



GNSS observation of HF induced ionospheric irregularities at high latitude

H. Sato*⁽¹⁾, M.T. Rietveld⁽²⁾, N. Jakowski⁽³⁾ and E. Varberg⁽⁴⁾

(1) DLR Institute for Solar-Terrestrial Physics, Neustrelitz, Germany; Hiroatsu.Sato@dlr.de

(2) EISCAT Scientific Association, Ramfjordbotn / Department of Physics and Technology, University of Tromsø, Norway; mike@eiscat.uit.no

(3) DLR Institute for Solar-Terrestrial Physics, Neustrelitz, Germany; Norbert.Jakowski@dlr.de

(4) EISCAT Scientific Association, Ramfjordbotn, Norway / Department of Physics and Technology, University of Tromsø, Norway; erik.varberg@uit.no

Simultaneous observations of incoherent scatter radar and high resolution GNSS signals are used to study small scale ionospheric irregularities generated by powerful HF waves. The experiments are designed to set the EISCAT (European Incoherent Scatter Scientific Association) UHF radar and the co-located GNSS receiver's link to a GLONASS satellite in a same line of sight. HF heating-induced perturbations of GPS satellite signals were previously observed at sub-auroral latitudes [1]. Since GLONASS satellites have higher inclination angles than GPS satellites, receiver-satellite links to GLONASS are occasionally nearly aligned to the direction of local magnetic field lines at the EISCAT location in Tromsø, Norway. Thus, GNSS signal fluctuations due to artificial field aligned irregularities can be observed [2]. Here we present the general view of the experimental setup and related observational geometry. Furthermore, recent results obtained under different experimental conditions are discussed.

References

- [1]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.
- [2]H. Sato, M. T. Rietveld, and N. Jakowski, "GLONASS observation of artificial field-aligned plasma irregularities near magnetic zenith during EISCAT HF experiment," *Geophys. Res. Lett.*, vol. n/a, no. n/a, p. e2020GL091673, doi: <https://doi.org/10.1029/2020GL091673>.