%). These observations failed MQC but were included at quarterly exchange. Before each quarterly data exchange, duplicates arising as a result of the same observations being submitted in a previous contribution were deleted. Unfortunately, duplicate observations submitted in different quarters cannot be identified.
- A small number of observations containing erroneous positions were identified, and after consultation with the appropriate CM, deleted.
- The RM USA (NOAA) supports the ICOADS (International Comprehensive Ocean-Atmosphere Data Set) with the quarterly MQC-checked dataset from the GCCs.

Figure 3: Distribution of observations received in 2016



## VOSClm Class Data 2016

- 513,711 observations were received and processed from VOSClm registered ships.
- This represents 72% of data received by the GCCs from the VOS fleet.
- 10 of the 12 CMs with registered VOSClm ships submitted observations (Figure 4).
- The GCCs received data from over 333 listed VOSClm ships.
- 208,752 of the VOSClm observations (41%) contained the VOSClm defined additional elements.
- The CMs France, Japan and Hong Kong provided 100% of VOSClm elements in the VOSClm reports.

Figure 4: VOSClm class observations submitted by CMs for each quarter of 2016

<b>Total Number of Observations from VOSClm-Ships / Number of Observations with VOSClm-Elements from VOSClm-Ships / Number of Observations with VOSClm-Elements from not listed ships 2016</b>															
<b>Country Name</b>	<b>1st Quarter</b>			<b>2nd Quarter</b>			<b>3rd Quarter</b>			<b>4th Quarter</b>			<b>Total</b>		
Australia	94	94	0	332	232	262	697	695	0	391	0	0	1.514	1.021	262
Canada	0	0	0	0	0	0	99.988	0	0	186.941	0	0	286.929	0	0
France	63.609	63.609	6.661	0	0	0	48.205	48.205	10.057	27.955	27.955	0	139.769	139.769	16.718
Germany	5.857	5.425	1	9.094	8.011	222	5.832	4.799	457	7.916	6.608	169	28.699	24.843	849
Hong Kong, China	0	0	0	0	0	0	0	0	174	41	41	174	41	41	348
India	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Japan	0	0	0	2.902	2.902	0	0	0	0	0	0	0	2.902	2.902	0
Netherlands	2.599	2.234	305	0	0	0	0	0	0	5.830	5.788	421	8.429	8.022	726
New Zealand	0	0	0	0	0	0	324	0	0	0	0	0	324	0	0
Russia	0	0	3	0	0	0	0	0	1	0	0	0	0	0	4
United Kingdom	0	0	0	13.693	8.491	588	23.436	17.019	40	6.232	4.917	1	43.361	30.427	629
USA	0	0	183	369	369	1.564	810	803	2.584	564	555	1.724	1.743	1.727	6.055
<b>10 of 12 countries</b>	<b>72.159</b>	<b>71.362</b>	<b>7.153</b>	<b>26.390</b>	<b>20.005</b>	<b>2.636</b>	<b>179.292</b>	<b>71.521</b>	<b>13.313</b>	<b>235.870</b>	<b>45.864</b>	<b>2.489</b>	<b>513.711</b>	<b>208.752</b>	<b>25.591</b>

## **Recent Developments**

### **Meetings and Activities**

#### **ETMC 6**

In July 2016, the Expert Team on Marine Climatology met for its 6<sup>th</sup> session in Southampton, UK. The team continued to work towards the development of the MCDS as a replacement for the Marine Climatological Summaries Scheme (MCSS). The team worked on identifying potential DACs and GDACs from both WMO and IODE and how these would map to the appropriate structure under the MCDS. The GCCs were identified as GDACs that could immediately assume the formal role under the MCDS as they would easily fit into the MCDS structure and could show proof of concept for how the system is expected to work. The formal process to apply to become a DAC or GDAC is under discussion.

Further progress was made in updating sections of the WMO Guide to Marine Meteorological Services (No. 471) and Manual on Marine Meteorological Services (No. 558) relevant to marine climatology. This progress has been slower than the group would have hoped.

The team also reviewed the status of the IMMT and MQCS formats. It was again noted that with CM continually moving to automated fleets, there is a risk that data could be lost if they are not submitted to the GCC in IMMT format. The team agreed that the replacement of the MCSS with the MCDS provides an opportunity to discuss the suitability of the IMMT format moving forward, given that it was designed specifically for delayed-mode VOS observations and the MCDS encompasses multiple data types.

