

WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC
COMMISSION (OF UNESCO)

JOINT WMO/IOC TECHNICAL COMMISSION FOR
OCEANOGRAPHY AND MARINE METEOROLOGY (JCOMM)
SHIP OBSERVATIONS TEAM

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PROGRAMME OPERATIONS AND DEVELOPMENT

Quality Management and Best Practices

(Submitted by the Secretariats)

Summary and purpose of document

This document provides information on quality management and best practices and on JCOMM and SOT efforts to address these issues. It also presents how these activities can be linked to the WMO Quality Management Framework.

ACTION PROPOSED

The Ship Observations Team is invited to:

- (a) review the information contained in this report and comment as appropriate;
- (b) improve the visibility across all JCOMM Programme Areas of successful quality monitoring and standard data assurance procedures;
- (c) consider how to better integrate SOT quality monitoring and assessment under JCOMM;
- (d) consider adopting VOSclim best practices more generally under the VOS scheme;
- (e) consider publishing the study by the SOT Task Team on standards as a JCOMM Publication;
- (f) adhere to the GCOS Climate Monitoring Principles;
- (g) review the list of JCOMM Publications and make recommendations regarding their need for updating.

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- Appendices:**
- A. Task Team on Instrument Standards
 - B. JCOMM Publications status
 - C. GCOS Climate monitoring principles

DISCUSSION

1. Introduction

1.1. Since its establishment in 1999, JCOMM has recognized the “*requirement to establish properly resourced procedures for evaluating and possibly accrediting instrumentation and procedures used operationally by JCOMM observing system components*” and “*the need to work towards implementation of mechanisms to ensure that data collected by observing system operators conformed to agreed upon basic standards, formats, and levels of data quality*”.

1.2. SOT at its first and second sessions well recognized the importance of the issue on instrument testing and standards, and therefore SOT-II established the Expert Group on Instrument Testing. However, SOT-III noted with regret that there had been no major progress but recognized the importance of this issue and decided to establish the Task Team on Instrument Standards and accepted the nomination of Mr Robert Luke (USA) as the new chairperson of the Task Team. The members and terms of reference of the Task Team are in Appendix A. Report by the Task Team is presented in document I-4.

2. Recommendations by JCOMM-II

2.1. The Second Session of JCOMM, Halifax, Canada, 19-27 September 2005 (JCOMM-II) recognized that in many cases there were successful quality monitoring and standard data assurance procedures in operation in each programme, such as the marine surface data monitoring undertaken by the Met Office (UK) on behalf of CBS, and data quality monitoring by GTSP for SOOP, and the ASAP monitoring by ECMWF and Météo-France, and through the EUMETNET E-SURFMAR and E-ASAP programmes. However, there was a need to ensure that appropriate documentation on these was made easily available and accessible across the JCOMM programme areas. Another issue related to data quality assurance for complementary observations, and how to integrate monitoring and assessment generally under JCOMM.

2.2. JCOMM-II recalled that the primary objective of the VOSCLim Project was to provide high quality ship based marine meteorological data and associated metadata to serve as a reference data set to support global climate studies, and that the VOSCLim Project was developing best practices which should be adopted more widely within the Voluntary Observing Fleet.

2.3. JCOMM-II supported the approach adopted by the SOT, and requested that the study being undertaken by the SOT Task Team on Instrument Standards should be completed as soon as possible, with the results published as a JCOMM Technical Report, as proposed. It requested the Management Committee to again address the issue, with a view to providing a broader input from JCOMM in support of the wider IOC study.

3. Recommendations by MAN-V

3.1 The fifth Session of the JCOMM Management Committee, Geneva, Switzerland, 5-7 October 2006 (MAN-V) agreed that the OOPC primary requirements involving JCOMM included in particular promoting standards and best practices for both real-time and delayed mode quality control.

3.2 The Committee also agreed that specific Panel or Programme web sites could for example include information on existing and future products and services, requirements,

standards and best practices, pilot projects, description of the data systems in place and how to access data. However, duplication of information should be avoided, and links to the web sites where the best practices information is being maintained provided.

4. Global Climate Observing System (GCOS)

4.1. For climate monitoring and research, observing activities should adhere to the GCOS Climate Monitoring Principles (Appendix C), which provide on best practices for the planning, operation and management of observing networks to ensure high quality climate data.

