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GNSS radio occultation data for weather forecast and climate research

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The GNSS radio occultation (RO) technique uses GNSS (Global Navigation Satellite Systems) signals received aboard low Earth orbiting satellites for atmospheric limb sounding.

Refractivity and temperature profiles are derived with high vertical resolution. Due to its long-term stability, all-weather capability, and global coverage the GNSS RO technique offers the possibility for global monitoring of the temperature structure in the upper troposphere and lower stratosphere (UTLS) region.

GFZ Potsdam currently provides RO data from TerraSAR-X (since 2008), Tandem-X (since 2011), and GRACE-FO (since 2020) operationally to weather service centres for the assimilation in forecast models and thus contributes to the global RO dataset build from different data centres and RO missions (e.g., COSMIC-1/2, Metop, and Spire).

In this presentation we provide an overview of recent atmospheric studies in the UTLS using the RO datasets since 2001 with respect to tropopause characteristics, UTLS temperature trends and global gravity wave activity in the stratosphere.

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