

Estimation of electron density distribution of strong Es using VOR, AIS and Ionosonde and its application to the VHF interference model of long-distance propagation wave

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The University of Electro-Communications observe Very High Frequency Electric wave Reflected in Sporadic E layer in Chofu and Kure[1]. It is necessary to check electronic density structure over a wide area to expect intervention of the VHF data transmission system (GBAS - VDB) long-distance propagating wave of GBAS by Strong Es[2]. Regional structure of sporadic E (Es) and transport property have become clear by Yanagisawa's study[3], but it isn't done clearly yet about the electron density distribution structure of Es. Es propagation model of ITU - R was guaranteed only to frequency 80 MHz by ionospheric reflection attenuation [based on a Es transmission observation in 1960 's and the correspondence system with ionosonde vertical critical frequency foEs around the middle specular point[4],[5]. But the distance between the middle specular point and ionosonde could confirm the correspondence with Es propagation model of ITU - R for the first time in case of about 400 km in the range in 2013-VOR long-distance transmission observation around the 110 MHz in 2015. Using this relation, result of presumption of electron density distribution structure from a lot of VOR reception electric power was compared with electron density distribution from AIS, Yamagawa, Okinawa ionosonde.

Yamagawa (31.20N, 130.62E) and Okinawa (26.68N, 128.15E) observed Es in the East China Sea, Okinawa and around the Kyushu south where the distance with ionosonde will be about 400 km in the range at 10-JST time 15:00 on June 15, 2014. It could be confirmed that Es has moved to about 330 deg direction by high 108 km and speed about 70 m/s. This Es showed that the electron density the strong Es territory where 1.0×10^{13} el/m³ appeared, and which can put electron density in Okinawa ionosonde is parallel with strong Es where 9.2×10^{12} el/m³ mostly in the Okinawa south and around the east around 10:10-11:30 in AIS. In case of this time's Es, it was assumed that there was a possibility beyond the VOR reception electric power-98dBm that intervention with VOR and GBAS - VDB is worried about when Es propagation model of ITU - R was applied. An analysis sample by this way will be indicated in the lecture, and I report on a relation between the distribution of the electron density, the feature of the transport property and intervention occurrence of strong Es conversantly.

Reference

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