

## GCOS input to the Global Goal on Adaptation

The Global Climate Observing System (GCOS, co-sponsored by WMO, IOC-UNESCO, UNEP and ISC) welcomes the opportunity to submit its views in response to the call referred to in SB 60 conclusions on matters relating to the Global Goal on Adaptation: “The SBSTA and the SBI invited Parties and non-Party stakeholders, including relevant constituted bodies, United Nations organizations and specialized agencies, and other relevant organizations from all geographical regions, to submit via the submission portal by 31 July 2024 information on existing indicators for measuring progress towards the targets referred to in paragraphs 9–10 of decision 2/CMA.5 in use at the local, national, regional and global level, including, if available, information on associated methodologies and data readiness for such indicators, as well as identified gaps and areas for which the development of new indicators may be needed”.

GCOS works towards climate observations being enhanced and sustained in order to provide the evidence needed to understand, diagnose, and predict the evolution of the climate as well as its causes. Therefore, GCOS supports the provision of climate information related to impacts and future risks along with information on socio-economic drivers, and therefore the provision of information essential also to guide adaptation measures.

GCOS developed and curates the Essential Climate Variables, ECVs (GCOS-245<sup>1</sup>), which are physical, chemical, or biological variables that critically contributes to the characterization of Earth’s climate. ECVs were selected by dedicated expert teams, considering:

- Relevance: The variable is critical for characterizing the climate system and its changes.
- Feasibility: Observing or deriving the variable on a global scale is technically feasible using proven, scientifically understood methods.
- Cost effectiveness: Generating and archiving data on the variable is affordable, mainly relying on coordinated observing systems using proven technology, taking advantage where possible of historical datasets.

The GCOS ECVs are used extensively in all efforts to monitor the progress of climate change, including the WMO State of the Climate reports and the IPCC Assessment Reports, as well as by the space agencies as the basis for their long-term Earth Observations planning and for their efforts to create Fundamental Climate Data Records (FCDRs) and derived climate products<sup>2</sup>. Long-term global datasets of ECVs allow for better validation of satellite derived products and climate models, better climate

<sup>1</sup> <https://library.wmo.int/records/item/58111-the-2022-gcos-ecvs-requirements-gcos-245>

<sup>2</sup> <https://ceos.org/ourwork/workinggroups/climate/>

projections, better reanalysis, better understanding of long-term trends and attribution of extreme events, as well as identification of areas with increasing climate extremes and compounded extremes (e.g. heat and drought). Therefore, the ECVs are instrumental for developing robust information-based methodologies, indicators, and metrics needed for risk and impacts attribution, adaptation planning and monitoring, and for providing complementary information under a consistent global perspective. Some of these ECVs are by themselves suitable to monitor adaptation – such as Fire related ECV products – and many are of special relevance when the adaptation plans are addressing the conservation and the empowering of the Natural Earth Systems and Ecosystems.

However, to be more effective for local adaptation, the completeness, resolution, interoperability, and accessibility of these climate datasets need to be improved. GCOS is working to identify the key gaps and needs to this end, and to determine the ECVs observational requirements (e.g., spatial and temporal resolution) specific for adaptation. More generally, GCOS supports archiving of data in reputable repositories that implement best practices, facilitate open and free dissemination, and provide other infrastructures necessary to support operational climate services and plan adaptation measures.

In 2022, GCOS published its latest Implementation Plan (GCOS-244<sup>3</sup>) which includes a chapter on Climate Services and Adaptation that outlined how climate observations are needed to meet the ever-growing demand for tailored climate information and services by decision makers, stakeholders, and the general public, in order to adapt to climate variability and change. As climate services continue to gain prominence on national, regional, and global climate change agendas, it is important to regularly re-examine their observational needs as science advances. **Maintaining and upgrading the observational networks and ensuring that both ongoing and historical observations can be used to inform policy and decision-making is key to developing effective and robust local services.** Support is particularly important for the Global South which faces a disproportionate share of the climate change impacts while having a limited capacity to develop and deliver services. Indeed, as noted in the 2021 GCOS Status Report (GCOS-240<sup>4</sup>), in situ observations for almost all the ECVs are consistently deficient particularly in parts of Africa, Central and South America, the Caribbean and Southeast Asia, in the deep ocean, and polar regions, a situation that has not improved since the previous GCOS Status Report published in 2015. This significant spatial heterogeneity of monitoring capacity across the globe calls to foster observational capacity equity to harmonize risk management and adaptation tools and metrics worldwide.

