WMO Support for Satellite Activities: A Means Towards Standardization

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ABSTRACT

Two of the objectives for establishing the World Meteorological Organization (WMO) are to promote world-wide co-operation for the making of meteorological observations and to encourage standardization of meteorological and related observations. This paper will recount the current scope and functions of the WMO Satellite Activities and how it could contribute to a framework towards facilitating dependable and universally accepted procedures for the extraction of cloud motion winds based on satellite imagery such that users of these winds could expect a given level of accuracy regardless of the satellite involved. Facets to be introduced will contain a historical prospective of the WMO systems and the current status of the satellite data requirements. There is a multifarious and yet well delineated connection between various international groups which serve as forums for satellite discussions and deliberations and the WMO. This connection embraces constituents bodies of the WMO, the Co-ordination Group for Meteorological Satellites and national and international groups serving as satellite operators and agencies. Terms of references and goals for each organization of the aforementioned groups will be discussed.

The paper will also briefly examine the status of the accuracy of retrieved winds versus stated requirements. These requirements are founded upon a consolidated list of satellite data requirements which has been assembled from the needs of six of the WMO Technical Commissions and other international organizations. Other prerequisite for the space-based portion of the WMO Global Observing System (GOS) will be resolved in terms of continuity of data and impacts on Numerical Weather Prediction. Further justification for standardization will be extracted from reference documents such as WMO resolutions in force, WMO Third Long Term Plan and existing precedents for the standardization for satellite data. Finally, the difference between standardized procedures and continuing research efforts, which of necessity not be constrained, will be discussed.

Based on the summation of material presented, a recommendation will be introduced which will propose that CGMS under the aegis of a dedicated CGMS Working Group act as the fulcrum for standardizing the procedures utilized by the various satellite operators when extracting cloud motion winds. The recommendation will recognize the need for standards of procedures best maintained by satellite operators and those standards for accuracy best established and maintained by users. As such, the recommendation delineates this distinction. Concurrence for this proposal could be accomplished through the present method within CGMS which has a proven record for unanimous commitment through persuasive consensus.

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Overview

The importance of winds as input for numerical forecast models is a well established requirement. One type of wind observation, called cloud track wind, is derived using sequential images from geostationary meteorological satellites. Presently, there are four different satellite operators producing cloud track wind observations each using different techniques. Error analyses by major forecast centers of the different cloud track winds with their associated techniques show large deviations. The deviations are of such an inconsistent nature that some cloud track wind observations are routinely discarded. This paper will propose an approach which, if accepted by the cloud track wind observation producers, could standardize the expected accuracy from the different techniques.

Historical

The World Meteorological Organization (WMO) is a United Nations specialized agency created to: facilitate international co-operation in the establishment of networks of stations and centres which provide meteorological and hydrological services and observations including climate related activities; promote the establishment and maintenance of systems for the rapid exchange of meteorological, hydrological and climate related information; promote standardization of meteorological and related observations; and further the application of meteorology to aviation, shipping, water management, agriculture and other human activities. For purposes of this paper, the key concepts of the WMO goals are "facilitate international co-operation" and "promote standardization of meteorological and related observations". During the course of its history, the WMO established the World Weather Watch part of which is the Global Observing System (GOS).

Operational satellites form the space-based component of the GOS. The thrust of the current generation of meteorological satellites is aimed primarily at defining and understanding the kinematics and dynamics of the atmospheric circulation. The ability to achieve such objectives was demonstrated during the Global Weather Experiment in 1979. This capability is now part of the global operations of the World Weather Watch. The existing network of meteorological satellites, forming part of the Global Observing System of the World Weather Watch, produces real-time weather information on a regular basis. This is acquired several times a day through direct broadcast from the meteorological satellites at more than 1000 stations located in over 125 countries.

There are two major components in the current meteorological satellite network. One element consists of the various geostationary meteorological satellites, which operate on the equatorial belt and provide a continuous view of the weather from roughly 70 degrees North to 70 degrees South. The second major element comprises the polar-orbiting satellites operated by the USSR and the USA.

The ability of geostationary satellites to provide a continuous view of weather systems make them invaluable in following the motion, development, and decay of atmospheric phenomena. Even such short-term events as severe thunderstorms, with a lifetime of only a few hours, can be successfully recognized in their early stages and appropriate warnings of the time and area of their maximum impact can be expeditiously provided to the general public. For this reason, their warning capability has been a primary justification for the geostationary spacecraft. Together, the polar-orbiting and geostationary satellites constitute a truly global meteorological satellite network.

