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Prepared by WMO
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STRATEGY TOWARDS AN ARCHITECTURE FOR CLIMATE MONITORING FROM SPACE

In response to CGMS actions A38.05, A38.13

WMO-WP-08 reports on the outcome of the sixteenth World Meteorological Congress (Cg-XVI), which agreed that an architecture for sustained climate monitoring from space should be defined and implemented, involving the different stakeholders including operational satellite operators and R&D space agencies, the CGMS, the Committee on Earth Observation Satellites (CEOS), the Global Climate Observing System (GCOS), the World Climate Research Programme (WCRP) and the Group on Earth Observations (GEO).

Congress provided guidelines for the development of such an architecture, and adopted Resolution 19 (Cg-XVI).

The first outcome of the collaborative work done on this subject will be presented at CGMS-39 by the CGMS Secretariat. As a partner in this effort, WMO is looking forward to broad support from CGMS on this matter.

STRATEGY TOWARDS AN ARCHITECTURE FOR CLIMATE MONITORING FROM SPACE

1. Outcome of the Sixteenth World Meteorological Congress

The sixteenth World Meteorological Congress (Cg-XVI) agreed that an architecture for sustained climate monitoring from space should be defined and implemented, based on the requirements established by the Global Climate Observing System (GCOS) for the Essential Climate Variables (ECVs) that can be monitored from space.

It welcomed the effort initiated to formulate a concept for such an architecture, noting that the architecture should enhance, and be modelled after, the system which has been developed for weather monitoring and forecasting over the last fifty years, to the extent possible.

Congress further noted the importance of enhancing synergies between in-situ and space-based observing systems, and recommended that this be taken into account in the development of the architecture. Specifically with regard to ocean observations, it recognized the potential importance of the existing JCOMM Observing Programme Support Centre (JCOMMOPS) to provide some coordination mechanism, and to the enhancement of such synergies.

Congress agreed that such architecture should be defined as an end-to-end system, involving the different stakeholders including operational satellite operators and R&D space agencies, the Coordination Group for Meteorological Satellites (CGMS), the Committee on Earth Observation Satellites (CEOS), the Global Climate Observing System (GCOS), the World Climate Research Programme (WCRP) and the Group on Earth Observations (GEO).

Within the WMO context, the architecture shall be part of the space-based component of the WMO Integrated Global Observing System (WIGOS).

Other components of this end-to-end system would include the intercalibration activities of the Global Space-based Inter-Calibration System (GSICS), additional calibration and validation activities to be conducted in coordination with the Commission for Instruments and Methods of Observation (CIMO), the product generation efforts as done within the SCOPE-CM and the training and capacity building activities of the VLab.

Congress therefore adopted Resolution 19 (Cg-XVI), as contained in the Appendix.

2. Conclusion

The first outcome of the collaborative work done on this subject will be submitted to CGMS-39 by the CGMS Secretariat (See related Working Paper). As a partner in this effort, WMO is looking forward to broad support from CGMS on this important matter.

Res. 19 (Cg-XVI) DEVELOPMENT OF AN ARCHITECTURE FOR CLIMATE MONITORING FROM SPACE

THE CONGRESS,

Noting:

- (1) Article 2 of the Convention of the World Meteorological Organization,
- (2) Resolution 5 (Cg XIV) - WMO Space Programme,
- (3) Resolution 30 (Cg-XV) - Towards enhanced integration between WMO observing systems,
- (4) Paragraph 9.2.5 of the *Abridged Final Report with Resolutions of the Fifteenth World Meteorological Congress* (WMO-No. 1026) reaffirming the Executive Council decisions to provide full support for the GEO process and resulting GEOSS and to support its implementation to the maximum extent possible within the WMO mandate,
- (5) Draft Resolution 3.1.1/1 (Cg-XVI) - Global Observing System,
- (6) Draft Resolution 11.1/x (Cg-XVI) - Global Framework for Climate Services,

Considering:

