Studying the ionospheric absorption during large solar flare events in September 2017

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The most intense external force affecting the ionosphere from above is related to large solar flare events, therefore it is of particular importance to study their impact on the ionosphere. During solar flares, the suddenly increased radiation causes increased ionization and enhanced absorption of radio waves leading to partial or even total radio fade-out lasting for hours in some cases (e.g. [1] [2]).

The ionospheric response to large solar flares have been investigated using the ionosonde data measured at Pruhonice (PQ052, 50°, 14.5°) in September 2017, the most active solar period of Solar Cycle 24. A novel method [3] to calculate and investigate the absorption of radio waves propagating in the ionosphere is used to determine the absorption during large solar flare events (M and X class). Subsequently, the absorption data are compared with the indicators derived from the f_{min} method (f_{min} the minimum frequency is considered as a qualitative proxy for the “nondeviative” radio wave absorption occurring in the D-layer). Total and partial radio fade-out and increased values (with 2-5 MHz) of the f_{min} parameter were experienced during and after the intense solar flares (> M3). The combination of these two methods may prove to be an efficient approach to monitor the ionospheric response to solar flares.


