Study of ionospheric variability

High variability of the ionosphere is connected to geomagnetic, solar, and neutral atmosphere wave activity. Results of scaling analysis of solar data (F10.7, SSN), geomagnetic indices (Dst, Kp, AE), and ionospheric critical frequencies (foF2) show similar structure of Kp, AE and foF2 at periods in the range from 4 to 32 days. Data structure depends on the location of ionospheric stations. Correlation coefficients between foF2 and geomagnetic and solar indices depend on length of time scale. We show that vertical coupling exists between neutral atmosphere activity and sporadic E layer area. This connection is located predominantly on periods corresponding to internal modes of planetary waves. Interplanetary magnetic field discontinuities (Coronal mass ejections, Magnetic clouds, Hight speed solar streams) affect strongly the ionosphere. Analysed events lead to lowering of foF2, increase in heights of the layer F2 and oscillations of hmF2 and foF2 on periods in the order of hours.