Within the planning and financial structure of the WMO, the WMO Congress issues Long Term Plans and Programmes and Budgets. Presently, the WMO is executing the plans found in the Third Long term Plan (TLTP, 1992-2001). The satellite programme of the WMO's TLTP meets the needs of all the various programmes, including the World Weather Watch Programme, World Climate Research Programme and World Climate Programme.

The WMO is structured with eight Technical Commissions representing the various needs of different programs, for instance, hydrology, climatology, etc. The satellite data requirements of each of these programmes are maintained in a data base. This data base provides an input to not only the operational satellite operators but also the space research organizations as they build their future system to meet the anticipated needs of the various user groups.

Internal and International Organizations

The programme with overall purview of matters related to satellites within the WMO is the WMO Satellite Activities (SAT). SAT provides the necessary support to a Panel which advises the WMO Executive Council. The terms of reference for the EC Panel of Experts on Satellites are: to collect, collate and keep under review, particularly with regard to their feasibility, the requirements for data, products and services from environmental observation satellites; to assess the status of implementation of the space-based sub-system of the Global Observing System and the adequacy of plans for this implementation; to assess the observation, collection and analysis systems available now in developing countries, in particular the use of satellites in all meteorological activities, and suggest ways and means for the upgrading of meteorological systems of developing countries; to represent WMO's interests and convey WMO Members' requirements through appropriate involvement in international satellite groups, including the Co-ordination Group for Meteorological Satellites (CGMS) and the Committee on Earth Observation Satellites (CEOS); to keep under review the progress in the availability and use of environmental observation satellites in WMO programmes; to keep under review satellite related education and training requirements and evaluate the adequacy of planned activities; to identify opportunities and/or problem areas concerning satellite technology and plans of environmental observation satellite operators; to assist in the continuing maintenance of a record of the plans for satellite developments and operations in order to assure appropriate consideration of satellite technology in the WMO long-term plans. At the forty-third session of the WMO Executive Council while reviewing relevant internal arrangements, the Council considered that the time is now mature to let the Commission for Basic Systems take over the duties of the EC Panel of Experts on

Satellites and thereby ensure closer connections between satellite operators and end users. Initially the EC Panel of Experts would continue its work for two years to ensure a smooth transition of its functions. Simultaneously, the President of the Commission for Basic Systems has been invited to establish the CBS Working Group on Satellites with the same terms of reference and membership as the EC Panel of Experts on Satellites. The President is acting upon this suggestion at the time of this paper.

Emphasis is placed on the close involvement of satellite operators in the WMO mechanisms. Two specifically mentioned international groups in the terms of reference for the EC Panel are the Co-ordination Group for Meteorological Satellites (CGMS) and the Committee on Earth Observation Satellites (CEOS). CGMS started as an informal group in 1972, to co-ordinate the first global geostationary system amongst satellite providers. ESRO, NOAA and the Japan Meteorological Agency were founder members. The current members of CGMS include EUMETSAT (ESA is also represented), India, Japan, PRC, USA, USSR and WMO. EUMETSAT currently acts as the Secretariat for CGMS. The CGMS recommendations are non-binding on Members, and are implemented on a voluntary basis. The objectives of CGMS allows it: to provide a forum for the exchange of technical information on geostationary and polar orbiting meteorological satellite systems, such as reporting on current meteorological satellite status and future plans, telecommunications matters, operations, inter-calibration of sensors, processing algorithms, products and their validation, data transmission formats and future data transmission standards; to harmonize to the extent possible meteorological satellite mission parameters such as orbits, sensors, data formats and down-link frequencies; to encourage complementarity, compatibility and possible mutual back-up in the event of system failure through co-operative mission planning, compatible meteorological data products and services and the co-ordination of space and data related activities, thus complementing the work of other international satellite co-ordination mechanisms. Some CGMS achievements are: agreement on the nominal location of satellites to obtain optimum levels of data coverage with five satellites provided by four early Members (recognition that additional satellites from other Members provide additional system resilience as well as serving national interests); agreement on standards for the International Data Collection System, as well as co-ordination of platform admissions to the system, data handling, IDCS Channel allocations to platform systems and platform radio-set certification. Through this co-ordination an aircraft, ship, balloon, buoy or other mobile platform can report continuously over most parts of the world with the assurance that the data will be handled correctly by the individual CGMS Members; agreement on standards for WEFAX image transmissions, with the result that the same equipment for reception of basic image data can be used in most parts of the world, enabling economies of scale in manufacture and facilitating the very large user base which exists worldwide today; consensus regarding practical ways to address the problem of mutual back-up in the case of satellite problems, and identification of the "help thy neighbour" philosophy which is assisted by the mutually agreed standards for the user interfaces; establishment of practical documentation, including the CGMS Meeting Reports, the CGMS Consolidated Report (which defines standards) and the International Data Collection System Guide. Some CGMS tasks continue from meeting to meeting, including the routine exchange of validation statistics for Cloud Motion Vectors, to encourage improvements in performance by all Operators. CGMS also concerns itself with special actions and with planning of particular elements of future systems such as product improvements. CGMS has been the instigator of routine inter-comparisons of Cloud Motion Vectors from the Geostationary satellites and has also pressed for a higher degree of scientific research in this field, through a session during the 1990 COSPAR meeting and through this workshop. CGMS has a special relationship with the WMO because WMO is the only full Member which is not a satellite operator. This means that it is in a unique position to represent the views of a specific (and major) user group.

