

Long-distance propagation of VHF radio waves associated with equatorial anomaly effect

Satoshi Ujigawa[1]; Toshiaki Takano[2]; Shin Shimakura[2]

[1] Earth and Human Env. Sci., Chiba Univ.; [2] Graduate School of Sci. and Tech., Chiba Univ.

We have observed VHF broadcasting waves at Tateyama observatory in Chiba, Japan. Then, the 48.25MHz radio waves are frequently, but intermittently, received in period of high solar activity except in summer seasons. This radio waves may be transmitted from Thai and/or Malaysian TV stations because of allocation of a radio frequency for TV broadcasting. Thus, in Asian region, the frequency of 48.25MHz has been only utilized in these countries.

The 48.25MHz radio waves have been frequently received with the strong signal strengths, in particular at winter seasons, although VHF radio waves are not normally reflected from the ionosphere. The northern equatorial anomaly crest is located near the great circle midpoint between Tateyama observatory and Bangkok, Thailand. Therefore, the propagation of the 48.25MHz radio waves may be significantly affected by the temporal variation of the equatorial anomaly crest. In practice, the received signal strengths of the 48.25MHz radio waves exhibit severe day-to-day and diurnal variations.

As compared the received signal strength with the ionospheric parameter foF2 at Guangzhou ionosonde station which is located near the great circle midpoint between Tateyama observatory and Bangkok transmitter, there is no good correlation except for the seasonal variation, which exhibits winter anomaly. However, statistical properties of the received signal strength show some certain behavior.

In order to investigate the propagation mechanism of the 48.25MHz radio waves and effect of equatorial anomaly crest for the radio waves, we performed the propagation simulation using ray tracing method.