

## Direct Evidence of Nitrate Aerosol Formation in Summer Antarctic Stratosphere Obtained by Balloon-Assisted UAV

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A system using the combination of a rubber balloon and an Unmanned Aerial Vehicle (UAV) for the upper atmospheric observation has been developed and stratospheric aerosol observation were performed in Antarctica. The balloon-UAV system reaches 20km to 30km in altitude, and it becomes difficult for the UAV to directly glide autonomously after separating from the balloon at higher altitudes without knowing the aerodynamic characteristics. The two-stage separation method is proposed in which the UAV first descends down to a flyable altitude of the UAV by a parachute after separating from the balloon (first separation), then it separates the parachute (second separation) for autonomous gliding back to the released point. Observation using the new platform in Antarctica as one of the 56<sup>th</sup> JARE summer activities. An optical particle counter and an aerosol sampler installed in UAV were launched on January 24, 2015 from S17 (69°01.50'S, 40°06.50'E, 607 m a.s.l.). Stratospheric aerosol layer composed by three sub-layers show enhancement comparing with normal condition, suggesting effect by eruption of Mt. Kelut of February 14, 2014. Electron Micrograph of stratospheric aerosol suggest existence of nitrate particles with diameter of sub-micrometer, even though temperature, around -45 °C, is very high.

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