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Ionospheric variability over the Antarctic Peninsula: insights from the long-term vertical sounding data at the *Akademik Vernadsky* station

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Behavior of the ionosphere over the *Faraday-Akademik Vernadsky* Antarctic station is a significant point of interest due to its proximity to the center of the Weddell Sea ionospheric anomaly. Vertical sounding of the ionosphere is conducted there almost continuously since the late 1950-s. The IPS-42 ionosonde manufactured in Australia has been operating since 1983 [1]. *Faraday* was transferred from Great Britain to Ukraine and renamed to *Akademik Vernadsky* in 1996. Ionospheric sounding was highlighted in the Memorandum on the station transfer as a critical area of research to be continued. Since 2017, a portable Doppler ionosonde developed and manufactured collaboratively by the Abdus Salam Centre for Theoretical Physics (ICTP, Italy), University of New Brunswick (UNB, Canada) and Institute of Radio Astronomy of the National Academy of Sciences of Ukraine (IRA NASU) is operating at the *Akademik Vernadsky* in conjunction with IPS-42 [2]. In 2022, a passive position with a new antenna system was installed 400 m from the active one, enabling the distinction of O- and X- polarization modes in the signals reflected from the ionosphere. Furthermore, the passive position of the ionosonde was successfully tested on board the research vessel *Noosfera* during her navigation in the Drake Passage and along the Antarctic Peninsula in 2022, and from Antarctic Peninsula to Cape Town in 2023. Ionospheric observations at the *Akademik Vernadsky* allow for the analysis of not only dynamic variations in ionospheric parameters, but also long-term, climatic changes in the ionosphere over the Antarctic Peninsula (Fig. 1). Our current study focuses on analyzing climate changes in ionospheric parameters and their responses to solar radiation and corpuscular activity. We will report the details of long-term changes in the ionosphere based on the data of vertical sounding at the *Akademik Vernadsky* in different seasons for almost three solar cycles. The features of ionospheric climate changes will be presented both within and across cycles.

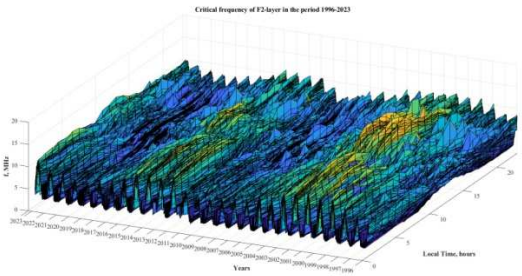

Figure 1. Seasonal and diurnal variations of *foF2* over *Akademik Vernadsky* station in 1996-2023

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2. Koloskov, O.; Kashcheyev, A.; Bogomaz, O.; Sopin, A.; Gavrylyuk, B.; Zalizovski, A. (2023). Performance Analysis of a Portable Low-Cost SDR-Based Ionosonde. *Atmosphere*, 2023, 14, 159. https://doi.org/10.3390/atmos14010159