#### **Assisting CM**

The DWD assisted Israel, Canada and the Netherlands in preparing their contributions in 2016.

#### **HQC Development**

New Higher Quality Control Standard (HQCS) developed by DWD is proposed to be used as the basis for a software package for automatic quality checks within the new MCDS GDACs.

## Recommendations

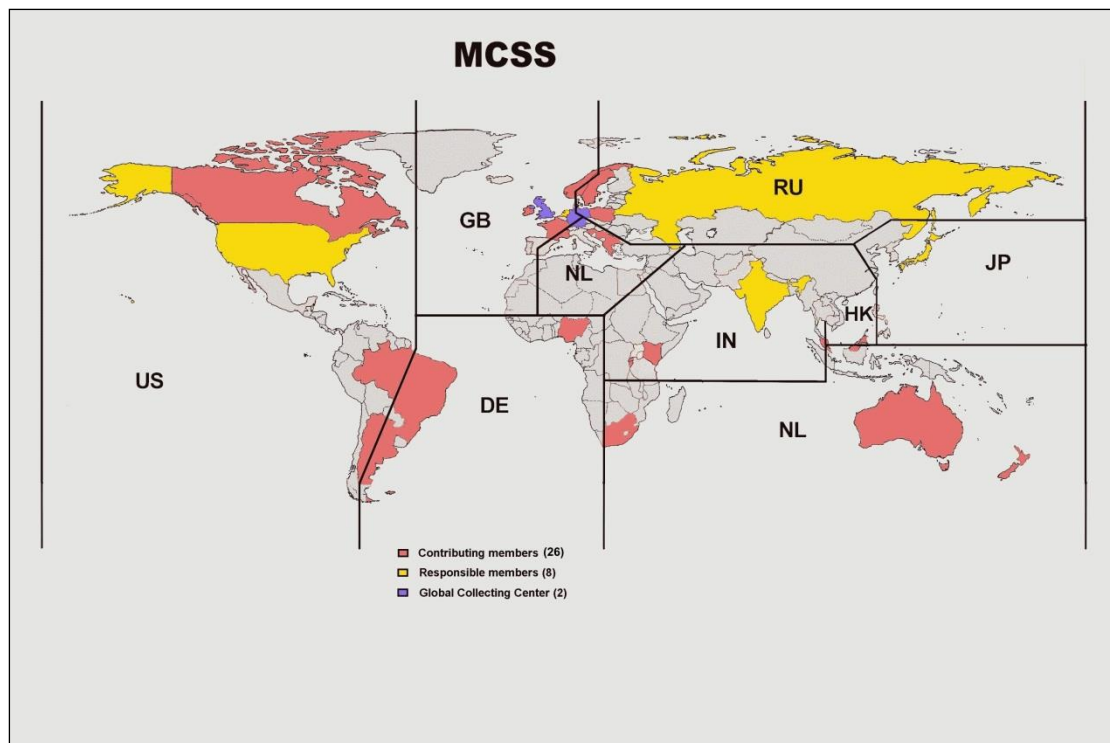
To improve data availability and quality, and in light of the recent developments, the GCCs make the following recommendations:

- CMs should submit their observations only once. If there is a requirement to resubmit data (e.g. quality improvements) then the GCCs should be made aware of this.
- CMs should submit data files in one IMMT format only – preferably now IMMT-5.
- Where problems arise that prevent a CM submitting its data e.g. when digitizing or converting into the IMMT format, GCCs should be asked for advice.
- By applying MQCS to data prior to submission, CMs can identify and solve significant problems, in particular issues within date, time and position.
- All VOSClim class ships should use the indicator for registered VOSClim ships in element 41 (observation platform), in the newly adopted formats IMMT-4 and -5, with the option set to 4.
- All VOSClim class ship observations should include the additional VOSClim elements.
- CMs with Voluntary Observing Ships reporting the additional VOSClim elements should consider listing the vessels within the VOSClim program.
- If possible, convert all masked call signs (i.e. 'SHIP') back to the original ID prior to submission.
- CMs and RMs should stay up to date with TT-MCDS developments in order to ensure they know how they might be affected in the future or how they may contribute in the present. This can be done by attending meetings or reading workshop and session reports available on the JCOMM website.
- CMs and RMs should consider if they wish to apply to be Data Acquisition Centres (DACs) and Global Data Assembly Centres (GDACs) in the future MCDS.
- Where fleets contain automated ships CMs should make every effort to ensure that delayed-mode data is submitted to the GCCs.
- MQCS should include threshold checks for element 102 (Relative humidity) and Element 103 (Relative humidity indicator) IMMT-4 and IMMT-5 format
- MQCs should be revised for Element 16 and 17 (sign and air temperature) IMMT-4 and IMMT-5 format. The check is too rigorous in particular during winter time in high latitude regions.
- The IMMT-format should be expanded to accommodate the extra resolution that BUFR provides for certain elements, for example the date/time group should include minutes and positions and temperatures should be expanded to take the resolution of hundredth of degrees rather than tenth.
- As Contributing Members (CM) continually move to automate voluntary observing fleets there is a risk that data could be lost. At present a substantial volume of data produced by automatic weather systems on board VOS is not being submitted to the GCCs. In order to do this, common procedures for producing observations in the IMMT format directly from AWS, or for converting observations into the IMMT format downstream should be investigated.

