Field measurements of aerosol particles near a runway of Narita International Airport, Japan

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- General -

Field measurements of aerosol particles were conducted at an observation point ~180 m from the centerline of runway A (~140 m from the edge of the runway) of Narita International Airport (NRT), Japan, in February 2018. The online aerosol instruments used for the field measurements consisted of an ultrafine condensation particle counter (UCPC: Model 3776, TSI, d_{50} = 2.5 nm), a condensation particle counter (CPC: Model 3771, TSI, d_{50} = 10 nm), a scanning mobility particle sizer (SMPS: Model 3080, TSI), and an engine exhaust particle sizer (EEPS, TSI). The other instruments included a carbon dioxide (CO_2) monitor (Model 840, LI-COR Bioscience) and meteorological sensors. The sampling inlet for the UCPC, CPC, and SMPS was switched between an unheated (room temperature) mode and a 350°C-heated mode every eight hours during selected time periods to measure total and non-volatile particles, respectively. The EEPS was operated independently with the UCPC/CPC/SMPS inlet system and it measured unheated particle number size distributions during the entire period.

- An example of the header of a data file -

10 <--- The number of lines for the header
Narita airport winter observation, 2018/02/15
CO2, final data, ver 2.1, 2018/08/30 (validated 2020/04/22)
CO2: LI-COR LI-840
PI: Nobuyuki Takegawa (Tokyo Metropolitan University)
Simple time series format
CO2_center_time_v2_1, hh:mm:ss JST, integration 1sec
CO2_ppmv_v2_1, CO2 mixing ratio, ppmv, null -999
Comment: Corrections for time shift and calibrations (397.2 and 1032 ppmv) are incorporated.
CO2_center_time_v2_1,CO2_ppmv_v2_1 <--- The names of the data variables

- Notes on the data quality -

Note 1: The effects of particle coincidence for the UCPC and CPC data were corrected by using the methods described by our previous studies (Takegawa and Sakurai, 2011; Takegawa et al., 2017). However, the uncertainties in the UCPC and CPC data due to particle coincidence were significant (>40 %) when particle number concentrations exceeded ~2.5×10^6 cm^{-3} and ~6×10^5 cm^{-3}, respectively.

Note 2: The nominal particle diameter range detectable by the EEPS extended from ~6 to 500 nm. However, our laboratory experiments have shown that the EEPS may significantly underestimate particle number concentrations below ~10 nm.

Note 3: The UCPC, CPC, EEPS, and CO_2 data were obtained every 1 s, and the SMPS data were obtained every 5 min (scanning time: 3 min). When we observed spiked increases in particle number concentrations and CO_2 in aircraft plumes, the timing of the detection of concentration peaks did not exactly match among the individual instruments. This was likely caused by differences in the response time of the instruments and delay time in the sampling tubes. The data stored in the archive are not completely corrected for these time differences.

Note 4: Only data obtained at 06:00-23:00 LT (aircraft operating times) should be used for the analysis of aircraft emissions. Data obtained during midnight were sometimes affected by local diesel emissions, which were not allowed during aircraft operating times.