

Statement Reporting on Progress by the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS) on Coordinated Response to UNFCCC Needs for Global Observations

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The Nation of Canada, on behalf of the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS) is pleased to provide this annual report to the 59th session of the Subsidiary Body for Scientific and Technological Advice (SBSTA) on the joint CEOS-CGMS response to the United Nations Framework Convention on Climate Change (UNFCCC) needs for systematic Earth observations as identified by the UN's Global Climate Observing System (GCOS).

CEOS and CGMS are international organisations composed of 63 Member Agencies and Associates, and 16 Member Agencies, respectively. The organizations coordinate civilian space observation activities that advance our knowledge of Earth's environment. The Joint CEOS-CGMS Working Group on Climate focuses on activities supporting the GCOS Implementation Plan, a periodic report of observation needs for addressing the challenges of climate change and the implementation of the Paris Agreement. Leveraging its Essential Climate Variables (ECV) Inventory¹, the Working Group assesses GCOS needs against the current and planned space architectures and satellite-derived climate records.

Over the past two years, the Agencies have focused significantly on the UNFCCC Global Stocktake, the first of the recurring global assessments of progress toward Paris Agreement goals. The Agencies provided satellite-derived measurements of greenhouse gases (GHGs), their surface exchanges, and other supporting data and information². Besides supporting Global Stocktake process needs, these contributions help address gaps in national assessments. The

Agencies derived several conclusions from this pioneering activity:

- The world's current climate observing infrastructure (space and *in situ*) is unprecedented and continues to advance. However, this infrastructure is not yet sufficiently comprehensive, robust or systematized to fully meet the needs of periodic and intercomparable Stocktakes. The Agencies strongly recommend an international focus on sustained observations -- both of GHG and non-GHG quantities, and interoperable with the requisite modelling capabilities -- to enable well-evidenced Stocktakes as needed to inform policy- and decision-making. Parties can help contribute by advancing their national GHG emission Measurement, Reporting and Verification systems that leverage satellite data.
- Satellite capabilities for measuring GHGs are advancing rapidly, enabling operational global monitoring as well as facility-, urban- and basin-scale anomaly detection. For example, satellites can now detect methane leaks from fossil fuel facilities, and abatement of leaks could slow the rate of climate warming. Strong effort is required to coordinate and integrate the new capabilities with monitoring programs, including WMO's Global Greenhouse Gas Watch (GGGW).
- Space technologies are also advancing for estimating biomass carbon stocks and fluxes in the Agriculture, Forestry, and Other Land Use (AFOLU) sector. CEOS will publish an AFOLU Roadmap in November 2023 to complement its GHG Roadmap³ and provide a coherent path forward.

¹ [CEOS-CGMS Inventory of Essential Climate Variable records](#)

² [CEOS Global Stocktake Information Portal](#)

³ [CEOS GHG Roadmap](#)

- Independent private sector entities, including academic and non-profit organisations, are rapidly contributing to the overall satellite infrastructure. The Agencies are developing frameworks to integrate these new contributions.
- National approaches to implementing the IPCC-endorsed methods⁴ for estimating GHG inventories vary widely. Improvements in the quality and transparency of the inventory process will occur if the Parties better align their approaches and integrate advanced observational and modelling capabilities.

In addition to supporting the Global Stocktake process, the Agencies are comparing current and planned capabilities against the observing needs expressed in the 2022 GCOS Implementation Plan⁵. Initial results reveal that, for most ECVs, advanced space and ground capabilities support data collection and uses, including the detection of changing patterns and impacts. However, measurement continuity for some key ECVs (e.g., precipitation and some atmospheric gas profiles)

is a top concern. Measurement gaps in time series reduce the ability to identify key environmental changes and patterns.

These findings, together with the Agencies' contributions to a 2022 report to UNFCCC on systematic observations⁶, identify the research and observation capabilities, gaps and paths forward for supporting UNFCCC needs. The Agencies will use these findings to inform future activities. To help maximise their effectiveness, the Agencies continue to partner with other programs and organizations, including GGGW, the UN Environment Programme's International Methane Emission Observatory, WMO's Integrated Global Greenhouse Gas Information System and the Group on Earth Observations.

