

A study on wave propagation around the Earth using ray tracing

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The result of Akebono PWS observation contains many signals from the ground transmitters, for telecommunications and broadcasts. One of the most intense signal with the frequency of 100 kHz is ocean navigation system Loran-C. In space, propagation of this signal is related to magnetic field and plasma density along the propagation path. Because the origin of these signals is stable man-made signal, it is possible to obtain physical parameters along the propagation path of the signal.

Ray path tracing method makes it possible to obtain propagating path in anisotropic and inhomogeneous medium. In this study, we choose plasma density model and magnetic field model for the ray path tracing of the 100kHz radiowave signal. Then we confirmed that telecommunication wave from ground is possible to arrive at the satellite position. By comparing distribution of signal with 100 kHz obtained by PWS/NPW on Akebono satellite with the result of ray path trace, we try to discuss the plasma density model and change of propagation vector along the path.