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ROUTINE OBSERVATIONS AND DATA ACQUISITION OF THE IONOSPHERE AT SYOWA STATION, ANTARCTICA

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The Earth's ionosphere is one of the important area for short-wave telecommunications and broadcasting. The conditions of the ionosphere varies depending on activities of space weather. Arctic and Antarctic regions are the gateway of electromagnetic and mechanical energy transfer between the magnetosphere and the ionosphere. National Institute of Information and Communications Technology (NICT), which is responsible for Japanese space weather forecast, has been operating routine ionospheric observations over Japan for more than 50 years as monitoring of space weather and radio-wave propagation. Also, NICT has been operating routine observations and data acquisition of the ionosphere at Syowa station in Antarctica from the early stages of Japanese Antarctic Research Expedition (JARE). These more than 50 years of ionospheric data enables us to study daily, seasonal, solar-cycle dependent, and long-term variations of ionosphere.

Currently, we operate three types of ionospheric observations. The first one is the vertical observation of the ionosphere (ionosonde). This observation enables us to estimate height-profile of ionospheric electron density. The second one is the measurement of GNSS-TEC and GNSS scintillations using three GNSS receivers. The density fluctuations caused by the electrons and ions precipitation from the magnetosphere produces scintillations of GNSS signal. The third one is the observation of LF standard time and frequency signal along the course of the Antarctic research expedition icebreaker, "Shirase", from Japan to Antarctica and back. This observation is for comparison with calculation results based on a new field strength prediction method developed by NICT for long distance propagation of LF waves. The data is transferred using Wide-area Observation Network Monitoring (WONM) system (Nagatsuma et al., 2014).

In this presentation, we will introduce our ionospheric observation at Syowa station, Antarctica, and current status of our observations at Syowa station.

ACKNOWLEDGEMENTS

Ionospheric observation at Syowa Station is based on the consignment study from the Ministry of Internal Affairs and Communications.

REFERENCES

Nagatsuma, T., Murata, K.T., Yamamoto, K., Tsugawa, T., Kitauchi, H., Kondo, T., Ishibashi, H., Nishioka, M., & Okada, M. (2014), Operation of a data acquisition, transfer, and storage system for the global space-weather observation network, *Data Science Journal*, 13, PDA51-PDA56, <http://dx.doi.org/10.2481/dsj.IFPDA-09>.