

Readme: ACCLIP aerosol size distributions

Authors

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1.0 Data Set Description

Particle number concentrations and related parameters 3-1500 nm measured from the RAF GV on the Asian summer monsoon Chemical Climate Impacts Project (ACCLIP) in 2022. This is version 1, final data.

Data covers ACCLIP GV research flights (RFs) between 20220731 and 20220831. Flights were based out of Osan Airbase, South Korea, except for RF01 on 20220731 which transited from Guam to South Korea, and RF13 on 20220829 which transited from South Korea to Alaska. Data frequency is 1 Hz.

Use of these data require prior agreement from PI.

2.0 Instrument Description

Instrumentation consists of a Nucleation Mode Aerosol Size Spectrometer (NMASS) (Williamson et al. 2018), a custom battery of 5 condensation particle counters operating at 100 mb downstream pressure, and a modified Ultra High Sensitivity Aerosol Spectrometer (UHSAS) (Kupc et al. 2018). These were operated inside the fuselage of the GV, with ambient air sampled through an inlet mounted to the top of the aircraft. Air flow to the UHSAS was first dried with a nafion dryer.

3.0 Data Collection and Processing

NMASS cumulative concentrations are those measured in each of the 5 CPCs. The threshold diameter is the mobility diameter larger than which each CPC exceeds 50% counting efficiency. UHSAS cumulative number concentration, surface area and volume are obtained by summing the measured number size distribution and derived surface area and volume size distributions for all size bins above 70 nm.

Losses due to diffusion in the inlet have not been corrected for.

Factor 2 correction applied to NMASS data following post-ACCLIP calibrations, UHSAS channels below 70 nm removed due to poor counting efficiency, and NMASS data removed when instrument was changing orifice.

4.0 Data Format

UNCERTAINTY: see PI; Ns +/-9%; S +22%/-12%; V +36%/-18%

ULOD_FLAG: -7777

ULOD_VALUE: N/A

LLOD_FLAG: -8888

LLOD_VALUE: N/A

Data columns are as follows:

UTC time

N3_NMASS, #/cm³ above 3 nm at 1013 hPa and 0 Celsius

N7_NMASS, #/cm³ above 7 nm at 1013 hPa and 0 Celsius

N14_NMASS, #/cm³ above 14 nm at 1013 hPa and 0 Celsius

N28_NMASS, #/cm³ above 28 nm at 1013 hPa and 0 Celsius

N56_NMASS, #/cm³ above 56 nm at 1013 hPa and 0 Celsius

N70_UHSAS, #/cm³ between 70 and 900 nm at 1013 hPa and 0 Celsius

S70_UHSAS, um²/cm³ between 70 and 900 nm at 1013 hPa and 0 Celsius

V70_UHSAS, um³/cm³ between 70 and 900 nm at 1013 hPa and 0 Celsius

5.0 Data Remarks

Data from one or both instruments are missing from part of all of some research flights due to instrument operational issues.

6.0 References

Kupc, A., C. Williamson, N. L. Wagner, M. Richardson and C. A. Brock "Modification, calibration, and performance of the Ultra-High Sensitivity Aerosol Spectrometer for particle size distribution and volatility measurements during the Atmospheric Tomography Mission (ATom) airborne campaign." Atmos. Meas. Tech. **11**(1): 369-383.10.5194/amt-11-369-2018 (2018).

Williamson, C., A. Kupc, J. Wilson, D. W. Gesler, J. M. Reeves, F. Erdesz, R. McLaughlin and C. A. Brock "Fast time response measurements of particle size distributions in the 3–60 nm size range with the nucleation mode aerosol size spectrometer." Atmos. Meas. Tech. **11**(6): 3491-3509.10.5194/amt-11-3491-2018 (2018).