E114-P022 **Room: Poster Session Hall** **Time: May 27**

Possible mechanism of stratification of the F2 layer in the equatorial ionosphere

Jyunpei Uemoto[1]; Takayuki Ono[2]; Takashi Maruyama[3]; Susumu Saito[3]; Masahide Iizima[4]; Atsushi Kumamoto[5]

[1] Geophys Sci, Tohoku Univ; [2] Department of Astronomy and Geophysics, Tohoku Univ.; [3] NICT; [4] Geophysical Inst., Tohoku Univ.; [5] Tohoku Univ.

http://stpp1.ppp.geophys.tohoku.ac.jp/

In this paper, we focused on stratification of the F2 layer in the equatorial region which is strongly concerned with the interaction between the ionospheric plasma and the thermospheric neutral gases. Studies on stratification of the F2 layer have a long history, and this stratification has been individually observed from the ground and from the topside ionosphere as the F3 layer and as the ionization ledge, respectively. However, the relationship between the two has not been clarified, and some unexplained problems still remain for each phenomenon. In order to clarify the structure and dynamics of the F3 layer and the ionization ledge and the relationship between the two, we analyzed the bottom side sounder data obtained from the SEALION and the topside sounder data obtained from the Ohzora and ISIS-2 satellites, and performed model calculations using the SAMI2 code.

As a result of the model calculation and the SEALION data analysis, the mechanism of the F3 layer was suggested as follows: The F3 layer corresponds to the density enhanced region associated with the equatorial anomaly. This enhanced region moves upward and to a higher latitude region due to the E x B drift and the field aligned diffusion. When it reaches the altitude sufficiently separated by the F2 layer at a lower altitude, the plasma density enhanced region becomes observable from the ground as the F3 layer. The density enhanced region continues to move to a higher altitude and a higher altitude latitude region, so that the F3 layer is shifted to a latitude region. The meridional neutral wind moves the density enhanced region at a higher altitude region in the windward hemisphere and at a lower altitude region in the leeward hemisphere. As a result, the formation of the F3 layer is promoted in the windward hemisphere and suppressed in the leeward region by the meridional neutral wind.

On the other hand, as a result of the model calculation and the topside sounder data analysis, the mechanism of the ionization ledge was suggested as follows: The plasma density enhanced flux tube was generated through the photo-chemical process at the altitude just above the F2 peak over the magnetic equator in the early morning local time. This flux tube rises upward by the E x B drift. When the altitude of this flux tube is sufficiently separated by the F2 layer at a lower altitude, the ionization ledge becomes observable from the topside ionosphere. The ledge field line becomes separated from the magnetic field line passing through the equatorial anomaly crest during the night local time due to the faster loss of plasma in the equatorial anomaly crest at the higher latitude. Since the plasma density structure becomes asymmetrical by the meridional neutral wind, the meridional neutral wind suppresses the formation of the density enhanced region at a high altitude. Then, the formation of the ionization ledge is suppressed by the meridional neutral wind.

One of the most important results is that the dynamics of the F3 layer and the ionization ledge cannot be understood by the one dimensional variation in altitude. The dynamics of these phenomena can be understood in the two dimensional frame of the whole magnetic meridional plane connected by the magnetic field lines. Based on the different mechanisms of each phenomenon, it is concluded that it is not necessary for the ionization ledge to accompany the F3 layer. The ionization ledge is not just a deformed F3 layer due to the chemical loss and the field aligned diffusion processes.