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# The verification of the small spatial structure of field aligned currents over the Brazilian Anomaly

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Nakanishi et al. (2014), using the magnetic data observed by the CHAMP satellite through high-pass filter with cutoff period around 40 seconds, show the ubiquitous existence of small scale (1-5 nT) magnetic fluctuations with period around a few tens seconds along the satellite orbit in middle and low latitudes. The results of analysis show the difference in the dependence of the amplitude and period on latitude between the magnetic fluctuations over the Brazilian Anomaly and the other region. That is, as the satellite approaches the dip equator, the period and amplitude get longer and smaller, respectively over the other region; on the other hand, over the Brazilian Anomaly, the period doesn't get longer and the amplitude doesn't get smaller or rather gets larger respectively. Another characteristics of the magnetic fluctuations over the Brazilian Anomaly are similar to those over other regions. That is, the magnetic fluctuations are perpendicular to the geomagnetic field; the amplitude on the dayside is much larger than that on the nightside, which shows high correlation between the amplitude and the ionospheric conductivities in E-layer with respect to local time; the amplitude has the geomagnetic conjugacy in general; almost no dependence on both geomagnetic activity and the solar wind parameters is found; the global distribution of the amplitude has clear seasonal dependence with the geographical characteristics.

They, putting importance on the dependence of the amplitude and period on latitude seen over the other region, suggest that the above characteristics can be interpreted as the spatial structure of small scale ( 200 ? 300 km ) field-aligned currents generated by the ionospheric dynamo driven by atmospheric gravity waves (acoustic mode or inertial mode) propagating from the lower atmosphere. The dependence of the amplitude and period on latitude can be explained in the following way. With use of dipole model, the spatial scale of the field aligned current is traced to the satellite altitude along the main magnetic field. The scale at the satellite altitude gets larger as latitude decreases to the dip equator. Over the dip equator, the scale gets larger than a scale corresponding to the cutoff period and the amplitude gets attenuated.

This time we verify that the magnetic fluctuations over the Brazilian Anomaly have the same generation mechanism with those over the different region and especially show the possibility that the different characteristic can be explained by the above model. That is, as the geomagnetic field leans to the East-West direction over the Brazilian Anomaly, by trace along the magnetic field, the latitudinal scale doesn't get larger than the scale corresponding to the cutoff period comparatively even over dip equator, therefore, the amplitude doesn't get smaller comparatively.

The possibility shows that we can study the objective magnetic fluctuations over all the regions in middle and low latitudes including the Brazilian Anomaly.

Keywords: spatial structure of field aligned currents, middle and low latitudes, the CHAMP satellite, the SWARM satellite, atmospheric gravity wave, the Brazilian Anomaly