CEOS was created in 1984 as a result of recommendations from the Economic Summit of Industrialized Nations and serves as the focal point for international co-ordination of space-related, Earth observation activities among space agencies. Policy and technical issues of common interest related to the whole spectrum of Earth observation satellite missions and their data are addressed. CEOS encourages complementarity and compatibility among experimental and operational space-borne Earth observing systems through coordination in mission planning, promotion of full and non-discriminatory data access, setting of data product standards, and development of compatible data products, services, and applications. Members of CEOS are those national and multinational government agencies with funding and program responsibilities for a satellite Earth observation program currently operating or in the later stages of development. Membership requirements also specify that members provide to the international community non-discriminatory and full access to their Earth observation data. CEOS members include NASA, NOAA, the European Space Agency, EUMETSAT, and counterpart space and Earth observation agencies in Australia, Brazil, Canada, France, Germany, India, Italy, Japan, and the United Kingdom. Current observers are agencies from Canada, New Zealand, and Norway. At the November 1990 CEOS plenary meeting, members recognized the need to extend membership to relevant agencies on a global basis and to strengthen interaction with both international scientific programs (ICSU/IGBP, WCRP) and intergovernmental user organizations (WMO, IOC, UNEP, IPCC) in order to enhance and further focus space agency Earth observation mission planning on global change requirements. An affiliate status was created for these organizations, as well as for other international satellite co-ordination groups. WMO has become an affiliate organization of CEOS.

Satellite Data Requirements

At its sixth session, the EC Panel of Experts decided to develop a consolidated set of satellite data requirements. The President of CBS, at that time, requested input from all of the technical commissions. In 1985, the requirements were consolidated by the WMO Secretariat. The thirty sixth session of the WMO Executive Council approved the convening of a special experts meeting for consolidation of requirements. The Expert Meeting in March 1985 assessed the ability to obtain the requirements. The seventh session of the EC Panel of Experts on Satellites approved the list and requested the presidents of technical commissions to regularly review the list. At the eighth session of the Panel, the consolidated list of satellite data requirements was reviewed. At that time, the Vice-president of the Commission for Basic Systems (CBS) confirmed that the consolidated list was still valid. At CBS-EXT.(90), the Commission for Basic Systems considered it proper to review the requirements and referred the matter to the Working Group on Global Data-Processing System in co-operation with the Working Group on the Global Observing System. The Commission felt that the list was extremely important and that the periodic reviews should occur on a continuing basis. Table 1 is an extract from the total list of satellite data requirements and only shows those requirements which are pertinent to cloud track winds.

