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We conducted observational and modeling studies of thermospheric composition and ionospheric total electron content (TEC) variations during two geomagnetically quiet periods (maximum Kp=1.7) at solar minimum. Daytime thermospheric O and N2 column density ratio ( ∑ O/N2) observed by Global-scale Observations of the Limb and Disk (GOLD) and TEC from a network of ground-based Global Navigation Satellites System receivers both exhibited large (~30% of reference values) and long-lived (5-11 hours) day-to-day variations in roughly the same mid-latitude geographic regions. Numerical simulations replicated the observed variability, though not perfectly. Analysis of the simulations suggested that the variations were mainly generated in the high-latitudes, and were subsequently advected equatorward and westward. When high-latitudes input was turned off in simulations, the variations were negligible. This suggested the potentially important role of high-latitude geomagnetic forcing in thermospheric composition and ionospheric density variations at mid-latitudes even during some ‘geomagnetically quiet’ periods at solar-minimum.
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