Preliminary development of radio propagation simulator for HF

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To investigate an ionospheric effect on the HF radio propagation, we are developing the radio propagation simulator. Because radio waves in the high frequency (HF) band can be reflected back to Earth by the ionosphere layer, they are widely used for long-distance communication. HF is not only popular among amateur radio users, but it is also valuable remote communication during a disaster e.g. Tsunami and big earthquake. Being involved in the ionosphere, an integrity of HF wave, however, unavoidably relies on sunlight/ darkness of the transmission and reception sites, season, sunspot number, solar activity, aurora activity, and magnetic activity. While the maximum usable frequency (MUF) has a direct variation with the electron density, the lower usable frequency depends on the absorption in the D-layer of the ionosphere. This paper presents a preliminary effort for an integration of the radio propagation knowledge and the ionospheric knowledge. The current status of the simulator development will be reported.

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