

**GCOS Reference Upper Air Network (GRUAN) Lead Centre
Terms of Reference
(August 2008)**

The GRUAN Lead Centre is to be responsible for the monitoring of the Global Climate Observing System (GCOS) Reference Upper Air Network (GRUAN), including development of GCOS needs for station operation, coordination among stations, and ensuring archival and dissemination of GRUAN data (this could in principle be carried out by a third party). GRUAN is envisaged as a network of 30-40 high-quality, long-term, upper-air observing stations that are built on, but not confined to, the larger GCOS Upper Air Network. These reference network observations would: provide anchor points that are very well characterised in their relative biases over time; attempt to comprehensively characterise the atmospheric column, and; be the best systematic *in situ* atmospheric profile measurements currently available. Each site would operate a suite of instrumentation sufficient to robustly ascertain the atmospheric characteristics for meteorological variables and, in some cases, atmospheric composition and radiation variables. Further details are given in the reports GCOS-112 and GCOS-121.

Initially, the GRUAN Lead Centre would be convened under the scientific guidance of the GCOS/WCRP AOPC Working Group on Atmospheric Reference Observations (WG-ARO) and with the agreement of the relevant Permanent Representatives of WMO Members. It would serve the following functions in developing and maintaining the Network:

- *Coordination of the network (in collaboration with the host country and WMO)*
 - Monitoring output of the GRUAN network. This would include making periodic visits to each station and ensuring understanding of the GCOS Climate Monitoring Principles. This includes coordinating a mechanism for ensuring adequate overlap and comparisons when inevitable instrument changes / improvements are made.
 - Identification of (external) instrument mentors (instrument experts who are familiar with the strengths and weaknesses of the instruments and data they produce) and a team of scientists who understand the site-specific climate science issues and can provide scientific assistance and guidance to sites.
 - Assisting in succession planning to ensure continuity in observations and expertise.
 - Coordination of national contributions to the network.
 - Requesting of reference radiosonde launch schedules, particularly if synchronization of launches with satellite overpasses is required.
 - Provision of administrative and technical support for the AOPC Working Group on Atmospheric Reference Observations.

- *Training, education and research (in collaboration with the host country and WMO)*
 - Provision of advice on instrument deployments and developments.
 - Coordinating work to encourage commercial development of reference upper-air instruments.
 - Provision of expertise and a commitment to train staff at sites.
 - Promotion of research activities, including a visiting scientist programme, that apply GRUAN data to climate research and monitoring issues.
 - Training at the lead centre of on-site scientists to ensure required accuracies.
 - Development and provision of guidelines to harmonize long-time series of upper-air observations, especially for archived data sets.

- *Data management including. reanalysis (in collaboration with the host country and WMO)*
 - Real time data quality control/quality assurance, with rapid feedback to stations having potential problems.

- Coordination with the data user community, with special emphasis on the satellite and reanalysis communities.
 - Provision of climate data sets including their relative uncertainties.
 - Network data assembly, archive, and dissemination.
 - Where applicable, inclusion of available historical upper-air profiles and re-analysis of these data with respect to seasonal and annual variability to enable longer-term analyses.
 - Inclusion of complementary data from satellites, NWP analyses and other activities for ease of intercomparison in the upper-air database.
 - Free distribution for bona fide research and operational users.
- *Reporting*
 - The Lead Centre shall report to the WG-ARO at least twice a year (see for reporting lines the Terms of Reference of WG-ARO).

The AOPC Working Group on Atmospheric Reference Observations envisages establishment of the Lead Centre in 2007, collocated with an existing organization already engaged in similar or related functions for climate observing system, with an initial staff of three full time scientific professionals, one full time visiting scientist and a part time administrative/support person.