5. WMO Quality Management Framework (QMF)

5.1. From a WMO perspective, quality management constitutes one of the most important issues and comprises two distinct aspects: (i) an overall strategy for the WMO, which would cover all WMO technical programme activities that relate to the delivery of products, data and services, and (ii) the implementation of quality management systems by its Members. An Inter-Commission Task Team on Quality Management Framework (ICTT-QMF) has been established to deal with these issues. The QMF aspects should eventually become an integral part of the work of the technical commissions. At its fifty-eighth Session the WMO Executive Council (EC-LVIII) supported the recommendation of the ICTT-QMF, to include “quality management” at the highest level of the Technical Regulations in an independent Volume IV (Quality Management Framework) encompassing the overall WMO policy related to quality and including a chapter for each of the Commissions. The Executive Council also decided to establish a closer collaboration with the International Organization for Standardization (ISO) with a view to develop a formal working agreement aimed at developing joint ISO-WMO technical standards, based on the WMO Technical Regulations and Manuals and Guides, which would widen the recognition of the WMO Standards.

5.2. The Quality Management Framework will include, in particular: (i) harmonization of the terminology related to quality and to the nomenclature of the technical guidance documents while adhering to the definitions provided in the ISO 9000:2005 *Standard for Quality-Related Terms*, and (ii) the review of the Technical Commission technical documentation, so that Members have easy access to all the relevant valid documentation and, if appropriate, include the content of some technical documents in their guides/manuals and/or develop necessary Quality Assurance (QA) / QC procedures.

5.3. The list of JCOMM Publications has been prepared and reviewed by the JCOMM Data Management Coordination Group (DMCG). At its second session (DMCG-II), Geneva, 10-12 October 2006, the Group agreed that the list should focus on the documents describing standards and noted that it required editing and should include additional information (e.g. a contact point, name of the responsible Expert Team). The latter information has then been added. The consolidated list is provided in Appendix B. However, it was noted that making documentation ISO compliant was a time consuming exercise and that it was not always possible or feasible to find the resources to do this. The meeting noted that the documents relevant to the DMPA constituted only a subset of all WMO documents, and that even more resources would be needed by the WMO to update its documentation to comply with the ISO document standards. DMCG-II also recommended to further developing Quality-Assurance and Quality-Control procedures, to identify the JCOMM advantageous Technical Standards that would be submitted as joint ISO-WMO Standards, and to include relevant documents in OceanTeacher and prepare training modules.

5.4. At its last meeting, Geneva, 15-17 January 2007, the ICTT-QMF agreed that the list should include the publications that the commissions considered essential for the ongoing sustainability of the WMO QMF, so as to ensure effective planning, operation and control of processes related to meteorological, hydrological, marine, and related environment data, products and services.

5.5 The SOT is invited to check the list of publications where the SOT or the OCG is listed as responsible group and to recommend steps for updating them as required or appropriate.

6. Other

6.1 Updates on other components of the SAMOS initiative will include a handbook of “best practices” for marine meteorological measurements, routine airflow modeling of research vessels, and interaction with user communities to design suitable products for research and operational activities.

Appendices: 3

APPENDIX A

TASK TEAM ON INSTRUMENT STANDARDS

Tasks:

1. Compile information on existing activities, procedures and practices within JCOMM relating to instrument testing, standardization and intercalibration, as well as the standardization of observation practices and procedures,
2. Using guidance contained in existing guides including the WMO Guides on Instruments and Methods of Observation (WMO-No.8), communicate with manufactures regarding new technologies and recognized equipment problems.
3. Prepare a JCOMM Technical Report containing this information, to be made widely available through relevant web sites (JCOMM, JCOMMOPS, VOS, DBCP, SOOP, SOT),
4. Provide guidance on testing and the intercalibration of marine meteorological and oceanographic observing systems.
5. Liaise closely with WMO/CIMO, both in the compilation of the information and also in assessing what additional work in this area might be required under JCOMM.
6. Liaise closely with IOC in the preparation of the wider compilation of existing instrumentation and observing practices standards in oceanographic observations in general, with a view to inputting an appropriate contribution from JCOMM.