CEOS and CGMS welcome engagement with the Parties, and stand ready to support a new international focus on sustained observations as needed for recurring Stocktakes, as well as to expand capacity building activities for unleashing the full value of satellite data.

⁴[IPCC Updated Guidelines for GHG Inventories](#)

⁵[2022 GCOS Implementation Plan](#)

⁶[The Role of Systematic Earth Observations in the Global Stocktake](#)

CEOS and CGMS Agencies

Agence Gabonaise d'Études et d'Observations Spatiales (AGEOS), Gabon	Intergovernmental Oceanographic Commission (IOC)*
Agencia Espacial Mexicana (AEM), Mexico	International Ocean Colour Coordinating Group (IOCCG)
Agensi Angkasa Negara (ANGKASA), Malaysia	International Society of Photogrammetry and Remote Sensing (ISPRS)
Agenzia Spaziale Italiana (ASI), Italy	Japan Meteorological Agency (JMA)**
Australian Bureau of Meteorology (BoM)	Korea Aerospace Research Institute (KARI)
Belgian Federal Science Policy Office (BELSPO)	Korea Meteorological Administration (KMA)*
Canada Centre for Mapping and Earth Observation (CCMEO)	Ministry of Education, Culture, Sports, Science and Technology (MEXT)/Japan Aerospace Exploration Agency (JAXA)*
Canadian Space Agency (CSA)	National Aeronautics and Space Administration (NASA), USA*
Centre National d'Études Spatiales (CNES), France*	National Institute of Environmental Research (NIER), Korea
Centro para Desarrollo Tecnológico Industrial (CDTI), Spain	National Oceanic and Atmospheric Administration (NOAA), USA*
China Center for Resources Satellite Data and Applications (CRESDA)	National Remote Sensing Center of China (NRSCC)
China National Space Administration (CNSA)**	National Satellite Meteorological Center (NSMC)/China Meteorological Administration (CMA)*
Chinese Academy of Space Technology (CAST)	National Space Agency of Ukraine (NSAU)
Comisión Nacional de Actividades Espaciales (CONAE), Argentina	National Space Research Agency of Nigeria (NASRDA)
Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia	Netherlands Space Office (NSO)
Council for Scientific and Industrial Research (CSIR) South Africa	Norwegian Space Agency (NOSA)
Crown Research Institute (CRI), New Zealand	Polish Space Agency (Poland)
Deutsches Zentrum für Luft- und Raumfahrt (DLR), Germany	Portuguese Space Agency (Portugal Space), Portugal
Earth System Science Organisation (ESSO), India	Russian Federal Service for Hydrometeorology and Environmental Monitoring (ROSHYDROMET)*
European Centre for Medium-Range Weather Forecasts (ECMWF)	Russian Federal Space Agency (ROSCOSMOS)*
European Commission (EC)	Scientific and Technological Research Council of Turkey (TÜBITAK---Uzay)
European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)*	South African National Space Agency (SANSA)
European Space Agency (ESA)*	Swedish National Space Agency (SNSA)
Geo---Informatics and Space Technology Development Agency (GISTDA), Thailand	United Arab Emirates Space Agency (UAESA)
Geoscience Australia (GA)	United Kingdom Space Agency (UKSA)
Global Climate Observing System (GCOS)	United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)
Global Geodetic Observing System (GGOS)	United Nations Educational, Scientific and Cultural Organization (UNESCO)
Global Ocean Observing System (GOOS)	United Nations Environment Programme (UNEP)
Global Terrestrial Observing System (GTOS)	United Nations Food and Agriculture Organization (FAO)
International Science Council (ISC)	United Nations Office for Outer Space Affairs (UNOOSA)
International Geosphere-Biosphere Programme (IGBP)	United States Geological Survey (USGS)
India Meteorological Department (IMD)**	Vietnam Academy of Science and Technology (VAST)
Indian Space Research Organisation (ISRO)*	World Climate Research Programme (WCRP)
Instituto Nacional de Pesquisas Espaciais (INPE), Brazil	World Meteorological Organization (WMO)*

*Denotes being (Associate) Member of both CEOS and CGMS. **Denotes being a Member of CGMS only.