EGU21-12567, updated on 23 Jan 2022
https://doi.org/10.5194/egusphere-egu21-12567
EGU General Assembly 2021

Examining and comparing observed and simulated daytime neutral wind and ionospheric drift variations

Astrid Maute[1], Brian Harding[2], Joanne Wu[2], Colin Triplett[2], Rodrick Heelis[3], Jeffrey M. Forbes[4], and Thomas Immel[2]

[1]National Center for Atmospheric Research, Boulder CO, United States of America (maute@ucar.edu)
[2]Space Science Lab, University of California, Berkeley CA, USA (bharding@ssl.berkeley.edu, yjwu@ssl.berkeley.edu, triplett@berkeley.edu, Immel@ssl.berkeley.edu)
[3]University of Texas, Dallas TX, United States of America (heelis@utdallas.edu)
[4]University of Colorado, Boulder CO, United States of America (forbes@colorado.edu)

The neutral wind dynamo plays an important role in generating low-latitude ionospheric variability and space weather. The characteristic equatorial ionization anomaly is generated by the daytime equatorial upward drift, which has imprinted on it the variation from upward propagating tides and waves. Observations and modeling studies have indicated large variability of the plasma drift on time scales from days to seasons associated with the wind dynamo at low and middle latitudes. The relationship of the ionospheric drift variability to the neutral wind variations is still not fully understood. The Ionospheric Connection explorer (ICON) mission is designed to focus on the low to middle latitude region and measures key parameters, such as the plasma drift and density and neutral temperatures and winds, to address the question of vertical coupling.

In this presentation, we will focus on the ICON observations and compare to Whole Atmosphere Community Climate Model-Extended (WACCM-X) simulations to examine the daytime low latitude ion drift and neutral wind variations. We investigate the day-to-day and longitudinal variation between concurrent ion drift and neutral wind variations over short time periods to quantify the contribution of the neutral wind in generating the ionospheric drift variations. Employing WACCM-X simulations, we investigate the importance of contributing factors, such as ionospheric conductivities, the geomagnetic main field, magnetosphere-ionosphere coupling, and the neutral wind, in generating the observed ionospheric drift variations. While we focus in this study on field line integrated ionospheric current density due to electric field/drift and neutral wind, we conclude by discussing our results in a more general context.