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The GCOS Reference Upper-Air Network (GRUAN)

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While the global upper-air observing network has provided useful observations for operational weather forecasting for decades, its measurements lack the accuracy and long-term continuity needed for understanding climate change. Consequently, the scientific community faces uncertainty on such key issues as the trends of temperature in the upper troposphere and stratosphere or the variability and trends of stratospheric water vapour.
To address these shortcomings, and to ensure that future climate records will be more useful than the records to date, the Global Climate Observing System (GCOS) program initiated the GCOS Reference Upper Air Network (GRUAN). GRUAN will be a network of about 30-40 observatories with a representative sampling of geographic regions and surface types. These stations will provide upper-air reference observations of the essential climate variables, i.e. temperature, geopotential, humidity, wind, radiation and cloud properties using specialized radiosondes and complementary remote sensing profiling instrumentation. Long-term stability, quality assurance / quality control, and a detailed assessment of measurement uncertainties will be the key aspects of GRUAN observations. The network will not be globally complete but will serve to constrain and adjust data from more spatially comprehensive global observing systems including satellites and the current radiosonde networks.
This paper outlines the scientific rationale for GRUAN, its role in the Global Earth Observation System of Systems, network requirements and likely instrumentation, management structure, current status and future plans.