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Long-term observations of tropospheric ozone: GAW Measurement Guidelines

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The Global Atmosphere Watch (GAW) Programme of the World Meteorological Organization (WMO) coordinates long-term observations of the chemical composition and physical properties of the atmosphere which are relevant for understanding of atmospheric chemistry and climate change. Atmospheric observations of reactive gases (tropospheric ozone, carbon monoxide, volatile organic compounds and nitrogen oxides) coordinated by the GAW Programme complement local and regional scale air quality monitoring efforts.
As part of the GAW quality assurance (QA) system detailed measurement guidelines for atmospheric trace species are developed by international expert teams at irregular intervals. The most recent report focuses on continuous in-situ measurements of ozone in the troposphere, performed in particular at continental or island sites with altitudes ranging from sea level to mountain tops. Data Quality Objectives (DQOs) are defined for different applications of the data (e.g. trend analysis and verification of global model forecasts). These DQOs include a thorough discussion of the tolerable level of measurement uncertainty and data completeness. The guidelines present the best practices and practical arrangements adopted by the GAW Programme in order to enable the GAW station network to approach or achieve the defined tropospheric ozone DQOs. The document includes information on the selection of station and measurement locations, required skills and training of staff, recommendations on the measurement technique and the necessary equipment to perform highest quality measurements, rules for conducting the measurements, preparing the data and archiving them, and more. Much emphasis is given to discussions about how to ensure the quality of the data through tracing calibrations back to primary standards, proper calibration and data analysis, etc. In the GAW Programme the QA system is implemented through Central Facilities (Central Calibration Laboratories, World and Regional Calibration Centers and World Data Centers), Scientific Advisory Groups and GAW Training and Education Center. These bodies support primary standards, provide calibration and data archiving facilities, coordinate comparison campaigns, perform stations audit, provide documentation and training of personnel.