Aerosol measurements around the ridge of East Antarctica using a Rogallo wing UAV

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Meteorological observations using a UAV in the Antarctica have been carried out at S17 Air Base (69° 02' S, 40° 06' E, 606m a.s.l.), near Syowa Base by the 48th, 54th, and 56th Japanese Antarctic Research Expedition, (JARE). The JARE 58th planned to perform meteorological observations including snow, water vapor and aerosols budgets at S17 during December 22nd, 2016 and February 4th, 2017. One of main mission of the observation focused on aerosol processes using automated UAVs with a Rogallo wing, called Kite Planes. Two types of Kite Planes were used for different type observations. One is engine powered Kite Plane for horizontal observations with a condensation particle counter, an optical particle counter, and an aerosol sampler for SEM/EDX analyses. Another is a glider KitePlane supported by electric motor with an optical particle counter for vertical distribution observations. 22 flights were successfully carried out during the campaign of JARE 58th and obtained following results.

1. Uniformity in CN and Mie particle concentrations is very high during January in 2017.

2. Low CN concentrations were sometimes observed near surface.

3. High CN event with low Mie particle concentration from free troposphere was observed on January 23rd, suggesting caused by new particle formation.

4. High CN event with high Mie particle concentration from ocean area was observed on January 27th, 2017, suggesting hygroscopic growth of aerosols from marin boundary layer.

Keywords: Aerosol, UAV, Antarctica, new particle formation