
Day 3 (Thursday, 27 October) 14:30 - 16:30, Hall C

Technical Session 13 Space Weather

T13-1-A

Anomalous Long-range Propagation of VHF NAV signals by the sporadic E

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The sporadic E (Es) layer is a layer in the ionospheric E region with a dense electron density and thin altitudinal thickness at altitudes around 100 km. It has been pointed out by International Civil Aviation Organization (ICAO) that the Es layer has a potential to introduce anomalous long-range propagation in the frequency band of aeronautical navigation and communication (EsAP: Es Anomalous Propagation). In order to reveal the detailed characteristics of EsAP, we have constructed a network of instruments for continuously monitoring the intensities of radio waves of various VOR and ILS LOC stations in Japan. In this paper, we introduce the following latest results obtained using data from this monitoring observation: 1) derivation of statistical characteristics (seasonal/local time dependence) of EsAP occurrence probability, 2) mapping of the spatial structure of Es in 2D by combining EsAP observations with GPS-TEC ROTI data, and 3) detailed investigation of the long-range propagation of ILS-LOC signal from Taiwan. We also discuss the possibility for using the anomalous propagation of VHF NAV signal for studies of equatorial plasma bubbles, a different phenomenon in the ionospheric F region.

T13-2-I

DFMC GBAS testbed at Ishigaki, Japan

Susumu Saito, Takayuki Yoshihara (Electronic Navigation Research Institute, , MPAT)

This paper introduces the dual-frequency and multi-frequency (DFMC) ground-based augmentation system (GBAS) testbed developed by the Electronic Navigation Research Institute and installed at the New Ishigaki Airport. The testbed can receive most of the signals of all the major GNSS constellations. It can generate two kinds of GBAS messages corresponding to the two architectures proposed. The first data collection campaign was conducted from 8 to 10 March 2022. More flight campaigns are planned in October 2022 and March 2023.

T13-3-I

Recent domestic activities and NICT's efforts toward the advancement of space weather forecast

Takuya Tsugawa (National Institute of Information and Communications Technology)

In recent years, the use of space has been rapidly advancing in the business sector, such as precise GNSS navigation, commercial small satellite constellations, and commercial space travel, while solar activity has been gradually increasing, with the first X-class solar flare in Solar Cycle 25 occurring in July 2021. Under these circumstances, various countries and international organizations have been studying the impact of space weather phenomena on social infrastructure and how to respond to them. The Ministry of Internal Affairs and Communications (MIC) "Council for the advancement of space weather forecast" has been held in Japan since January 2022, and its report was released in June. The WG on space weather alert criteria, which was established under the council, has been discussing new alert types and criteria, and the first Japanese worst-case scenario of extreme space weather phenomena". In this presentation, an overview of this report and related efforts by NICT will be reported.