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Winter nighttime enhancement and summer dusk-to-nighttime enhancement of NmF2 and interhemispheric coupling

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The dusk-to-nighttime enhancement (DNE) of summer NmF2 and the nighttime enhancement (NE) of winter NmF2 were investigated using COSMIC radio occultation observations at solar minima. Summer DNE mainly occurs in three regions that depend on geomagnetic configuration and is more prominent in the southern than in the northern hemisphere owing to the particular geomagnetic configuration over the South Pacific (both the declination and inclination are important, neutral winds induce larger upward plasma drift around sunset thanks to this geomagnetic configuration) at higher geographic latitudes where photoionization is still significant at sunset and evening hours. Winter NE shows evident dependence on geomagnetic latitudes, the magnitude of winter NE reaches latitudinal peaks (troughs) at the geomagnetic latitudes of about 40°∼50° (60°∼70°); and the longitudinal variation of winter NE is also evident. The latitudinal variation of NE was suggested to be related to that of the plasma storage above F2-peak region, geomagnetic inclination, and background NmF2, and the longitudinal variation of NE was found to be related to the longitudinal differences in background NmF2, thermospheric density, and interhemispheric plasma transport. Moreover, the longitude variation of winter NE is dependent on that of summer DNE to some extent via interhemispheric plasma transport, implying that under the effect of geomagnetic configuration, neutral wind induced upward plasma transport in the summer hemisphere is important for the interhemispheric plasma transport from the summer to winter hemisphere.