Members:

Robert Luke (TT chairperson, USA)
Graeme Ball (chairperson of SOT)
Pierre Blouch (E-SURFMAR project manager)
Steven Cook (chairperson of SOOPIP)
Yvonne Cook (Canada)
Julie Fletcher (chairperson of VOSP)
Rudolf Krockauer (E-ASAP Programme Manager)
Sarah North (chairperson of TT on the VOS Climate Project)
Derrick Snowden (USA)

APPENDIX B

JCOMM PUBLICATIONS STATUS (January 2007)

Background

Quality management constitutes for WMO one of the most important issues and comprises two distinct aspects: (1) an overall strategy for WMO, which would cover all WMO technical programme activities that relate to the delivery of products, data and services; and (2) the implementation of quality management systems by its Members. An Inter-Commission Task Team on Quality Management Framework (ICTT-QMF) has been established to deal with these issues. Quality Management Framework (QMF) aspects should eventually become an integral part of the work of the technical commissions. The fifty-eighth WMO Executive Council supported the recommendation of the ICTT-QMF to include "quality management" at the highest level of the Technical Regulations in an independent Volume IV (Quality Management Framework) encompassing the overall WMO policy related to quality and including a chapter for each of the Commissions. A draft resolution will be prepared for the fifteenth WMO Congress on that matter. The Executive Council also decided to establish closer cooperation with the International Organization for Standardization (ISO) with a view to develop a formal working agreement aimed at developing joint ISO-WMO technical standards based on WMO Technical Regulations, Manuals and Guides, which would widen the recognition of WMO standards.

The QMF will include in particular (i) harmonization of the terminology related to quality and to the nomenclature of the technical guidance documents while adhering to the definitions provided in the ISO 9000:2005 standard for quality-related terms, and (ii) the review of the Technical Commission technical documentation so that Members have easy access to all the relevant valid documentation and, if appropriate, include the content of some technical documents in their guides/manuals and/or develop necessary QA/QC procedures.

The fifty-eighth WMO Executive council requested the technical commissions to review their technical documentation so that Members have easy access to all the relevant valid documentation and, if appropriate, include the content of some technical documents in their guides/manuals and/or develop necessary QA/QC procedures. In that context the Inter Commission Task Team on WMO Quality Management Framework developed a preliminary list of the commissions' valid technical guidance documents to be used by Members. EC recommended that the Technical Commissions update this list yearly.

The WMO EC had asked the technical commissions to carry out a review of their documentation as a priority activity within their regular work programs in an attempt to identify areas of overlap and gaps. This review should rectify issues of deficiency, duplication, inconsistency, and errors; making the relevant WMO Technical Regulations, guides and manuals viable reference documents for use within a national QMS.

The second meeting of the JCOMM Data Management Coordination Group (DMCG) reviews the existing list of JCOMM Technical Publications. It noted that it required editions and should include additional information such as (i) a contact point, (ii) the name of the Expert Team or group responsible for updating it, (iii) information whether it is obsolete or needs to be updated. Current version of the list is provided in the annex.

The DMCG agreed to focus on the documents describing standards. However, it noted that making documentation ISO compliant was a time consuming exercise and that it was not always possible to find the resources to do this.

The DMCG made the following decisions or recommendations:

- (i) for WMO and IOC Secretariats to identify contact points for each of the JCOMM Publications, circulate to DMCG, and focal points, and ask for comments;
- (ii) for contact points (in liaison with the Secretariats and the authors when relevant and

possible) to provide for complementary information regarding the documentation (Expert Team in charge, obsolete or not, needs to be updated/when, updating frequency requirement, electronic version available, QMF requirements);

- (iii) for IODE Chair to look into the status of IODE documents and add them to the list;
- (iv) for a new consolidated table of documents to be circulated to the DMCG for comments/approval;
- (v) to review JCOMM documents to ensure that the terminology used in them is in agreement with the decision of EC-LVIII;
- (vi) to review, and possibly incorporate the content of some documents in others to ensure that Members have easy access to all the relevant valid documentation and to ensure compatibility with the documentation of other commissions;
- (vii) to further develop Quality Assurance and Quality Control procedures;
- (viii) to identify JCOMM technical standards that would be worthwhile to be submitted as joint ISO-WMO standards;
- (ix) to include some documents in OceanTeacher and prepare training modules.

