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Quiet‐Time Day‐to‐Day Variability of Equatorial Vertical E × B Drift From Atmosphere Perturbations at Dawn

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Ionospheric day‐to‐day variability is ubiquitous, even under undisturbed geomagnetic and solar conditions. In this paper, quiet‐time day‐to‐day variability of equatorial vertical E × B drift is investigated using observations from ROCSAT‐1 satellite and the Whole Atmosphere Community Climate Model with thermosphere and ionosphere eXtension (WACCM‐X) v2.1 simulations. Both observations and model simulations illustrate that the day‐to‐day variability reaches the maximum at dawn, and the variability of dawn drift is largest around June solstice at ~90–180°W. However, there are significant challenges to reproduce the observed magnitude of the variability and the longitude distributions at other seasons. Using a standalone electro‐dynamo model, we fifind that the day‐to‐day variability of neutral winds in the E‐region (≤~130 km) is the primary driver of the day‐to‐day variability of dawn drift. Ionospheric conductivity modulates the drift variability responses to the E‐region wind variability, thereby determining its strength as well as its seasonal and longitudinal variations. Further, the day‐to‐day variability of dawn drift induced by individual tidal components of winds in June are examined: DW1, SW2, D0, and SW1 are the most important contributors.