

SID IN TEC MEASUREMENTS

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Abstract:

F-region and above ionization changes are considerably smaller than in the lower ionosphere. X-ray fluxes increase, UV as well as radio noise bursts may occur concurrently during flares, but the intensity of the increase comparing to quiet level differs from flare to flare. X-ray fluxes are useful and sensitive indicators of solar activity, but here the wide spectrum of radiation is under the interest, as its ionospheric effects are under consideration. Often flares produce a wide variety of ionospheric effects. So that the Sudden Ionospheric Disturbances (SID) accompanied by flares may appear in D-region as Short Wave Fade-out (SWF) for instance, and/or in E-region - Solar Flare Effect (SFE), and/or in the higher levels. Some of the effects related to E-region are detected at geomagnetic observations also. However during intense solar flares resulting enhancement of electron concentration at heights of lower ionosphere can also increase the Total Electron Content (TEC). TEC observed effects are the integrated result of the effects occurring over the entire height range from the ground level to satellite orbit. Every effect follows usually immediately sharp increase of radiation flux and resulting increase of electron concentration and decreases together with the decrease of the ionization flux, as it is related to the production function of ionization, save these at F heights for much more complicated F dynamics; the F-region recovery phase shows remarkable relaxation time, as well as at D heights for much more complicated aeronomy, but these heights are not considered in the present study for their influence at the TEC behaviour is negligible. Presented paper study the Sudden Increase in the Total Electron Content (SITEC). These phenomena properties are analyzed together with the effects at lower altitudes during considered flare. Ionospheric characteristics and magnetic measurements are reckon in for lower parts of the ionosphere. GPS routine observations are used exclusively for TEC data, while ionosonde data for lower ionosphere parameters. Unfortunately time resolution of ionosondes data does not match the resolution of available GPS data. Nevertheless ionosonde station provided information can be used in chosen cases for electron concentration height profile estimation. The several flares registered during both perturbed and un-perturbed ionospheric conditions are examined. Perturbed ionospheric circumstances mean not only the ionospheric storm or substorm, but a sequence of solar flares also. While quiet conditions refer to the lack of even isolated events of unknown origin, as for instance Traveling Ionospheric Disturbance (TID). For these purposes the catalogue of ionospheric quiet and disturbed days is used.