ANNEX
List of JCOMM valid technical guidance documents

Explanation of fields:

No.:	Formal publication number
Title:	Title of the publication
Year:	Year when the publication was last updated
Version	Version number of applicable
Status:	Indication whether there is a need to update the publication Obs.: Obsolete; TBU: To be updated; UTD: Up to date
Contact:	Main contact person for the publication
Responsible group:	Group, Panel, Expert Team responsible for updating the publication
Languages	List of languages in which the publication is available (En, Fr, Sp, Ru, Ar, Ch)
Keywords	List of keywords
Standard	Whether the publication contains standard procedures, standard practices and best practices

Contacts:

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Part A - JCOMM Guides, manuals, and publications

No.	Title	Year	Version	Status	Contact	Responsible group	Languages	Keywords	Standard	Mandatory
JCOMM Services Programme Area										
WMO No. 558	Manual on marine meteorological services (Volume I-Global aspects, Volume II-Regional aspects) http://www.jcomm.info <u>Summary:</u> This Manual is designed to: (a) facilitate cooperation in respect of the international coordination of marine meteorological services; (b) specify obligations of Members in the implementation of marine meteorological services; (c) ensure uniformity in the practices and procedures employed in archiving (a) and (b) above; and facilitate the development of adequate support from WMO to marine meteorological services. The Manual is composed of Volumes I and II, dealing with technical regulations for global and regional aspects respectively.	2006		UTD	Chair, SCG	JCOMM via SCG	En Fr Ru Sp	Marine services	Y	Y
WMO No. 471	Guide to marine meteorological services, 3 rd edition http://www.jcomm.info <u>Summary:</u> This Guide provides a complement to the Manual (WMO-No. 558), which contains standard and recommended practices to be applied by Members in the provision of Marine Meteorological Services (such as broadcast of weather and sea bulletins, warnings, marine information for Search and Rescue operations, pollution of the sea, etc.)	2006		UTD	Chair, SCG	JCOMM via SCG	En Fr Ru Sp	Marine services	Y	Y
WMO No. 9, Volume D	Information for shipping <u>Summary:</u> This publication contains information on (i) Meteorological Broadcast Schedules for shipping and other Marine	2006		TBU	Chair, SCG	SCG	En	Ship shipping	Y	Y

No.	Title	Year	Version	Status	Contact	Responsible group	Languages	Keywords	Standard	Mandatory
	Activities (Meteorological Broadcasts by Radiotelegraphy and Radiotelephony, Meteorological Broadcasts by Radio-Facsimile, Global Maritime Distress and Safety System (GMDSS)), (ii) Coastal Radio Stations Accepting Ships' Weather Reports and Oceanographic Reports (List of Coastal Radio Stations, List of INMARSAT Coast Earth Stations (CESS)), (iii) Specialized Meteorological Services (Marine Meteorological Services Available for Main Ports, Ship Weather Routing Services), and (iv) Visual Storm Warning Signals. Full information is given on the issue of meteorological forecasts and warnings to shipping and on the collection of ships' weather reports									
WMO No. 259	WMO sea-ice nomenclature <u>Summary:</u> Describes WMO Sea-ice terminology, and the international system of sea-ice symbols. It also provides for an illustrated glossary.	2006		UTD	Chair, ET-SI	ET-SI	En Fr Ru Sp	Sea-ice nomenclature	Y	
WMO No. 574	Sea-ice information services in the world http://www.jcomm.info <u>Summary:</u> This publication consists of two parts: Part I: A general description of the nature of sea ice, of methods of observation and of the basis of ice information services; Part II: Regional sea ice information services.	2006		UTD	Chair, ET-SI	ET-SI	En	Sea-ice services	N	
WMO No. 702	Guide to wave analysis and forecasting, second edition http://www.jcomm.info <u>Summary:</u> This Guide provides guidelines on wave forecast methodology suitable for use by NMHSs in the provision of ocean wave forecast and hindcast services in support of	1998		UTD	Chair, ET-WS	JCOMM via ET-WS	En Fr Ru Sp	Wave analysis forecasting	Y	Y

