Global Navigation Satellite Systems to study the Earth's ionosphere

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The Global navigation satellite system (GNSS) provides vast data sets to study the Earth's ionosphere and various aspects of space weather impact. The talk will briefly review GNSS-based experimental studies of the ionospheric effects from solar flares, solar terminator, solar eclipses, magnetic storms, etc, mentioning recent events such as the ionospheric effects of the 2023 Turkey earthquake, or the 18 November 2023 Starship explosion. Such researches are based on total electron content variations. Our team developed a free-to-use system to treat GNSS data – SIMuRG (https://simurg.iszf.irk.ru). The system could be useful for studying the ionospheric space weather. We have also developed a tool to forecast the TEC and forecast indicies to drive ionospheric models. The work is financially supported by the Russian Science Foundation (project No. 23-17-00157).