# HF simulator: A door to space weather users

*Kornyanat Hozumi[1], Takashi Maruyama[1], Susumu Saito[2], Mamoru Ishii[1], Takuya Tsugawa[1]

1. National Institute of Information and Communications Technology, 2. National Institute of Maritime, Port and Aviation Technology, Electronic Navigation Research Institute

Utilization of radio wave enhances convenience, safety level and quality of life for decades. Various space weathers, which affect the Earth via the coupling processes in the Sun-Earth system, cause unreachability, intensity fluctuation, abnormal route propagation, propagation delay, etc. of radio wave. Space weather is thus significant to radio wave users, especially the user who deals with the critical radio application. High frequency (HF) radio communication is an important means of aeronautical communications especially for airplanes oceanic en-route and in polar routes, even though satellite communications are getting popular. Reasons are, for example, satellite communication is expensive, GEO satellites are not visible from polar region, etc. For sky wave mode, HF radio waves are reflected back to the Earth by the ionosphere layer. Integrity and availability of HF waves are unavoidably associated with 3D structure of plasma frequency in the Earth’ s ionosphere. This paper presents a problem of existing radio propagation model and the challenge on developing the radio propagation simulator that is dedicated to space weather users. The future plan for users will be reported.

Keywords: Radio propagation, HF, Space weather, Ionosphere

 