

Japan Geoscience Union Meeting 2011

(May 22-27 2011 at Makuhari, Chiba, Japan)

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PEM032-21

Room:103

Time:May 27 09:30-09:45

Initial results from a Rayleigh-Raman lidar at Syowa station

Takuji Nakamura^{1*}, Hidehiko Suzuki¹, Mitsumu Ejiri¹, Makoto Abo², Yoshihiro Tomikawa¹, Masaki Tsutsumi¹, Takuya Kawahara³, Kazuyo Sakanoi⁴, Kaoru Sato⁵

¹National Institute of Polar Research, ²Tokyo Metropolitan University, ³Shinshu University, ⁴Komazawa University, ⁵The University of Tokyo

The polar regions of the middle atmosphere are in the downward/upward stream of the meridional circulation in winter/summer, and shows a significant seasonal change in the upper region. However, observations over the Antarctic are very limited, and therefore profiling dynamical parameters such as temperature and wind, as well as minor constituents is very important there. The National Institute of Polar Research (NIPR) is carrying out 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." In this project, active remote sensings such as a large atmospheric radar (PANSY) and a lidar, as well as profiling of minor constituents by a millimeter wave spectrometer are being installed in Syowa, Antarctica. In this paper, an initial report of the Rayleigh Raman lidar observations which have been commenced by the 52th JARE (Japanese

Antarctic Research Expeditions) in early 2011.

The lidar observes temperature and atmospheric density perturbation in the stratosphere and mesosphere, including PSC (Polar Stratospheric Clouds) and PMC (Polar Mesospheric Clouds). Two Nd:YAG lasers of 355 nm (300mJ x 20Hz, 100mJ x 20Hz) and two telescopes (82 cm and 35 cm) are used. Elastic scatter and N₂ vibrational Raman scatter (387nm) are detected in four channels using photon counting and A/D techniques. The system has installed and started operation in February this year. In the paper, initial results of temperature, clouds and atmospheric waves will be reported.

Keywords: Middle atmosphere, lidar, polar region, gravity waves