

Unusual aerosol enhancement in Antarctic troposphere during spring

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Antarctic region is isolated from the other continents with human activities. Nevertheless, high aerosol concentrations (Antarctic haze) were observed occasionally near surface at Syowa Station, Antarctica, during winter ? spring (Hara et al., JGR, 2010). Vertical distributions of the Antarctic haze were obtained in a few tethered-balloon-borne aerosol measurements and a lunched-balloon borne aerosol measurement at Syowa Station (Hara et al., ACP, 2011). Spatial features of the aerosol enhancement, however, have not been discussed well. This study aims to elucidate spatial features of aerosol enhancement (Antarctic haze) over Syowa Station by simultaneous measurements in near surface ~ upper atmosphere. Condensation particle counter (CPC), optical particle counter (OPC), and aethalometer were used to measure physical properties of aerosols near surface. Micro-pulse LIDAR (MPL) and aerosol sonde (balloon-borne OPC) were used to measure vertical distributions of aerosol particles over Syowa Station in this study. Balloon-borne aerosol measurements carried out under aerosol enhanced conditions near surface on 14 August and 6 September, 2012. High aerosol enhanced conditions near surface on 13-16 August, 2012 were observed immediately after storm condition. MPL measurements exhibited that aerosols were enhanced in ~ ca. 2.5 km on 13 - 16 August. In contrast, aerosol enhancement near surface on 5 - 7 September, 2012 appeared suddenly under the calm wind conditions. Although aerosol number concentrations near surface dropped markedly before the aerosol enhancement (00-15UT on 5 September), strong aerosol enhancement was found around 1-1.5 km since 05UT on 5 September in the MPL measurements. Although strong aerosol enhanced layer was distributed mostly in ~3km, high relative backscatter was observed occasionally in 3 ~ 4 km on 6 September. Here, we discuss aerosol features and distributions in the twice simultaneous measurements.