Parameter	Scale	Hor res	Vert res	Freq	Acc	WMO Id No.
Wind direction	5	70km	200mb	2hr	5deg	WMO UA 46
Wind speed	5	70km	200mb	2hr	1m/s	WMO UA 49
Wind direction	2	20km	100mb	10min	5deg	WMO UA 47
Wind speed	2	20km	100mb	10min	1m/s	WMO UA 50
Wind jetstream posit	3	10km	1km	.5hr		WMO UA 48
Wind velocity	9	300km	1km	3hr	1%	WMO UA 52
Wind, stratosphere	9	100km	Ly	6hr	2m/s	WMO UA 56
Wind, stratosphere	8	km	Ly	6hr	2m/s	WMO UA 57
Wind, troposphere	9	100km	Ly	6hr	1m/s	WMO UA 59
Wind, troposphere	8	km	Ly	6hr	1m/s	WMO UA 60
Wind velocity		500km	100mb	24hr	1m/s	WMO UA 51

Table 1. Extract from WMO Satellite Data Requirements

The Scale column indicates the size to be observed and the code indicate a range of sizes as follows: 2 = 50-499 km^2, 3 = 500-4999 km^2, 5 = 50,000-499,999 km^2, 8 = regional, 9 = global. In the Vert res column, Ly indicates layers. A quick analysis of the requirements indicates that tropospheric winds every 6 hours with a 1m/s accuracy are needed covering the entire globe every 100 km. At a reduced horizontal resolution of 300 km, wind velocity accurate to 1% every 3 hours is needed. Higher level winds in the stratosphere have similar requirements except that the accuracy is only 2m/s. Finer scale requirements (2, 3 and 5) also exist with higher horizontal resolution. The various commissions of the WMO have submitted these requirements and revalidated them on a continuous basis. It is also interesting to be aware that the last requirement on the list above is from the World Climate Research Programme. While the horizontal resolution for climate research is global at 300 km resolution, the accuracy is just as stringent as the all the others (1 m/s). Noting that these requirements exist, the users of such observations have sought to substantiate their accuracy when ingested into Numerical Weather Prediction (NWP) systems.

It is interesting to compare the current satellite data requirements with those from a decade ago. Table II contains an excerpt from the observational requirements for the World Weather Watch [2] (and FGGE) for the 1977. One can observe that the accuracy requirements have increased - for instance the accuracy requirement in the troposphere has increased from 2 m/s to 1m/s over the last decade. However, the horizontal resolution has increased markedly. This can be explained from the viewpoint of the operational use and increasing sophistication of global forecast models. These models can assimilate higher resolution data and the requirements have subsequently increased. The latter part of the decade of the 80's and into the 90's will see increased capabilities in the forecast skill for regional models as well as the global models. For this reason, one can logically expect that the present satellite data requirements in terms of accuracy and resolution will continue to become more stringent and demanding.

Parameter	Horizontal Resolution	Vertical Resolution	Accuracy
Mid and high latitudes			
Wind	500 km	4 levels in troposphere	3 m/s
Tropics			
Wind	500 km over land	4 levels in troposphere (FGGE 5 levels)	2 m/s
	1000 km over oceanic areas	3 levels in stratosphere	
	(FGGE: stratosphere 4000 km		
	troposphere active regions 350-500 km		
	inactive regions 500-700 km)		

Table II. Observational requirements for WWW (and FGGE) - 1977.

Eriksson [1] performed statistical analyses of operational cloud track wind observations from three SATOB producers. The observations were compared with the six hourly forecasts of ECMWF. Comparisons were performed at high and low levels and in three geographical regions, namely Northern Hemisphere, Southern Hemisphere and the Tropics. Her analyses indicate that the rms vector difference in m/s for high level winds exceed the goal of 2 m/s and for low level winds exceed the goal of 1 m/s. However, a most noteworthy fact was the difference in accuracy between the SATOB producers. For instance, at low levels, there is almost a doubling in the directional error between the best and worst. The net results of the analyses performed by ECMWF is that the following data is not used: all INSAT winds, high level HIMAWARI winds in the extra-tropics (poleward of 20°N/S), high level GOES data north of 20°N, and in the extra-tropics no SATOB data is used over land. In contrast to this large data rejection process, Eriksson also indicated that the "use of SATOBs is vital for the otherwise data sparse tropics. In the southern hemisphere the impact is positive." In her conclusion, she noted that SATOB producers must "bring their products up to the best possible standard of tracking techniques, height assignment and quality control."

