



WMO OMM

World Meteorological Organization
 Organisation météorologique mondiale
 Organización Meteorológica Mundial
 Всемирная метеорологическая организация
 المنظمة العالمية للأرصاد الجوية
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15 March 2021

Annex: 1

Subject: GCOS Surface Reference Network Lead Centre

Action Required: To confirm interest in hosting a GSRN Lead Centre **no later than 15 April 2021**

Dear Sir/Madam,

I wish to refer to [Decision 5 \(INFCOM-1\)](#) - Development of a draft implementation plan for the GCOS Surface Reference Network. I am pleased to invite all WMO Members to express their interest in hosting a lead centre for the Global Climate Observing System (GCOS) Surface Reference Network (GSRN).

Once established, GSRN will be a stable and metrologically well-characterized global land surface climate reference network providing observations of high quality that are used to determine trends, constrain and calibrate data from more spatially comprehensive systems and support political decisions around mitigation and adaptation.

The GCOS Surface Reference Network Task Team (TT-GSRN) was established by the president of the Commission for Observation, Infrastructure and Information Systems (INFCOM) with concurrence of the Commission through Decision 5 (INFCOM-1) and will develop the implementation plan for the GSRN. The plan will call for the establishment of a lead centre which will manage implementation and operations of GSRN.

For further information on GSRN, please find attached herewith the Background Information on the steps towards its implementation and elements of the expected Terms of Reference (ToR) for the lead centre.

I would appreciate it if you could confirm whether your country would be interested to host the above-mentioned lead centre, **no later than 15 April 2021**.

I wish to take this opportunity to thank you for your continued support to the activities of GCOS.

Yours faithfully,

Dr Wenjian Zhang
 for the Secretary-General

To: Permanent Representatives of Members with WMO
 cc: Hydrological Advisers

BACKGROUND INFORMATION

The United Nations Framework Convention on Climate Change ([UNFCCC](#)) in Article 4 1.(g) calls for all parties to “promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies”.

GCOS and the WMO Integrated Global Observing System (WIGOS) both recommend that networks should be part of a tiered system: reference, baseline and comprehensive networks. This tiered network concept is included in the *Manual on the WMO Integrated Global Observing System: Annex VIII to the WMO Technical Regulations (WMO-No. 1160)*, in Appendix 2.1, Principle 7 states that “Observing network design should use a tiered structure, through which information from reference observations of high quality can be transferred to other observations and used to improve their quality and utility”.

A paper by [Thorne et al., 2018](#), provides the background, rationale, metrological principles, and practical considerations regarding what would be involved in implementing and maintaining a suitably stable and metrologically well-characterized global land surface climate fiducial reference measurements network: “ can bequeath to future generations a better set of observations. This will aid future adaptation decisions and help to monitor and quantify the effectiveness of internationally agreed mitigation steps”. The GSRN represents the surface equivalent of the GCOS Upper Air Reference Network (GRUAN), which at the Seventeenth Session of the World Meteorological Congress (Cg-17) was recognized as a WIGOS implementation project.

Consequently, the GCOS Steering Committee established a task team on the scope and level of interest in establishing a GCOS Surface Reference Network, in which experts from the Commission for Instruments and Methods of Observation (CIMO) and the Commission for Basic Systems (CBS) participated. The team produced a report - *GCOS Surface Reference Network (GSRN): Justification, requirements, siting and instrumentation options (GCOS-226)*”, which provides details on how it is presently envisaged to implement the GSRN and outlines the next steps required for the implementation of a GSRN.

According to GCOS-226, reference quality observations are directly traceable to the International System of Units (SI) standards and include full documentation of all components of their uncertainty. Such observations respond to the need for monitoring the changes that occur in the climate and ensure greater confidence in the assessment of future climate change and variability. A GSRN will contribute to the improvement of the current climate observing system. However, benefits would accrue much more immediately, through improved observational understanding and better methods of observation leading to improvements in numerical weather prediction and disaster and emergency response systems. Other important benefits of a reference network are an improved instrument performance that transfers down to other broader global regional and national networks, support and characterization of wider networks, robust calibration/validation of satellite data and improved process understanding and model validation. Reference network will also support timely political decisions around mitigation and adaptation. Initial implementation is aimed at six core atmospheric surface Essential Climate Variables (ECV): Air temperature, wind speed and direction, water vapour, pressure, precipitation and surface radiation budget components. However, it is envisaged that once established the networks will also provide observations for terrestrial and atmospheric composition ECVs.

For the GSRN to fulfil its intended role of providing globally representative, high quality observations, critical attention will need to be given to the matters of station location, siting and quality of instrumentation, each of which are discussed in GCOS-226. The management of the implementation and operation of the GSRN will require the establishment of a lead centre. In the first phase of the implementation, the lead centre will:

- Develop a network based on existing reference quality monitoring stations;
- Coordinate reference stations;
- Ensure that all observations are of reference quality;
- Establish common procedures and standards across the GSRN;
- Certify stations as being of reference quality and contributing to the GSRN;
- Establish systems to monitor station performance and perform Quality Assurance/Quality Control (QA/QC);
- Ensure data is easily discoverable and freely and openly available to all; and
- Develop a plan for the long-term operation and development of GSRN.

A more detailed Terms of References (ToR) for the lead centre will be prepared by the GSRN Task Team in collaboration with the director of the designated lead centre.

The next activities for the initial implementation of the GSRN, including solicitation of offers to host and staff appropriately the proposed lead centre and the selection of suitable sites for an initial GSRN, are part of the work plan in the ToR of the GSRN Task Team included in [Decision 5 \(INFCOM-1\)](#) - Development of a draft implementation plan for the GCOS Surface Reference Network .