No.	Title	Year	Version	Status	Contact	Responsible group	Languages	Keywords	Standard	Mandatory
	the requirements of users in the whole range of maritime activities (shipping, fisheries, offshore mining, commerce, coastal engineering, construction, recreation, etc.).									
WMO TD No. 779	Storm surges / Vladimir E. Ryabin, Oleg I. Zilberstein, and W. Seifert <u>Summary:</u> This publication provides information and describes techniques of forecasting storm surges				Chair, ET-WS	ET-WS	En	Storm surge		
WMO TD No. 70	Forecast techniques for ice accretion on different types of marine structures, including ships, platforms and coastal facilities / by Ralph G. Jessup (Atmospheric Environment Service, Canada). <u>Summary:</u> This publication provides information and describes techniques of prediction ice accretion on different type of marine structures	1985		TBU	Chair ET-SI	ET-SI	En	Forecast sea-ice ship platforms coastal	Y	
WMO TD No. 840	Tropical coastal winds / prepared by W.L. Chang.	1997		TBU	Chair, ET-MSS	ET-MSS	En	Tropical Coastal wind		
WMO TD No. 850	Handbook of offshore forecasting services / prepared by Offshore Weather Panel.	1998		TBU	Chair, SCG	SCG	En	Forecast offshore services		
WMO TD No. 858	Evaluation of the highest wave in a storm / prepared by A.V. Boukhanovsky, L.J. Lopatoukhin and V.E. Ryabinin. <u>Summary:</u> This publication provides information and describes techniques of evaluation and calculation the highest wave in a storm.	1997		TBU	Chair, ET-WS	ET-WS	En	Extreme Waves storm		
WMO TD No. 959 (vol I) WMO TD No. 960 (vol II)	MARPOLSER 98 : Metocean Services for Marine Pollution Emergency Response Operations, Townsville, Australia, 13-17 July 1998 : proceedings http://www.jcomm.info <u>Summary:</u> These publications provide information on the nature and types of	1998		UTD	Chair, ET-MAES	ET-MAES	En	Marine pollution services		

No.	Title	Year	Version	Status	Contact	Responsible group	Languages	Keywords	Standard	Mandatory
	marine pollution emergencies, the clean-up and other operations; define the types and scope of meteorological data and services which are required to support these operations; and provide guidance and technical support NMHSs to develop their support activities to the highest level.									
JCOMM TD No. 9 WMO TD No. 1041	Estimation of extreme wind wave heights / by L.J. Lopatoukhin et al. <u>Summary:</u> This publication provides not simple estimates of extreme wind wave heights, but informative and authoritative support in their decision-making http://www.jcomm.info	2000		TBU	Chair, ET-WS	ET-WS	En	Extreme wind wave		
JCOMM TD No. 23 WMO TD No. 1214 b	SIGRID-3 : a vector archive format for sea ice charts / developed by the International Ice Charting Working Group's Ad Hoc Format Team for the WMO Global Digital Sea Ice Data Bank Project. http://www.jcomm.info	2004		UTD	Chair, ET-SI	ET-SI	En	Sea-ice SIGRID charts	Y	
JCOMM TD No. 24 WMO TD No. 1215 b	Ice Chart Colour Code Standard http://www.jcomm.info	2004		UTD	Chair, ET-SI	ET-SI	En	Sea-ice	Y	
JCOMM TD No. 30 WMO TD No. 1333	Verification of operational global and regional wave forecasting systems against measurements from moored buoys / by J. - R. Bidlot and M.W. Holt.	2006		UTD	Chair, ET-WS	ET-WS	En	Wave forecast moored buoy	N	
IOC Manuals and Guides No. 13	Manual for Monitoring Oil and Dissolved/Dispersed Petroleum Hydrocarbons in Marine Waters and on Beaches.	1984			Chair, MAES	JCOMM via MAES	En	Oil marine monitoring coastal	Y	
IOC Manuals and	Guide to Satellite Remote Sensing of the Marine Environment.	1992		TBU	SPA satellite rapporte	JCOMM via cross cutting team on	En	Satellite remote sensing	Y	

