The relation between the intensities of VHF waves observed at Tateyama and ionospheric electron densities measured by ionosondes

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From the continuous observation of VHF-band radio waves (47.5 - 76.0 MHz) at Tateyama, we found that radio waves used for TV broadcasting are received even though the radio waves for this band are not assigned to broadcasting in Japan. The radio waves received at Tateyama are these for broadcasting used in Southeast Asia such as Philippine, Thailand, Malaysia and so on. From pictures and sounds of the radio waves and their ray-tracing simulation, we have identified that the wave with a frequency of 48.25 MHz is used in Thailand, and that of 49.75 MHz is used in China. It is conceivable that when the electron density in the ionosphere is enough large to reflect the radio waves, the reflection by the ionosphere enables these waves propagate to Japan. In the present study, we investigate the relationship between the intensities of the radio waves received at Tateyama and the ionospheric electron density observed by the ionosondes at Yamagawa and Okinawa observatory settled by Communications Research Laboratory, Japan. As the waves with frequencies of 48.25 MHz and 49.75 MHz are reflected by the F2 and Es layer, respectively, we investigate the relation of the value of foF2 with the intensity of the wave with 48.25

MHz and that of 49.75 MHz with foEs. It is found that the intensity of the radio wave with 48.25 MHz is enhanced when the value of foF2 at Okinawa becomes larger than 10 MHz, and that

the correlation between the intensity of the radio wave with 48.25 MHz and the value of foF2 is 0.6. When the value of foF2 at Yamagawa become larger than 8 MHz, the intensity of the radio wave with 48.25 MHz is enhanced and their correlation is 0.5. As concerns the waves with 49.75 MHz coming from China, the intensity of

the wave with 49.75 MHz is enhanced when the value of foEs at Yamagawa or Okinawa increases, and the correlation between the intensity with 49.75 MHz and the values of foEs at Yamagawa is larger than the the correlation with the values of foEs at Okinawa. We also found that the intensity of the radio wave with a frequency of

48.25 MHz is not enhanced when the sporadic E layer is developed even though the value of foF2 is larger than 10 MHz. This implies that the Es layer prevents the radio wave with a frequency of 48.25 MHz from propagating to Japan.