Since we do not fully understand all the relevant physics of the equatorial ionosphere, current models do not completely agree with each other and are not able to accurately reproduce observations. To understand the strengths and the limitations of theoretical, time-dependent, low-latitude ionospheric models in representing observed ionospheric structure and to better understand the underlying ionospheric physics, we initiated a model-model comparison project called Equatorial-PRIMO (Problems Related to Ionospheric Models and Observations). Two sets of ionosphere-plasmasphere models are participating: non self-consistent models including IFM, IPM, LLIONS, PBMOD, GIP, SAMI2 and self-consistent models including SAMI3, TIE-GCM, TIME-GCM, GITM, CTIPe, IDEA. These models theoretically calculated ionospheric parameters in the Peruvian longitude sector, under equinoctial and solstice conditions with moderate solar activity. We will present the initial results which reconcile the differences between the two sets of models and the comparisons of neutral parameters from the self-consistent model calculations. Furthermore, since the lower boundary conditions can be an important source in reproducing ionospheric variability and causing differences in the models, we implement the Whole Atmosphere Model (WAM) as the lower boundary of CTIPe. The geopotential height, neutral temperature, zonal and meridional wind are replaced by the WAM outputs between 80 and ~100 km. We compare the tidal modes reproduced in CTIPe and WAM thermosphere to validate the wave propagation scheme in CTIPe and to understand their impact on ionospheric electrodynamics. Several thermospheric phenomena and influences of planetary waves in ionosphere and thermosphere are also studied using CTIPe with the new boundary condition.