No.	Title	Year	Version	Status	Contact	Responsible group	Languages	Keywords	Standard	Mandatory
Guides No. 24					ur	satellite data requirements		observation marine		
IOC Manuals and Guides No. 36	Methodological Guide to Integrated Coastal Zone Management.	1997		TBU	Chair, SCG	SCG	En	Marine coastal services	Y	
IOC Manuals and Guides No. 41	Potentially Harmful Marine Microalgae of the Western Indian Ocean	2001		TBU	Chair, ET-MAES	ET-MAES	En	Harmful microalgae Indian ocean	N	
IOC Manuals and Guides No. 33	Manual on Harmful Marine Microalgae.	1995		TBU		JCOMM via ET-MAES	En	Marine harmful microalgae	Y	
JCOMM Observations Programme Area										
WMO No. 47	International list of selected, supplementary and auxiliary ships http://www.wmo.ch/web/www/ois/pub47/pub47-home.htm <u>Summary:</u> This edition contains information and instrumental metadata about the ships participating in the WMO Voluntary Observing Ships Scheme. This information has been supplied by the countries which have recruited ships within the framework of this programme, in accordance with regulation 2.3.3.3 and 2.3.3.4 as contained in WMO Publication No. 544 - <i>Manual on the Global Observing System, Volume I, Part III</i>	2005		UTD	WMO (Chief, OCA)	SOT	En Fr	Ship metadata	Y	Y
WMO No. 806	An overview of selected techniques for analysing surface-water data networks <u>Summary:</u> This report brings together a review of a number of techniques currently employed in evaluating and designing stream gauging networks and illustrates their	1994					En	Sea surface	Y	

No.	Title	Year	Version	Status	Contact	Responsible group	Languages	Keywords	Standard	Mandatory
	use with examples									
JCOMM TD No. 4 WMO TD No. 1009	The Voluntary Observing Ships Scheme – A Framework Document http://www.jcomm.info <u>Summary:</u> In view of the importance of VOS observations, and at the same time of the ongoing and increasing difficulties in VOS recruitment and maintenance, the JCOMM (formerly CMM) Subgroup on the VOS recognized the value of adopting a guiding strategy or framework document for the VOS. This document would provide VOS operators with a global framework in which to develop and maintain their national VOS programmes, and at the same time help to sensitize user groups and organizations to the VOS scheme in general, its structure, operations and value.	2000		TBU	Chair, VOSP	SOT	En	SOT VOS VOSP ship observation	Y	
JCOMM TD No. 5 WMO TD No. 1010	Voluntary Observing Ships (VOS) Climate Subset Project (VOSCLIM) – Project Document, Revision 2	2002		TBU	Chair, VOSCLIM Task Team	SOT TT on VOSCLIM	En	SOT VOSCLIM ship observation climate	N	
JCOMM TD No. 8 WMO TD No. 1032	Oceanographic and Marine Meteorological Observations in the Polar Regions - A Report to JCOMM http://www.jcomm.info	2000		TBU	Chair, OCG	OCG	En	Sea-ice polar observation		
JCOMM TD No. 31 IOC Manuals and Guides No. 14 WMO TD. No. 1399	Manual on Sea Level Measurement and Interpretation, Volumes I – III http://www.jcomm.info <u>Summary:</u> This Manual provides information on tide gauge technology and measurement techniques, including information on real-time reporting capability and a capacity to provide data of use to a tsunami warning system.	2006		UTD	Chair, GLOSS-GE	JCOMM via GLOSS	En	Sea-level tide gauge observation Tsunami	Y	
IOC	Guide to Oceanographic and Marine	1975		Obs./TBU	Chair,	JCOMM via	En	Observation	Y	

No.	Title	Year	Version	Status	Contact	Responsible group	Languages	Keywords	Standard	Mandatory
Manuals and Guides No. 4	Meteorological Instruments and Observing Practices				OCG	OCG		instrument practices		
IOC Manuals and Guides No. 15	Operational Procedures for Sampling the Sea-Surface Microlayer	1985		Obs.	OPA satellite rapporteur	JCOMM cross cutting team on satellite data requirements	En	Sea-surface observation microalgae	Y	
IOC Manuals and Guides No. 2	International Catalogue of Ocean Data Station	1976		Obs.	Director, GOOS PO	GOOS	En	Observation metadata	N	
IOC Manuals and Guides No. 12	Chemical Methods for Use in Marine Environment Monitoring.	1983			Director, GOOS PO	GOOS	En	Chemical marine monitoring	Y	
IOC Manuals and Guides No. 6 rev	Wave Reporting Procedures for Tide Observers in the Tsunami Warning System	1968		Obs./TBU			En	Waves Tsunami observation warning	Y	
IOC Manuals and Guides No. 20	Guide to Drifting Buoys	1988		Obs./TBU	TC DBCP	JCOMM via DBCP	En	Drifting buoy	Y	
IOC Manuals and Guides No. 29	Protocols for the Joint Global Ocean Flux Study (JGOFS) Core Measurements	1994				JGOFS	En	Marine JGOFS flux	Y	
IOC Manuals and Guides	Oceanographic Survey Techniques and Living Resources Assessment Methods	1996			Chair OCG	OCG	En	Living resources survey	Y	

