

The Global Climate Observing System (GCOS)

M.J. Manton

Bureau of Meteorology Research Centre (BMRC), GPO Box 1289K, Melbourne VIC 3001, Australia;
+61-3-9669 4444, Fax: +61-3-9669 4660, E-mail: m.manton@bom.gov.au

The Global Climate Observing System (GCOS) was established in 1992 following the Second World Climate Conference, with the aim of ensuring that the specific observations and information needed to address climate-related issues are obtained and made available to all users. It is cosponsored by the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific, and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP), and the International Council for Science (ICSU). GCOS is an integrated system that builds on existing observing systems (such as the WMO World Weather Watch (WWW) and the Global Atmosphere Watch (GAW)) to meet the needs of the global community for

- climate monitoring and analysis,
- seasonal-to-interannual climate prediction,
- the detection of climate trends and climate change,
- reduction in the uncertainties in long-term climate projections, and
- improved data for climate impact studies.

Three types of networks will support the core monitoring functions of GCOS:

- (1) Comprehensive global systems, which involve all available climate data that are used in models to provide comprehensive representations of past, current, and future climate.
- (2) Baseline global systems, which involve a minimal-coverage network to provide calibration data for the comprehensive system and to provide estimates of key global climate indicators.
- (3) Reference sites, which involve a sparse network of instruments to provide local estimates of key variations to evaluate models and to provide comprehensive data sets to understand climate processes.

Initially there is a focus in GCOS on the development of the baseline systems that underpin the comprehensive systems and provide a basis for monitoring long-term trends in climate. For example, the GCOS Upper Air Network (GUAN) involves about 150 sites and aims to provide baseline data for upper air variables. The GCOS baseline systems have an end-to-end character to ensure the quality control, homogeneity, and archiving of the data.

An important aspect of the observing system for climate is the measurement of atmospheric constituents that influence the radiation budget of the atmosphere. The key variables identified by GCOS for monitoring long-term climate trends in atmospheric constituents are aerosols, ozone, carbon dioxide, methane, and other long-lived greenhouse gases. The associated measurements of the radiation budget at the surface and the top of the atmosphere are also important baseline data. The GCOS Atmospheric Observation Panel for Climate is seeking to work with GAW and its partners to identify the baseline systems to support the monitoring of these variables.