Statistical analysis of the F3 layer using the SEALION ionosonde network

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To clarify an electric field effect and a trans-equatorial neutral wind effect for the F3 layer individually, we are analyzing the ionosonde data of the South East Asian Low-latitude IOnosonde Network [SEALION] provided mainly by the National Institute of Information and Communications Technology [NICT]. In this paper, we report some preliminary results of the statistical analysis of the ionosonde data observed at Chiang Mai (CMU [geographic latitude 18.8^o, longitude 98.9^o, dip latitude 13.0^o]), Chumphon (CPN [10.7^o, 99.4^o, 3.3^o]) and Koto Tabang (KTB [-0.2^o, 100.3^o, -10.0^o]) during the period from October 2004 to September 2005.

As a result of analyzing the ionosonde data in December 2004, March, June, and September 2005, the occurrence probability of the F3 layer averaged through the whole period were 80.2%, 24.8% and 57.7% at CMU, CPN and KTB, respectively. The F3 layer occurred at local times from 9 to 16 LT at CMU and KTB, and from 9 to 11 LT at CPN.

At 3 stations, occurrence probability on December was lower than that in other months. This result is consistent with the seasonal dependence of the eastward electric field in this longitude sector calculated from the equatorial vertical drift model proposed by Scherliess and Fejer [1999]; namely, the calculated vertical drift velocity was smallest in the December solstice. At CPN, the occurrence probability was smaller than that at other stations, and the F3 layer disappeared in earlier local time than other two stations. It is suggested that plasma, which was lifted upward from the altitude near the F2 peak in morning local times, diffused along the magnetic field line to higher latitudes in noon local time sector, so that the F3 layer structure could not be maintained for a long time in the vicinity of the dip equator. On the other hand, occurrence probability at CMU was lower than that at KTB. It seems to be caused by a combined effect of the trans-equatorial neutral wind effect and the difference between the dip equator and the geographic equator in this longitude sector. From this point of view, CMU is located in the northern hemisphere so that the poleward neutral wind makes downward motion of plasma along the magnetic field line except in June. On the other hand, since KTB is located in the vicinity of the geographic equator, the neutral wind makes downward motion of plasma only in June.