Oral | Symbol P (Space and Planetary Sciences) | P-EM Solar-Terrestrial Sciences, Space Electromagnetism & Space Environment

[P-EM36_28PM2]Physics and Chemistry in the Atmosphere and Ionosphere

Convener:*Yuichi Otsuka(Solar-Terrestrial Environment Laboratory, Nagoya University), Takuya Tsugawa(National Institute of Information and Communications Technology), Seiji Kawamura(National Institute of Information and Communications Technology), Chair:Mitsuru Matsumura(Center for Space Science and Radio Engineering, University of Electro-Communications), Tatsuhiro Yokoyama(National Institute of Information and Communications Technology)

Mon. Apr 28, 2014 4:15 PM - 6:00 PM 312 (3F)

This session covers a broad scope of studies of physics and chemistry in the atmosphere and the ionosphere. Coupling processes between plasma and neutral species, and upward and downward coupling among lower/upper atmosphere, and ionosphere/mesosphere/thermosphere including magnetosphere are discussed. We solicit papers based on experiments with ground-based and/or space-borne instruments, theoretical studies, numerical simulations, and development of new observation techniques.

5:15 PM - 5:30 PM

[PEM36-P08_PG]Small spatial scale field aligned currents in middle and low latitudes as observed by the CHAMP satellite

3-min talk in an oral session

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Keywords:spatial structure of field aligned currents, middle and low latitudes, the CHAMP satellite, atmospheric gravity wave, the lower atmospheric origin, correlation relation

The magnetic field observation by the CHAMP satellite shows the ubiquitous existence of small scale (1-5 nT) magnetic fluctuations with period around a few tens seconds along the satellites. From characteristics of the amplitude and period, they can be interpreted as the spatial structure of small scale field-aligned currents generated by the ionospheric dynamo driven by atmospheric gravity waves propagating from the lower atmosphere. The mechanism is the following; first, the gravity waves generated by the lower atmospheric disturbance propagate to the ionosphere; the neutral winds oscillate, cause ionospheric dynamo and Pedersen and Hall currents flow; because the dynamo region is finite, the currents cause polarized electric fields; and the polarized electric fields propagate along the geomagnetic filed as Alfven waves accompanied by field-aligned currents, at the same time, the ionospheric currents divert to the filed aligned currents; finally the CHAMP satellite observes the spatial structure of the filed aligned currents generated in this way as a temporal change along the path, because the temporal variation of the gravity waves are slow enough, i.e., more than a few minutes, that is, that of field aligned current can be ignored and nearly constant for the satellite crossing the currents. This time we analyze correlation relation of the two components perpendicular to the geomagnetic field to find the following tendencies. About the magnetic data at the observed point, 1) if inclination and declination are plus and plus respectively, a correlation coefficient tends to be minus; 2) if inclination and declination are plus and minus respectively, it tends to be plus; 3) if inclination and declination are minus and plus respectively, it tends to be plus; 4) if inclination and declination are minus

and minus respectively, it tends to be minus. We report the model of the current system consistent to the characteristics of the magnetic fluctuations including the tendency of the correlation relation.