No.	Title	Year	Version	Status	Contact	Responsible group	Languages	Keywords	Standard	Mandatory
No. 32										
JCOMM Data Management Programme Area										
WMO No. 781	Guide to the applications of marine climatology <u>Summary:</u> This Guide provides a set of procedures for the collection, exchange, quality control, archival and processing of marine climatological data. (dynamic part of the guide available in electronic form via the Volume 25, Issue 7 of the International Journal of Climatology, Special Issue: Advances in Marine Climatology) http://www3.interscience.wiley.com/cgi-bin/jissue/110507133?CRETRY=1&SRETRY=0	1994 & 2005		UTD	Chair, ET-MC	JCOMM via ET-MC	En Fr Ru Sp	Marine climatology IMMT IMMA MQCS MCSS GCC	Y	
JCOMM TD No. 13 WMO TD No. 1081 b	Advances in the Applications of Marine Climatology - The Dynamic Part of the WMO Guide to the Applications of Marine Climatology (CD-Rom) http://www.jcomm.info	2003		UTD	Chair, ET-MC	ET-MC	En	Marine climatology	N	
IOC Manuals and Guides No. 1	Guide to IGOSS (now JCOMM) Data Archives and Exchange (BATHY and TESAC)	1993		TBU	Chair, DMCG	JCOMM via DMCG	En	Data management	Y	
IOC Manual & Guides No. 3	Guide to operational Procedures for the Collection and Exchange of IGOSS (now JCOMM) Data, Third Revised Edition http://www.jcommops.org/soopip/mg3.html	1999		TBU	Chair, DMCG	JCOMM via DMCG	En	Data management	Y	
IOC Manuals and Guides No. 9 rev	Manual on International Oceanographic Data Exchange. (Fifth Edition), including Guide for Responsible National Oceanographic Data Centres as Annex II	1991			Chair, DMCG	IODE & JCOMM via DMCG	En	Data management RNODC	Y	
IOC	Marine Environmental Data Information	1993			Chair,	IODE	En	Marine		

Part B - Technical papers produced by the Expert Teams and Panels:

No.	Title	Year	Version	Status	Contact	Responsible group	Languages	Keywords	Standard	Mandatory
DBCP TD No. 2	Reference Guide to the GTS Sub-system of the Argos Processing System http://www.jcommops.org/doc/satcom/argos/Argos-GTS-sub-system-ref-guide.pdf	2005		UTD	TC DBCP	DBCP	En	GTS Argos	N	N
DBCP TD No. 3	Guide to Data Collection and Location Services using Service Argos http://www.jcommops.org/dbcp/Argos-guide.pdf	1995		TBU	TC DBCP	DBCP	En	Argos	N	N
DBCP TD No. 8	Guide to Moored Buoys and Other Ocean Data Acquisition Systems	1997		TBU	Chair, DBCP	DBCP	En	Moored buoy observation	Y	N
UNESCO Technical Papers in Marine Science #44	Algorithms for the Computation of Fundamental Properties of Seawater (UNESCO technical papers in marine sciences, 44, 1-53, 1983)	1983.			Director, GOOS PO	IOC	En	Algorithm Seawater UNESCO	Y	N
(web)	SOT Basic ship visit and rider rules	2003		UTD	Chair, SOT	SOT	En	Ship VOS SOT observation	Y	N
(web)	SOT VOS recruit presentation http://www.bom.gov.au/jcomm/vos/download/vosrecruit.pps	2003		UTD	Chair, SOT	SOT	En	Ship VOS SOT ship observation	N	N
(web)	SOOPIP XBT best practices guide http://www.jcommops.org/soopip/doc/manuals/best_guide/SOOP_best_guide.pdf	2001		TBU	TC SOT	SOOPIP	En	SOOPIP SOOP SOT XBT ship observation	Y	N
(web)	SOOPIP XBT/XCTD Standard Test Procedures	2000		TBU	TC SOT	SOOPIP	En	SOOPIP SOOP SOT XBT ship observation	Y	N
(web)	SOOPIP User Guide for Thermosalinograph (TSG) Installation and Maintenance aboard Ships http://www.jcommops.org/soopip/tsg.html#TSG_GUIDE	1999		TBU	TC SOT	SOOPIP	En	SOOPIP SOOP SOT TSG ship observation	Y	N
CSIRO Marine Laboratories Report 221	SOOPIP Quality Control Cookbook for XBT data http://woce.nodc.noaa.gov/woce_v3/wocedata_1/woce-quot/document/gcmans/csiro/csiro.htm	1994			TC SOT	SOOPIP	En		Y	N

