

## 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

52<sup>nd</sup>-55<sup>th</sup> Session of the of the Subsidiary Body for Scientific and Technological Advice (SBSTA)

31 October 2021, Glasgow, United Kingdom

The United States of America on behalf of the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS) is pleased to provide this annual update to the 52<sup>nd</sup> to 55<sup>th</sup> 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, international organizations of 61 Members and Associates and 16 Members, respectively, coordinate space agency activities that advance the systematic observation of the Earth's climate system by implementing the Architecture for Climate Monitoring from Space<sup>1</sup>. The Joint CEOS/CGMS Working Group on Climate coordinates these activities in part through its updated Inventory<sup>2</sup> of more than 1,137 climate data records addressing the GCOS Essential Climate Variables (ECV) observable from space. The most recent Inventory analysis focused on ECVs for which GCOS has identified continuity risks and provided substantial input to the 4<sup>th</sup> GCOS Status Report<sup>3</sup>. Space agencies continue to use this analysis to inform their planning for both Earth observation missions and data product generation to preempt continuity issues in the future.

The data provided by CEOS and CGMS Agencies supports both the climate change mitigation and

adaptation objectives of the first Global Stocktake (GST) of the UNFCCC Paris Agreement.

The 47<sup>th</sup> session of SBSTA noted the increasing capability of satellite and in situ observations to support systematic monitoring of greenhouse gas (GHG) emissions and removals. The updated IPCC guidelines<sup>4</sup> on methodologies to assess national GHG emissions and removals noted these evolving contributions. In addition, it acknowledges the capacity for satellite data to contribute further to assessments of carbon stock changes from Agriculture, Forestry, and Other Land Use (AFOLU).

To fully address this potential, CEOS and CGMS defined a space-based constellation architecture for monitoring atmospheric carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) concentrations, as well as their natural and anthropogenic fluxes<sup>5</sup>. This provides a reference for agencies planning space-based CO<sub>2</sub> and CH<sub>4</sub> missions as well as for the international coordination on the acquisition, analysis, and distribution of their measurements.

Further, CEOS and CGMS developed a roadmap to implement a GHG monitoring system that supports the Transparency Framework, Global Stocktakes, and Nationally Determined Contributions activities. The first prototype system has been developed and leverages space-based assets to inform the first Stocktake with a use case on top-down CO<sub>2</sub> and CH<sub>4</sub> inventories. A follow-on pre-operational system integrates satellite data into a sustainable atmospheric CO<sub>2</sub> and CH<sub>4</sub> monitoring system to support future Stocktakes in 2028 and beyond. CEOS and

<sup>1</sup>[https://ceos.org/document\\_management/Working\\_Groups/WGClimate/Documents/ARCH\\_strategy-climate-architecture-space.pdf](https://ceos.org/document_management/Working_Groups/WGClimate/Documents/ARCH_strategy-climate-architecture-space.pdf) and <https://ceos.org/ourwork/workinggroups/climate/documents/> for further information

<sup>2</sup> <https://climatemonitoring.info/ecvinventory/>

<sup>3</sup>[https://ane4bf-datap1.s3.eu-west-1.amazonaws.com/wmod8\\_gcoss/s3fs-public/gcos-status\\_report\\_full\\_text-240\\_lr\\_compressed.pdf?FDdn12yqIcPlxugb2V7hTQ9ITicMRQFd=](https://ane4bf-datap1.s3.eu-west-1.amazonaws.com/wmod8_gcoss/s3fs-public/gcos-status_report_full_text-240_lr_compressed.pdf?FDdn12yqIcPlxugb2V7hTQ9ITicMRQFd=)

<sup>4</sup><https://www.ipcc.ch/report/2019-refinement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/>

<sup>5</sup>[http://www.ceos.org/document\\_management/Virtual\\_Constellations/ACC/Documents/CEOS\\_AC-VC\\_GHG\\_White\\_Paper\\_Version\\_1\\_20181009.pdf](http://www.ceos.org/document_management/Virtual_Constellations/ACC/Documents/CEOS_AC-VC_GHG_White_Paper_Version_1_20181009.pdf)



CGMS welcome early engagement with the Parties to ensure the planned products and services are satisfactory and engage with capacity building activities to ensure appropriate uptake of these satellite data.

To address overall system implementation goals, CEOS and CGMS continue to coordinate their activities with other stakeholders such as the WMO Integrated Global Greenhouse Gas Information System (IG<sup>3</sup>IS) and relevant modelling centres, and maintain partnerships with national emission inventory and policy user communities. To this end, the space agencies of CEOS and CGMS are coordinating with other organizations on the development of a Synthesis Report on contributions of the Systematic Observations community to the first Global Stocktake.

Agencies continue to coordinate space-based monitoring of Earth's forested areas to support the Global Forest Observations Initiative (GFOI), and the Global Observation of Forest Cover and Land Dynamics (GOFC-GOLD). CEOS Agencies are also developing a roadmap<sup>6</sup> for providing satellite products that support AFOLU land modeling needs and emissions reporting by the Parties to the UNFCCC. This includes the use of multiple new satellite missions to derive aboveground biomass for the Stocktakes, among other uses.

Finally, CEOS recently developed its Strategy to Support the Global Stocktake of the UNFCCC Paris Agreement encompassing all of the above described measures in support of mitigation and adaptation goals.

Parties are invited to continue supporting the activities of the space agencies.

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[http://ceos.org/document\\_management/Meetings/Plenary/34/Documents/AFOLU\\_Roadmap\\_Discussion\\_Paper\\_v1-0.pdf](http://ceos.org/document_management/Meetings/Plenary/34/Documents/AFOLU_Roadmap_Discussion_Paper_v1-0.pdf)

## CEOS and CGMS Agencies

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

\*Denotes Agencies being Member of both CEOS and CGMS. \*\*Denotes only CGMS Agencies.