Observed fine-structures in sporadic Ca^+ ion layers by a frequency-tunable resonance scattering lidar in the midlatitude

Mitsumu K. Ejiri[1], Takanori Nishiyama[1], Takuo T. Tsuda[2], Makoto Abo[3], Katsuhiko Tsuno[4], Satoshi Wada[4], Takayo Ogawa[4], Takuya Kawahara[5], Takuji Nakamura[1]

[1]*National Institute of Polar Research, Tachikawa, Japan*
[2]*The University of Electro-Communications, Chofu, Japan*
[3]*Graduate School of System Design, Tokyo Metropolitan University, Hino, Japan*
[4]*RIKEN, Wako, Japan*
[5]*Faculty of Engineering, Shinshu University, Nagano, Japan*

The National Institute of Polar Research (NIPR) is leading a six year prioritized project of the Antarctic research observations since 2010. One of the sub-project is entitled the global environmental change revealed through the Antarctic middle and upper atmosphere. Profiling dynamical parameters such as temperature and wind, as well as minor constituents is the key component of observations in this project, together with a long term observations using existent various instruments in Syowa, the Antarctica (69S). As a part of the sub-project, we are developing a new resonance lidar system with multiple wavelengths and plan to install and operate it at Syowa, Antarctica. The lidar will observe temperature profiles and variations of minor constituents such as Fe, K, Ca+, and aurorally excited N2+. The lidar system is being developed with trial and error in test observations of the metal atom and ion density and the MLT temperature profiles. The lidar will be installed at Syowa in Antarctica by the 58th Japan Antarctic Research Expedition (JARE 58). As a challenge of high resolution measurements, Ca+ layer was observed with temporal/special resolutions of 5 sec/15 m. In this presentation, we will show some observation results and discuss relationship between observed fine-structures in Ca^+ layer and neutral wind shear in the lower-thermosphere.