

EGU21-7651

<https://doi.org/10.5194/egusphere-egu21-7651>

EGU General Assembly 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Stratospheric jet stream as a possible source for similar seasonal variations of the short-term variability in the ionosphere, upper mesosphere and subpolar stratosphere

Anna Yasyukevich¹, Vera Sivtseva², Irina Medvedeva¹, Marina Chernigovskaya¹, Petr Ammosov², and Galina Gavriilyeva²

¹Institute of Solar-Terrestrial Physics SB RAS, Irkutsk, Russian Federation (annpol@iszf.irk.ru)

²Yu.G. Shafer Institute of Cosmophysical Research and Aeronomy SB RAS, Yakutsk, Russian Federation (verasivtseva@gmail.com)

Based on the data of Total Electron Content (TEC) and OH rotational temperature, we analyze temporal and spatial features of the level of short-term variability (within the periods of up to several hours) at the ionosphere and the upper mesosphere. The study is carried out at three points located at mid-latitude, subauroral, and high-latitude regions during for more than 5 years period. The dynamics of variability, both in the ionosphere and at the mesopause, have the similar pattern with a clear seasonal variation. The maximum in the variability is registered in winter, and it exceeds up to 5-6 times the variability level during the summer period. This feature is observed regularly. The revealed dynamics does not correlate with changes the in geomagnetic and solar activities. The variability within considered periods is generally related to activity of Internal Gravity Waves in the upper atmosphere. We suggest that a source of the related seasonal variations in the variability may be the stratospheric high-velocity jet stream that develops in the subauroral regions during winter months. We propose a stratosphere disturbance index based on Era-5 Reanalysis data. The index is shown to have a maximum at subpolar regions and experience the similar regular seasonal variation with a maximum during winter months. We show a clear correlation between the mesosphere/ionosphere variability indices and the stratosphere disturbance index. The obtained results indicate a strong coupling between the short-period variability in the ionosphere, in the upper mesosphere, and in the subauroral stratosphere. The study is supported by the Russian Science Foundation Grant No. 20-77-00070.