

Computer simulation of electron density and temperature distribution at Indian equatorial and low latitude topside ionosphere

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A time dependent two dimensional theoretical model is used to investigate the distribution of the major ions O^+ and H^+ , electron density and electron and ion temperature of the Indian equatorial and low latitude F region ionosphere within $\pm 20^\circ$ geomagnetic latitude. The continuity equation, momentum equation and energy balance equations are simultaneously solved for solar minimum equinoctial conditions along tilted dipole magnetic field lines from a base altitude of 120 km from the Northern Hemisphere to the Southern Hemisphere. In the present model, heating due to photoelectrons, collision between ions, ions and electrons, rotational heat transfer, vibrational heat transfer and thermal conductivity are considered for calculation of electron and ion temperature. The simulated ion density and electron temperatures are also compared with ion density and plasma temperature measurements carried out by the SROSS C2 satellite during the low solar activity period of 1995-1997 in the 75° Indian longitude sector. It is found that the modelled O^+ and H^+ concentrations are in reasonable accord with diurnal and seasonal variations of measured densities at 500 km altitude. The simulated electron temperature shows lower morning and evening enhancements compared to those observed by the satellite. The results are discussed taking into account the relative contribution of model inputs viz. neutral temperature, electric field, solar flux and geomagnetic field model.