Estimating the daytime vertical E×B drift velocities in the F-region of the equatorial ionosphere using the IEEY and AMBER magnetic data in West Africa

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Oral
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In this paper the daytime vertical E→×B→ drift velocity in the F-region of the equatorial ionosphere was estimated from the magnetic effect of the equatorial electrojet (EEJ) in West African sector for September equinoxes in 1993 during solar cycle 22 and in 2013 during solar cycle 24. Geomagnetic data recorded during the International Equatorial Electrojet Year (IEEY) from 1993 to 1994 and the ongoing AMBER (African Meridian B-field Education and Research) program since 2008 were used. The vertical drift velocity was inferred from the EEJ contribution (ΔH) in the geomagnetic field horizontal component. The IEEY data were used to examine the seasonal variations of the daytime vertical drift velocity. The noontime seasonal averages are Vd=10.95m/s and Vd=9.46m/s respectively for March and September equinoxes, and Vd=8.75m/s and Vd=8.27m/s for December and June solstices. The daytime vertical drift velocity was found to be larger in equinoxes than in solstices. The dependence of the daytime vertical drift velocity on solar cycle was also shown by comparing the results of September equinox in 1993 and 2013. The drift velocity of 9.5m/s in 1993 is significantly weaker than that of 24.5m/s in 2013. This strong difference in Vd reflects the level of solar cycle between 1993 when the mean F10.7=109.86 sfu and 2013 when the mean F10.7=122.55 sfu.

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