

Origin of small-scale field-aligned currents as observed by SWARM above the ionosphere in middle and low latitudes

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We analyzed magnetic field data obtained by the Swarm satellites launched on 22 November 2013, and confirmed that the short-period(10~40 s) and small-amplitude scaled(0.1~5 nT) magnetic fluctuations observed in middle and low latitudes are the manifestation of small-scale field-aligned current structure (Iyemori et al., GRL, 2015). Because of the characteristics of geographical and seasonal dependence of their amplitude obtained by analysis of the CHAMP satellite magnetic field data (Nakanishi et al., EPS, 2014), we interpret these results as the indication of field-aligned currents generated by dynamo action in the ionospheric E-layer. We assume that the dynamos are caused by the acoustic waves generated by the lower atmospheric disturbances. In this presentation, we show the evidence of the above interpretation by comparing the meteorological data with the magnetic fluctuations, and estimate in which hemisphere, i.e., in north or south hemisphere, the origin of the dynamo exists from a comparison of spectral indices of the small magnetic fluctuations above typhoons in 2014.

Keywords: field-aligned current, ionospheric dynamo, atmospheric gravity wave, acoustic gravity wave, swarm satellite, typhoon