南極昭和基地におけるエアロゾル粒径分布の季節変化
Seasonal cycle of aerosol size distribution at Syowa Station, Antarctica

*原 圭一郎[1]、西田 千春[2]、長田 和雄[3]、矢吹 正教[4]、山内 恭[5]
*Keiichiro Hara[1], Chiharu Nishita-Hara[2], Kazuo Osada[3], Masanori Yabuki[4], Takashi Yamanouchi[5]

1.福岡大学理学部地球圏科学科、2.福岡大学福岡から診る大気環境研究所、3.名古屋大学大学院環境学研究科、4.京都大学生存圏研究所、5.国立極地研究所
1.Fukuoka University, 2.Fukuoka University, FIT, 3.Nagoya Univ., GSES, 4.Kyoto Univ., RISH, 5.NIPR

Atmospheric aerosols are related closely to the climate change through direct and indirect effects. Number concentrations and size distributions of aerosols are one of the most important properties. Recently, aerosol size distributions have been measured even in the Antarctic regions during summer (e.g., Virkkula et al., 2007; Asmi et al., 2010; Pant et al., 2011; Park et al., 2004). These studies focused on the respect of new particle formation. However, only a few wintering-measurements of aerosol size distributions in fine - ultrafine modes have been made in the Antarctic regions (Ito, 1993; Hansen et al., 2009; Järvinen et al., 2013). This study aims to understand seasonal cycle of aerosol size distribution and new particle formation at Syowa Station, Antarctica. For measurement of size distribution in ultrafine - fine modes (Dp: 5–168 nm), a scanning mobility particle sizer (SMPS: 3936-N-25; TSI Inc.) was used from February 2004 - December 2006 at Syowa Station, Antarctica. The scanning time for one scan was set to 5 min in SMPS measurement. Local contaminated data were filtered using CN data (aerosol monitoring data) and wind data (observed by JMA). Log-normal fitting was used to compare modal structure of aerosol size distributions in this study. All daily-mean aerosol size distributions were fitted using the following lognormal modes: fresh nucleation mode (Dp<10 nm), aged nucleation mode (Dp=10-25 nm), 1st Aitken mode (Dp=25-50 nm), 2nd Aitken mode (Dp=50-100 nm), and accumulation mode (Dp>100 nm). Aerosol size distribution showed 2 –4 modal structures from early September –end-March. Fresh nucleation mode appeared occasionally in March-April, and August-November, and rarely in December-February and May-July. The number concentrations in aged nucleation –2nd Aitken modes increased in summer. In contrast, most of size distribution showed 1 - 2 modal structures during April - August. Strong mono-modal distribution appeared in 2nd Aitken and/or accumulation modes under/after the storm conditions in the winter –early spring. This seasonal feature might be associated with seasonal cycles of (1) the concentrations of condensable vapors linked to photochemical reactions and biogenic activity, and (2) sea-salt particles released from sea-ice surface in the winter - spring. Here, we discuss and characterize seasonal cycle of aerosol size distribution in ultrafine –fine modes in the Antarctic coasts.

キーワード：エアロゾル、粒径分布、南極
Keywords: aerosols, size distribution, Antarctica

