

## **GNSS measurements of artificial ionospheric irregularities**

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We present observations of GNSS amplitude and TEC fluctuations to characterize artificial ionospheric irregularities generated by high-power HF experiment. The experiments were designed so that a GNSS satellite signal intersected the disturbed ionospheric volume along the local magnetic field line direction according to the experiment setup described in [1]. Compared to the previous studies [2], the presented experiments allow us to compare high-rate GNSS (20-50 Hz) parameters with the electron density and temperature deviations from the background in the F-region that are measured by an incoherent scatter radar which is co-located with a GNSS receiver. The spectrum of GNSS amplitude and TEC shows enhanced signal fluctuations when the ionosphere is heated especially in the magnetic zenith direction. We investigate GNSS signal responses to artificial ionosphere irregularities in different geophysical conditions such as peak electron density and electron temperature. It is shown that Rate of TEC (ROT) values may be used as proxy to represent the strength of ionospheric density irregularities. The experiments presented here aim to study fundamental process of GNSS signal scattering due to ionosphere irregularities by a controlled manner.

### References

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- [2] G. Milikh, A. Gurevich, K. Zybin, and J. Secan, "Perturbations of GPS signals by the ionospheric irregularities generated due to HF-heating at triple of electron gyrofrequency," *Geophys. Res. Lett.*, vol. 35, no. 22, p. L22102, Nov. 2008, doi: [10.1029/2008GL035527](https://doi.org/10.1029/2008GL035527).