



Daytime dependence of disturbances of ionospheric Es-layers connected to earthquakes

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In the present work variations of the semi-transparency of the sporadic E-layer of the ionosphere due to seismic activities are studied. The semi-transparency Q is determined by the blanketing frequency $f_b E_s$ and the characteristic frequency $f_o E_s$, $Q = (f_o E_s - f_b E_s) / f_b E_s$. At low values of the blanketing frequency $f_b E_s$, the critical frequency $f_o E_s$ does not describe the maximum ionisation density of the Es-layer, as the critical frequencies of regular ionospheric layers (e.g. $f_o F2$) do, but it describes the occurrence of small-scale (tenths of meters) inhomogeneities of the ionisation density along the vertical in the layer. The maximum ionisation density of the sporadic layer is proportional to the square of $f_b E_s$. In the case of vertical ionospheric sounding, the sporadic layer becomes transparent for signals with frequencies larger than $f_b E_s$. Investigations showed that about three days before an earthquake an increase of the semi-transparency interval is observed during sunset and sunrise. In the present work, analogous results are found for data of the vertical sounding stations "Tokyo" and "Petropavlovsk-Kamchatsky". Using the method of superposition of epoches, more than 50 earthquakes with magnitudes $M > 5$, depths $h < 40$ km, and distances between the station and the epicenter $R < 300$ km are considered in case of the vertical sounding station "Tokyo". More than 20 earthquakes with such parameters were analysed in case of the station "Petropavlovsk-Kamchatsky". Days with strong geomagnetic activity were excluded from the analysis. According to the station "Petropavlovsk-Kamchatsky" about 1-3 days before earthquakes, an increase of Es-spread is observed a few hours before midnight. This increase is a sign of large-scale inhomogeneities in the sporadic layers.