necessarily follow that standardization will improve the accuracy of winds, it will allow the users to have similar expectations from different satellite operators in terms of accuracy. Utilizing the characteristics of optimal interpolation (OI), one should expect improvement. In the discussion of the paper by Eriksson [1], she noted that some of the presently derived cloud track winds are not utilized. To analyze this impact, one must first make some assumptions. Here, it is assumed that the normal total view of a geostationary satellite is a rectangle 140 degrees in latitude by 110 degrees of longitude and that there are four functional geostationary satellites performing cloud track wind extractions. Eriksson implies that around 50% of the possible cloud track wind observation are discarded. From a regional vantage, this varies between 18% to 100%. In light of the large expenses involved with building and operating a geostationary satellite and especially the costs involved in salaries, operations and research for cloud track wind observations, a prudent manager should logically expect to see a cost impact ratio which is satisfying. More importantly, the loss of around 50% of the total possible cloud track wind observations, contributes to the argument that satellite data provides no impact to NWP. One way to insure a positive impact would be to provide the end-users with large quantity and high quality cloud track wind observations. Given that this would lead to a positive impact, then it would be logical to anticipate a positive impact in terms of financial support for satellite operations.

Operational Procedures versus Research

It is clear that the preponderance of information accumulated in this paper indicate a need for standardization. However, one should clearly distinguish standard procedures in an operational environment from changing procedures in a research environment. Without the necessary research to determine improvements, operational procedures will become stagnant. Research is not only necessary but mandatory. Furthermore, research procedures must be tested in an operational scenario and many times that can not be replicated in non-realtime. Therefore, one must accept that research procedures will be tested in operational streams. This should not preclude alerting the users such that appropriate flags could be utilized to account for the potential variations from the standard. Finally, if the strict use of operational standards is taken to the extreme then there is no room for research and that is not the intent of any recommendation towards standardization.

Precedents

Before summarizing the previous information and drawing conclusions and recommendations, one should review history to determine any precedences for standardization and determine their strengths and weaknesses. The most prevalent example of standardization is in observations. The Commission for Instruments and Methods has worked diligently developing procedures to ensure that observations are taken the same world-wide. To this end, the Commission meets regularly and develops recommendations for procedures and algorithms which WMO Members may use. These recommendations are added periodically to the Guide to Meteorological Instruments and

Justification for Standardization

The WMO Guide on the Global Observing System [3] states that one of the principal purposes of the WMO, as laid down in the Convention, is to facilitate world-wide co-operation in the establishment of networks of stations for the making of meteorological observations or other geophysical observations related to meteorology, and to promote the establishment and maintenance of meteorological centres charged with the provision of meteorological services. Another purpose of the Organization is to promote standardization of meteorological observations and to ensure the uniform publication of observations and statistics.

In the Third Long-term Plan of the WMO, the main purpose of Satellite Activities (SAT) is to co-ordinate environmental satellite matters and activities throughout all the WMO programmes and to give guidance to the WMO Secretariat, Commissions and Regional Offices on the potentialities of remote-sensing techniques in meteorology, hydrology, related disciplines and their applications. Some aspects of the WMO Satellite Activities sub-programme are: to define satellite data requirements, transmission, and applications; to provide guidance on satellite matters through close collaboration with all other technical departments of the WMO Secretariat, Commissions and Regional Offices; to facilitate technology transfer between WMO Members; to co-ordinate, monitor, compile and evaluate satellite activities and initiate required action; to co-ordinate with WMO Members for satellite activities continuity, standardization and contingency planning through CGMS and the EC Panel of Experts on Satellites. There are several specific objectives and plans which relate to the Satellite Activities sub-programme and the following one is germane to standardization:

> Co-operation with satellite operators in meteorological satellite programme development. To develop satellite data requirements, standards for data formats and procedures to achieve economical and effective storage and retrieval systems through co-ordination with the major satellite operators as well as active participation in satellite operator decision-making.

During the WMO's tenth Congress, it noted the potential benefits of derived satellite winds and temperature data, particularly over areas not adequately covered by conventional observations, for the improvement of NWP. However, the accuracy of the operational derivations of winds from geostationary satellite imagery and of the retrieval of atmospheric temperature profiles from satellite radiances is still not adequate to meet the increasingly stringent requirements of NWP. Congress emphasized the importance of continued attention to research and operational implementation in these areas. In Resolution 3.1.7/1 (Cg-XI) adopted by the tenth Congress, they requested the Secretary-General: to follow closely the developments in relation to environmental satellite systems and to ensure that WMO participates actively in the international pursuit for assuring the continuity and reliability of satellite data.

