Recent report on lidar observations at Syowa Station (69S, 39E) in the Antarctic

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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-projects is entitled â€˜the global environmental change revealed through the Antarctic middle and upper atmosphereâ€™. As a part of the sub-project, we are promoting two lidar-related activities, which are on a Rayleigh/Raman scattering lidar and a resonance scattering lidar. The Rayleigh/Raman lidar system has three receiving channels, Raman (10-30km), Rayleigh-Low (20-65km), and Rayleigh-High (30-80km), providing temperature profiles and cloud detections from the upper troposphere to the mesosphere. The Rayleigh/Raman lidar has been operated for more than 350 nights (>3000 hours) from January 2011 to February 2014 at Syowa Station (69S, 39E) in Antarctica. The obtained data set would be useful to reveal seasonal and year-to-year variations of temperature structures and gravity wave activities in the middle atmosphere, as well as high altitude clouds such as polar mesospheric clouds (PMCs) and polar stratospheric clouds (PSCs). On the other hand, we are developing a new resonance scattering lidar system to be installed at Syowa Station. For the new lidar system, we have employed a tunable alexandrite laser covering the resonance scattering wavelengths of two neutral species, which are atomic potassium (K, 770.11 nm) and atomic iron (Fe, 386.10 nm), and two ion species, which are calcium ion (Ca+, 393.48 nm) and aurorally excited nitrogen ion (N2+, 390.30 nm, 391.08 nm). Thus the tunable resonance scattering lidar system will provide information on the mesosphere and lower thermosphere as well as the ionosphere. Using the two lidars and co-located other instruments, we will conduct a comprehensive ground-based observation of the low, middle, and upper atmosphere above Syowa Station. This unique observation is expected to make important contribution to studies on the atmospheric vertical coupling process and the neutral and charged particle interaction. In this presentation, we report current status of the NIPR lidar activities.