- (1) The benefits that have been achieved through the coordinated, collaborative and cost-effective approach to the planning and operation of an end-to-end system for weather observations, modelling, analysis and forecasting,
- (2) The increasingly important role that space-based observations are playing in the long-term monitoring of the Earth's environment,
- (3) The substantial investment that Members have made in Earth-observation satellites to monitor and study weather, water, climate and related natural disasters,
- (4) The importance of long-term, sustained and coordinated observations of the Earth's climate, climate change and variability for the world's population, and particularly those at most risk,
- (5) The benefits in efficiency, sustainability and cost-effectiveness that could be achieved through increased coordination of efforts among all parties involved in the planning and implementation of space-based observational capabilities and related operational processing activities for climate monitoring,
- (6) The underpinning role that observations will play in the Global Framework of Climate Services (GFCS),
- (7) The importance of integration of ground-based and space-based observations in the successful implementation of the WMO Integrated Global Observing System (WIGOS),

Appreciating:

- (1) The important contributions Members, their satellite operators, international partner organizations and programmes make toward observing, and coordinating observations of the Earth from space,
- (2) The relevant work undertaken by the Global Climate Observing System (GCOS) to identify the requirements associated with the Essential Climate Variables (ECVs) for the long-term and sustained observation of the Earth's climate system,
- (3) The invitation made by the sixty-second session of the Executive Council to the WMO Space Programme, in coordination with GCOS and with the support of relevant technical commissions, to work with space agencies, the Coordination Group for Meteorological Satellites (CGMS), the Committee on Earth Observation Satellites (CEOS), and the Group on Earth Observations (GEO) in order to develop an architecture for sustained, space-based climate monitoring as a component of the future WIGOS and GFCS, for consideration by the Congress,
- (4) The early work done by the WMO Space Programme to develop a concept and initiate a dialogue among interested parties for an architecture for climate monitoring from space,

Recognizing:

- (1) The WMO Space Programme provides Members with an appropriate framework to advance, in partnership with CEOS, CGMS, GCOS, GEO, the World Climate Research Programme (WCRP) and other partner organizations the development of an architecture for climate monitoring from space,
- (2) The end-to-end system implemented by Members to support weather monitoring and forecasting, which includes the review of observational requirements, satellite observations, intercalibration, as well as product generation and training and user-engagement, can be leveraged for climate monitoring,
- (3) The different, but complementary roles and responsibilities, of satellite operators and their coordinating mechanisms for activities which cover the spectrum of research and development and operational missions,
- (4) That, in this architecture, space-based observations have to be supported by surface-based observations,

Decides that an architecture be developed using as a starting point the concept given in the annex to this resolution to provide a framework for the sustained and coordinated monitoring of the Earth's climate from space;

Decides further:

- (1) That the development be undertaken as a major initiative of the WMO Space Programme, as an important component of WIGOS, with the support of relevant technical commissions, and in coordination with satellite operators, CEOS, CGMS, GCOS, GEO and WCRP;
- (2) That the results will be made available for the deliberations and final approval by the Executive Council;

Requests:

- (1) The Executive Council to monitor, guide, support and consider approving, at its sixty-fourth session, the development of an architecture for climate monitoring from space;
- (2) Technical commissions to:
 - (a) Guide the technical aspects of the development activities;
 - (b) Update WMO Regulatory Material, including development of the Manual on WIGOS;
 - (c) Provide the technical lead for the architecture through the Commission for Basic Systems (CBS), the Commission for Instruments and Methods of Observation (CIMO), and the Commission for Climatology (CCI);
- (3) Members to:
 - (a) Provide experts to participate in the development, implementation and operation of an architecture for climate monitoring from space;
 - (b) Provide voluntary contributions to the WMO Space Programme Trust Fund for the further advancement of the architecture development efforts;
 - (c) Share relevant experience and cooperate with one another in leveraging the existing end-to-end weather monitoring system to serve climate monitoring needs;
 - (d) Continue to enhance and integrate their national climate monitoring capabilities;
- (4) Regional associations to support and coordinate efforts of Members in the development and eventual implementation of an architecture for climate monitoring;
- (5) The Secretary-General to:
 - (a) Ensure management and support of the architecture for climate monitoring from space development efforts;
 - (b) Support the review and update of WMO Regulatory Material, including the development of the Manual on WIGOS;

Invites CEOS, CGMS, GCOS, GEO and WCRP to collaborate with the WMO Space Programme on the development of an architecture for climate monitoring from space.

Annex: 1 (See CGMS-38 WMO-WP-09)