Another viewpoint which can be utilized in evaluating the need to standardize operational procedures for cloud track wind extraction is financial. While it does not

Methods of Observations [5]. The Guide contains uniform recommended procedures such that any Member using another Member's observation will know how that observation was obtain. Chapter 12 of the Guide contains a description of the recommended procedures for measuring upper winds from conventional observing systems. The Guide also contains accuracy requirements for upper level wind observations. Examples of standardized procedures emanating from the guide include algorithms for wind gust computation and algorithms for temperature and humidity profiles derived from a radiosonde ascent. This drive towards standardization has greatly benefitted the data users and is clearly an unprecedented success. Another example of standardization is the direct broadcast service from polar-orbiting satellites called the Automated Picture Transmission (APT) and from the geo-stationary satellites called Weather Facsimile (WEFAX). Through the coordination efforts of the CGMS, the direct broadcast service of APT have been standardized such that any user in the world can be guaranteed successful reception from a satellite if his equipment can process the APT format. Furthering this standardization, the format for WEFAX is compatible world-wide (except India which does not offer a WEFAX service within the WWW) with the receiving equipment for APT if an appropriate downconverter and antenna is placed functionally ahead of the APT system. This standardization is a true tribute to the ideals which CGMS has adopted in its Terms of Reference. It should also be noted that the satellite operators of EUMETSAT and NOAA have indicated a strong commitment to continue this standardization for the satellite systems which will be deployed at the end of this decade. They are actively including the WMO in this endeavors.

Proposal for Standardization of Cloud Track Wind Extraction Procedures

The author proposes that satellite operators who produce cloud track winds agree to a standardized procedure such that users can expect the accuracy of the winds from different producers to be the same. To effectuate such a procedure, the author proposes that CGMS, under the aegis of a dedicated CGMS Working Group, have as an annual agenda item the review of the procedures and level of accuracy from each Member.

In fact CGMS [4] has already agreed on the need for international intercomparison of satellite winds in order to assess their homogeneity and accuracy. The intercomparison is an annual agenda item. The annual CGMS meetings have also discussed the standardization of cloud track wind extractions. CGMS IX (1979) noted the three principal errors in derived winds. At that time CGMS agreed that standardization was still difficult. At CGMS XIII (1984), they agreed that standardization of methods for deriving cloud motion vectors was not appropriate at this time.

As a summary and in justifying the above proposal, the following are excerpts from the text:

a World Meteorological Organization (WMO) goal is to promote standardization of meteorological and related observations,

the terms of reference of the EC Panel of Experts on Satellites include representing

WMO's interests and convey WMO Members' requirements through appropriate involvement in international satellite groups,

a CGMS objective is to inter-calibration of processing algorithms, products and their validation,

a CGMS achievement is the agreement on standards for WEFAX image transmissions,

a CGMS task is the routine exchange of validation statistics for Cloud Motion Vectors, to encourage improvements in performance by all Operators,

CGMS has been the instigator of routine inter-comparisons of Cloud Motion Vectors from the geostationary satellites,

CGMS has a special relationship with the WMO because WMO is the only full Member which is not a satellite operator. This means that it is in a unique position to represent the views of a specific (and major) user group.

the WMO has a consolidated list of satellite data requirements which include cloud track winds,

Eriksson [1] performed a statistical analyses of operational cloud track wind observations and indicated that ECMWF does not use: all INSAT winds, high level HIMAWARI winds in the extra-tropics (poleward of 20°N/S), high level GOES data north of 20°N, and in the extra-tropics no SATOB data,

according to the WMO Guide on the Global Observing System [3] one of the principal purposes of the WMO is to promote standardization of meteorological observations,

one aspect of the WMO Satellite Activities sub-programme is to co-ordinate with WMO Members for satellite activities standardization,

the WMO's tenth Congress noted the accuracy of the operational derivations of winds from geostationary satellite imagery is still not adequate to meet the increasingly stringent requirements of NWP,

the tenth Congress requested the Secretary-General to ensure that WMO participates actively in the international pursuit for assuring the continuity and reliability of satellite data,

If such a process for standardization as proposed by the author were adopted, then the strong links which exists between CGMS and WMO would ensure that the WMO guiding principles and those of its Technical Commissions, for instance CBS, would be met. The proposal also recognizes the need for standards of procedures which are best maintained by satellite operators through a CGMS umbrella and those standards for accuracy best established and maintained by users through the satellite data requirements as compiled from the needs of all the Technical Commissions of the WMO.

To approve such a proposal, all the related satellite operators would have to concur. Assuming their concurrence then success within the CGMS framework would be assured due to its proven record for unanimous commitment through persuasive consensus.

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