



foF2 seismo-ionospheric effect analysis: actual data and numerical simulation

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In the present work, ionospheric phenomena of earthquakes are investigated, which have a magnitude $M > 5.5$, a depth $h < 70$ km, and which occur at distances from the vertical sounding station not larger than the Dobrovolsky radius $R = \exp(M)$. Variations of the characteristic foF2 frequency obtained by the stations Tokyo, Petropavlovsk-Kamchatsky and Yamagawa during 30 years are analysed using the superposition of epochs method. It is found that, on the average, foF2 increases 3–5 days before an earthquake, and it decreases one day before the eruption and until 2–3 days after it. The foF2 increase seems to be stronger for comparatively weaker earthquakes, and the decrease of foF2 is strongest at largest values of M . Thus the authors conclude that before earthquakes, two lithosphere-ionosphere links exist. 3–5 days before the events, plasma episodically propagates upward in the atmosphere and the recombination of ions decreases. Later, one day before the event and up to 2–3 days after it, the plasma also propagates upward, but it is strongly heated so that the electron and ion diffusion at the F-layer maximum increases. The numerical simulation shows that the foF2 growth 3–5 days before the earthquakes has to amount to 1–3 %, and the later foF2 decrease has to equal 2–6 % to describe experimental data. The obtained results help to construct adequate physical models of seismic processes and of their connections with phenomena at the surface and in the atmosphere and ionosphere of the Earth.