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No.	Title	Year	Version	Status	Contact	Responsible group	Languages	Keywords	Standard	Mandatory
AOML XBT QC procedures	Procedures used at AOML to quality control real time XBT data collected in the Atlantic Ocean http://woce.nodc.noaa.gov/woce_v3/wocedata_1/woce-uot/document/gcmans/aoml/aoml_1.htm	1994			TC SOT	SOOPIP				
(web)	DBCP Quality Control Guidelines http://www.jcommops.org/dbcp/2qgd.html	2004		UTD	TC DBCP	DBCP				
cordo-die-02-047	WOCE Sea Surface Salinity user's manual http://www.ifremer.fr/gosud/doc/cordo-mut-02-047.doc	2006		UTD	Chair, GOSUD	GOSUD				

APPENDIX C

GCOS CLIMATE MONITORING PRINCIPLES

(excerpt from GCOS-92 report, WMO/TD No. 1219, October 2004)

(full report available at [http://www.wmo.ch/web/gcos/Implementation_Plan_\(GCOS\).pdf](http://www.wmo.ch/web/gcos/Implementation_Plan_(GCOS).pdf))

Effective monitoring systems for climate should adhere to the following principles:

1. The impact of new systems or changes to existing systems should be assessed prior to implementation.
2. A suitable period of overlap for new and old observing systems should be required.
3. The results of calibration, validation and data homogeneity assessments, and assessments of algorithm changes, should be treated with the same care as data.
4. A capacity to routinely assess the quality and homogeneity of data on extreme events, including high-resolution data and related descriptive information, should be ensured.
5. Consideration of environmental climate-monitoring products and assessments, such as IPCC assessments, should be integrated into national, regional and global observing priorities.
6. Uninterrupted station operations and observing systems should be maintained.
7. A high priority should be given to additional observations in data-poor regions and regions sensitive to change.
8. Long-term requirements should be specified to network designers, operators and instrument engineers at the outset of new system design and implementation.
9. The carefully planned conversion of research observing systems to long-term operations should be promoted.
10. Data management systems that facilitate access, use and interpretation should be included as essential elements of climate monitoring systems.

Furthermore, satellite systems for monitoring climate need to:

- (a) *Take steps to make radiance calibration, calibration-monitoring and satellite-to-satellite cross-calibration of the full operational constellation a part of the operational satellite system; and*
- (b) *Take steps to sample the Earth system in such a way that climate-relevant (diurnal, seasonal, and long-term interannual) changes can be resolved.*

Thus satellite systems for climate monitoring should adhere to the following specific principles:

11. Constant sampling within the diurnal cycle (minimizing the effects of orbital decay and orbit drift) should be maintained.
12. A suitable period of overlap for new and old satellite systems should be ensured for a period adequate to determine inter-satellite biases and maintain the homogeneity and consistency of time-series observations.
13. Continuity of satellite measurements (i.e., elimination of gaps in the long-term record) through appropriate launch and orbital strategies should be ensured.
14. Rigorous pre-launch instrument characterization and calibration, including radiance confirmation against an international radiance scale provided by a national metrology institute,

should be ensured.

15. On-board calibration adequate for climate system observations should be ensured and associated instrument characteristics monitored.

16. Operational production of priority climate products should be sustained and peer-reviewed new products should be introduced as appropriate.

17. Data systems needed to facilitate user access to climate products, meta-data and raw data, including key data for delayed-mode analysis, should be established and maintained.

18. Use of functioning baseline instruments that meet the calibration and stability requirements stated above should be maintained for as long as possible, even when these exist on de-commissioned satellites.

19. Complementary *in situ* baseline observations for satellite measurements should be maintained through appropriate activities and cooperation.

20. Random errors and time-dependent biases in satellite observations and derived products should be identified.