Methodologies for risk management and adaptation have received considerable attention in the recent IPCC reports and in support of UNFCCC. Several gaps in knowledge and observations on the impacts of extreme climatic and meteorological events, abrupt changes, cascading effects, and compound extremes have been identified, and require supporting information. Moreover, while robust climate

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<sup>3</sup> <https://library.wmo.int/records/item/58104-the-2022-gcos-implementation-plan-gcos-244>

<sup>4</sup> <https://library.wmo.int/records/item/57596-the-global-climate-observing-system-2021-the-gcos-status-report?offset=1>

information is available at the global and regional scales, it is often lacking at the local scales required for effective decision-making and response.

Consistent with the above paragraphs, GCOS is drawing the attention to the necessity that at least some of the proposed indicators for measuring progress towards the targets of the Global Goal on Adaptation must address the observational gaps identified by the GCOS Status Report, in particular for what concerns the sustainability of the monitoring networks and the availability of long-term observations in global climate data repositories as fundamental prerequisites for successful climate change adaptation. Those indicators should consider, among others:

- the wealth of global ECVs datasets from various sources, including national holdings that can be used for developing indicators for different types of adaptation activities and to assess the progress and effectiveness of adaptation measures in different sectors and at different scales;
- the fundamental aspects of historical observations of meteorological phenomena for understanding the changing exposure to many climate hazards;
- WMO's recently adopted Unified data policy which places a strong expectation on the sharing of historical meteorological data repositories;
- the presence of recognised global meteorological data repositories jointly maintained by NOAA-NCEI in its role as WDC-A and the EU Copernicus Climate Change Service;
- the value of original meteorological observations in informing improved reanalyses products for adaptation decision making.

Possible quantitative measures that can be considered for developing these observation-relevant indicators are:

- Number of Global Basic Observing Network (GBON<sup>5</sup>) stations and sharing of their historical records.
- Number and type of ECVs for which national or global observing programmes with sustained funding exist.
- Number of ECVs for which global data repositories with free and open access exist.
- Number of CLIMAT reports<sup>6</sup> with daily averages available in repositories open to countries and shared with global and regional repositories.
- Number of countries with an active GCOS national coordination mechanism.
- Number of countries sharing their full national meteorological and climate data with the global data repositories.

The indicators taking into account these quantitative measures will contribute to the target referred in the paragraph 10a of the Decision 2/CMA.5<sup>7</sup> on the Global Goal on Adaptation for "Impact,

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<sup>5</sup> <https://wmo.int/activities/global-basic-observing-network-gbon>

<sup>6</sup> CLIMAT is a code for reporting monthly climatological data assembled at land-based meteorological surface observation sites to data centres. CLIMAT-coded messages contain information on several meteorological variables that are important to monitor characteristics, changes, and variability of climate. See GCOS-127: [https://library.wmo.int/records/item/48218-practical-help-for-compiling-climat-reports?language\\_id=&offset=1](https://library.wmo.int/records/item/48218-practical-help-for-compiling-climat-reports?language_id=&offset=1).

<sup>7</sup> [https://unfccc.int/sites/default/files/resource/cma2023\\_16a01E.pdf](https://unfccc.int/sites/default/files/resource/cma2023_16a01E.pdf)

vulnerability and risk assessment” in particular “by 2027 all Parties have established multi-hazard early warning systems, climate information services for risk reduction and **systematic observation to support improved climate-related data, information and services**”.

This will help governments to plan and prioritize investments in climate infrastructures necessary to provide data and information that enable: i) the scientific community to improve the knowledge of the changing exposure to climatic changes globally, regionally, and locally, and, consequently, ii) decisions makers to develop disaster risk reduction measures and build resilience to adapt to changing conditions. GCOS can provide assistance to countries on all aspects upon request.