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Radio Occultation (RO) soundings are one of the few remote sensing technologies that allow the simultaneous observation of both the neutral atmosphere and the ionosphere. When the GRAS instruments onboard EUMETSAT's Metop satellites were designed, space weather was not yet of high priority for EUMETSAT's operational users. The GRAS instruments were therefore optimized for measurements up to 80-100 km. For the future EUMETSAT Polar System - Second Generation satellites, RO measurements will be taken from the ground up to 500 km altitude, covering therefore the lower ionosphere and the F2 peak of the electron density in the ionosphere.
In preparation to this, during the Metop-A End-of-life technology testing campaign EUMETSAT extended the GRAS instrument's measurement range on Metop-A into the lower ionosphere. Due to limitations in the GRAS instruments' design, side effects in the reduction of the number of daily occultations and of the Signal-to-Noise Ratios (SNRs) at altitudes above 100 km were expected. Aim of the experiments was to look for a compromise between such effects and the possibility to make available in the near future good-quality high-rate (50 Hz) measurements for monitoring scintillations and electron density distributions, beneficial for space weather monitoring.
Three experiments were performed during the 2020 summer season, extending the GRAS observation capabilities up to 300 km and 600 km in different campaigns. Even if the SNRs of ionospheric occultations started to drop off above 100 km because of the GRAS instrument's antenna patterns, scintillations induced by the E-layer were clearly visible. Moreover, about 95% of the GRAS ionospheric occultations provided continuous measurements from the ground up to 300 km. During the high-altitude (600 km) test, an additional 5% of the occultations suffered from data gaps at altitudes above 400 km. We attribute most of these cases to the reduced SNR due

to the decreasing antenna gain. Bending angles at L1 and L2 frequencies were also produced.

The preliminary results suggested that noise levels may prohibit successful scintillations and electron density distributions monitoring above 300 or 400 km. Limiting the vertical measurement coverage to altitudes below 300 km would thus be consistent with the instrument's noise performance from the point of view of ionospheric observations. From the other side, the impact on the number of high-quality occultations in neutral atmosphere obtained from the instrument was marginal; the daily number of occultations for measurement up to 300 km was reduced by at most 1% (less than 10 occultations).

Results of the GRAS ionospheric extension campaign and future perspectives will be covered by this contribution.

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