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13. Deutsche Klimatagung

GNSS Precipitable Water Vapor for Climate Monitoring

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Water vapour is under-sampled in the current climate-observing systems and obtaining and exploiting more high-quality humidity observations is essential for climate monitoring. Global Navigation Satellite System (GNSS) is an established observing system for atmospheric water vapour with high spatiotemporal resolution for climate research.

Established in 2006, the Global Climate Observing System (GCOS) Reference Upper-Air Network (GRUAN), is an international reference observing network of sites measuring essential climate variables above the Earth's surface. Currently, this network comprises more than 30 reference sites worldwide, designed to detect long-term trends of key climate variables such as temperature and humidity in the upper atmosphere. GRUAN observations are required to be of reference quality, with known biases removed and with an associated uncertainty value, based on thorough characterization of all sources of measurement. In support of these goals, GNSS precipitable water (GNSS-PW) measurement has been included as a priority one measurement of the essential climate variable water vapor.

GFZ contributes to GRUAN with its expertise in processing of ground-based GNSS network data to generate precise PW products. GFZ hosts a central processing facility for the GNSS data and is responsible for the installation of GNSS hardware, data transfer, processing and archiving, as well as derivation of GNSS-PW products according to GRUAN requirements including PW uncertainty estimation. Currently more than a half of the GRUAN sites are equipped with GNSS receivers. GNSS-PW products for GRUAN and the results of validation studies will be presented.