

## Vertical distributions of aerosol constituents in the Antarctic troposphere during the ANTSYO-II: AGAMES campaign

HARA, Keiichiro<sup>1\*</sup>, HIRASAWA, Naohiko<sup>2</sup>, YAMANOUCHI, Takashi<sup>2</sup>, WADA Makoto<sup>2</sup>, Andreas HERBER<sup>3</sup>

<sup>1</sup>Fukuoka Univ., <sup>2</sup>NIPR, <sup>3</sup>AWI

During JARE48 (2006/2007), Japan-Germany cooperated airplane-borne aerosol measurement campaign (ANTSYO-II/AGAMES) was carried out around Neumayer, Kohnen and Syowa stations. This campaign aims to characterize aerosol properties in the summer Antarctic troposphere and understand spatial distributions and transport processes of aerosols. Here, we show the vertical distributions of aerosol constituents and their mixing states during the ANTSYO-II: AGAMES campaign.

Aerosol samples were taken using one-stage aerosol impactor (cut off diameter, ca. 0.2 micrometer) on board of "Polar-2" (Dornier 228, AWI). Aerosol measurements over Neumayer were made from 23 December 2006 till 31 December 2008 (including Kohnen flights on 28 ? 29 December), whereas the measurements around Syowa were carried out from 7 ? 24 January, 2007. Individual particles were observed and analyzed by TEM and SEM-EDX.

From the individual particle analysis, the following aerosol constituents were identified; (1) sulfate particles (sulfuric acid), (2) wholly Cl depleted sea-salt particles, (3) sea-salt particles containing Cl, (4) mineral particles, (5) CaSO<sub>4</sub> particles, (6) sulfate particles containing K, (7) sulfate particles containing Mg, and (8) phosphate particles. For quantitative comparison, relative abundance of each aerosol constituents was used in this study. Most of aerosol particles in all aerosol samples were sulfate particles without soot. Relative abundance of sulfate particles reached to >95 % in samples collected in the free troposphere. Although higher relative abundance of sea-salt particles and wholly modified sea-salt particles were obtained in the lower troposphere, high abundance of sea-salt particles was found in the middle free troposphere (3000 ? 6000 m). In contrast to higher abundance of wholly modified sea-salt particles in the boundary layer - lower free troposphere, abundance of sea-salt particles containing Cl was higher in the free troposphere. The vertical features of sea-salt particles were important information to understand transport processes from origin of sea-salt particles into Antarctic region. In addition, sulfate particles containing K were identified often in aerosol samples collected in the upper free troposphere. Although relative abundance of sulfate particles containing K was mainly <1%, abundance in aerosol samples collected in the upper free troposphere over Kohnen station reached to ca. 7 %. Because sulfate particles containing K can be released from combustion processes of fossil fuel and biomass, combustion-origin aerosol particles might be transported into the Antarctic regions via upper troposphere or lower stratosphere.

Keywords: aerosols, Antarctica, Troposphere, Spatial distributions