**Appendix A: CM contribution by year since GCCs began operations in 1994**

	ISO Alpha-2 code	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Number of Years with Contributions 1994 - 2016	
Argentina	AR								X		X	X	X	X	X	X									7	
Australia	AU							X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14
Brazil	BR	X	X	X	X																					4
Canada	CA																			X	X	X	X	X	X	6
Croatia	HR				X	X	X	X	X												X	X				7
France	FR	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19
Germany	DE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	23
Greece	GR																		X		X	X				3
Hong Kong, China	HK	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	23
India	IN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				20
Ireland	IE			X	X	X				X							X	X	X	X		X	X	X	X	11
Israel	IL		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	19
Italy	IT																				X					1
Japan	JP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	23
Kenya	KE																									0
Malaysia	MY	X		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			19
Netherlands	NL	X	X	X		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	21
New Zealand	NZ													X	X	X	X	X	X	X			X	X	X	10
Nigeria	NG																									0
Norway	NO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20
Poland	PL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	23
Russian Federation	RU		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	22
Singapore	SG		X	X	X	X					X	X	X	X						X						9
South Africa	ZA						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	18
Sweden	SE			X													X	X	X		X	X				6
United Kingdom	GB	X	X	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	21
United States	US	X	X	X	X	X	X	X		X	X				X	X	X	X	X	X	X	X	X	X	X	19

**Appendix B: Countries and regional responsibilities under the MCSS (updated 2009)**



**Appendix C: List of acronyms**

<b>APP</b>	Ancillary Pilot Project
<b>AWS</b>	Automatic Weather Station
<b>CM</b>	Contributing Member
<b>CMOC</b>	Centre for Marine Meteorological and Oceanographic Climate Data
<b>DAC</b>	Data Acquisition Centre
<b>DMCG</b>	Data Management Coordination Group
<b>DWD</b>	Deutscher Wetterdienst
<b>E-SURFMAR</b>	EUCOS Surface Marine Programme
<b>ETMC</b>	Expert Team on Marine Climatology
<b>FTP</b>	File Transfer Protocol
<b>GCC</b>	Global Collecting Centre (MCSS / JCOMM)
<b>GDAC</b>	Global Data Assembly Centre
<b>GISC</b>	Global Information System Centre (of WIS)
<b>HQCS</b>	Higher Quality Control Standard
<b>ICOADS</b>	International Comprehensive Ocean-Atmosphere Data Set (USA)
<b>IMMT</b>	International Maritime Meteorological Tape Format
<b>IOC</b>	Intergovernmental Oceanographic Commission of UNESCO
<b>IODE</b>	International Oceanographic Data and Information Exchange
<b>JCOMM</b>	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
<b>MCDS</b>	Marine Climate Data System
<b>MCSS</b>	Marine Climatological Summaries Scheme
<b>MQCS</b>	Minimum Quality Control Standard
<b>NCEI</b>	National Centers for Environmental Information
<b>NMDIS</b>	National Marine Data and Information Service
<b>NOAA</b>	National Oceanic and Atmospheric Administration (USA)
<b>ODP</b>	Ocean Data Portal
<b>QC</b>	Quality Control
<b>RM</b>	Responsible Member
<b>SOA</b>	State Oceanic Administration
<b>SOT</b>	Ship Observations Team
<b>TT-MCDS</b>	Task Team on Marine Climate Data System of ETMC
<b>UK</b>	United Kingdom
<b>VOS</b>	Voluntary Observing Ship
<b>VOSclim</b>	VOS Climate (Subset for High Quality Data)
<b>WIS</b>	WMO Information System
<b>WMO</b>	World Meteorological Organization