

Formation of the equatorial ionization anomaly and stratification of the F2 layer

Jyunpei Uemoto^{1*}, Takashi Maruyama¹, Takayuki Ono², Susumu Saito³, Masahide Iizima⁴,
Atsushi Kumamoto²

¹NICT, ²Graduate School of Science, Tohoku Univ, ³ENRI, ⁴Daijo Shukutoku Gakuen

In the equatorial ionosphere, the electron density is maximized in the northern and southern magnetic low-latitude regions with the density trough over the magnetic equator. This phenomenon is called as the equatorial ionization anomaly (EIA), and it is well known that EIA results from the combined effect of the daytime upward $E \times B$ drift and the field-aligned diffusion. Recently, IMAGE satellite observations revealed a striking longitudinal dependence of EIA, and many studies have been performed to clarify this dependence with a focus on a coupling between the ionosphere and lower atmosphere. Thus, EIA occupies one of the major positions of the science topics in the equatorial ionosphere, although EIA was found in at least 1940s.

On the other hand, stratification of the F2 layer has been often observed using ionosondes in the equatorial ionosphere. The finding of this phenomenon was as old as EIA, however, the mechanism of stratification has not been clarified to date. Since the dynamics of the equatorial ionosphere has been able to be investigated in detail by the grace of recent development of computer simulation, the stratification of F2 layer has been studied vigorously through the numerical methods as well as observations.

To clarify the mechanism, we analyzed statistically the SEALION ionosonde data and compared with the model calculation. In this presentation, we report our data analysis and model calculation, and discuss the relationship between EIA and stratification of the F2 layer which has not been investigated in detail.

Keywords: Equatorial ionosphere, ionosonde, equatorial ionization anomaly, electron density structure