

TITLE: Total aerosol number concentrations UCN, ColdCN, HotCN

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1.0 DATA SET OVERVIEW:

Total aerosol number concentrations with the following temperature, cut size and TSI Condensation Particle Counter (CPC) model: "Ultrafine CPC (UCN)", unheated particles  $>0.003\mu\text{m}$ , CPC model 3025; "Cold CPC (CNcold)", unheated particles  $>0.01\mu\text{m}$ , CPC model 3010; "Hot CPC (CNhot)": heated to 300 C, CPC model 3010.

Collected on the NCAR C-130 in Aug-Sept, 2007 from Kiritimati (Christmas) Island, Republic of Kiribati (Pacific Atmospheric Sulfur Experiment-PASE).

2.0 INSTRUMENT DESCRIPTION:

The aerosol number concentrations ( $\text{cm}^{-3}$ ) measured inside C-130 with TSI condensation nuclei counters to determine total aerosol number density  $>0.003\mu\text{m}$  and  $>0.01\mu\text{m}$ ; the number of particles between 0.003 and  $0.01\mu\text{m}$ ; and particles heated at  $300^\circ\text{C}$  to obtain the fractional volatility of aerosol number  $> 0.01 \mu\text{m}$  (Clarke, 1991). The temperature difference in the 3010s was increased from the default 17C to 22C to get smaller particles than usual.

3.0 DATA COLLECTION AND PROCESSING:

The air was sampled through the NCAR Inlet. The data have been corrected for the ambient temperature and pressure based on the ideal gas law. Data influenced by droplet shatter have been removed. The data uncertainty is about 5% for the cold and 10% for the hot and

ultrafine CPC. These values are estimated from uncertainties in the flow rate and temperature measurements.

#### 4.0 DATA FORMAT:

Data for each flight is supplied in its own file. Filenames are structured as (for example): RF03\_20070813T175221\_CN\_v1.txt (RAF flight number\_start time\_measured parameter\_version . file type ASCII text).

Standard EOL data archive header information is first, followed by a NASA-NOAA header information style with "REMARKS =" identifier.

#### EXAMPLE HEADER and 3 lines of data

```
PI/DATA CONTACT = Antony Clarke, 1000 Pope Road, Honolulu, HI 96822; email: tclarke@soest.hawaii.edu; 808-956-6215
DATA COVERAGE = START: 20070808180500; STOP: 20070809031205 UTC
PLATFORM/SITE = C-130
INSTRUMENT = CPC, UCPC
LOCATION = mobile
DATA VERSION = 1.0 (20080325)
REMARKS = Pacific Atmospheric Sulfur Experiment (PASE)
REMARKS = Sample Start time yyymddhhmmss, UTC
REMARKS = Sample Start time Matlab format, UTC
REMARKS = Sample Start time, seconds
REMARKS = ultrafine_aerosol, cm-3
REMARKS = cold_aerosol, cm-3
REMARKS = hot_aerosol, cm-3
REMARKS = missing data NaN
REMARKS = NASA-NOAA HEADER INFORMATION FOLLOWS
REMARKS = Clarke, Antony
REMARKS = HiGEAR/University of Hawaii
REMARKS = Aerosol concentrations measured with the condensation particle counters aboard NSF C-130
REMARKS = PASE
REMARKS = 1 1
REMARKS = 2007 08 04 2007 09 08
REMARKS = 1
REMARKS = Start.UTC, second
REMARKS = 3
REMARKS = 1 1 1
REMARKS = -9999 -9999 -9999
REMARKS = ultrafine_aerosol, cm-3
REMARKS = cold_aerosol, cm-3
REMARKS = hot_aerosol, cm-3
REMARKS = 0
REMARKS = 15
REMARKS = PI_CONTACT_INFO: Antony Clarke, 1000 Pope Road, Honolulu, HI 96822; email: tclarke@soest.hawaii.edu; 808-956-6215
REMARKS = PLATFORM: NSF C-130 aircraft
REMARKS = LOCATION: Lat, Lon, and Elev data in a separate file
REMARKS = ASSOCIATED_DATA: N/A
REMARKS = INSTRUMENT_INFO: The aerosol number concentrations (cm-3) measured inside C-130 with the following temperature, cut size and TSI Condensation Particle Counter (CPC) model are given in the columns 4 - 6: 4. "Ultrafine CPC (UCN)": unheated ultrafine, CPC model 3025; 5. "Cold CPC (CNcold)": unheated, CPC model 3010; 6. "Hot CPC (CNhot)": heated to 300 oC, CPC model 3010. The first 3 columns give the time of measurement (UTC). The air was sampled through the NCAR Inlet. The data have been corrected for the ambient temperature and pressure based on the ideal gas law. The cold and hot data are corrected for coincident counts. The CN cold data has been screened for laser misbehavior with the aid of the CN hot and NCAR CN ("CONCN", data available in the navigation file). No time averaging has been made. Data influenced by droplet shatter and low isokinetic ratio have been removed.
REMARKS = DATA_INFO: Unit is #/cm3 for the aerosol concentrations.
REMARKS = UNCERTAINTY: About 5% for the cold and 10% for the hot and ultrafine CPC. These values are estimated from uncertainties in the flow rate and temperature measurements.
REMARKS = DM_CONTACT_INFO: Vladimir Kapustin and Vera Brekhovskikh, Dept. of Oceanography, University of Hawaii at Manoa, 1000 Pope Road, Honolulu, Hawaii 96822; 808-956-7777; kapustin@soest.hawaii.edu
REMARKS = PROJECT_INFO: PASE; 4 August - 8 September 2007, http://www.eol.ucar.edu/projects/pase/PASE_HomePage.html;
REMARKS = STIPULATIONS_ON_USE: N/A
REMARKS = OTHER_COMMENTS: N/A
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REMARKS = REVISION:R0

REMARKS = R0: Hot CPC concentration shows periodic structure (period ~ 100s, amplitude ~10%) due to the temperature controller. The modulation need to be filtered out.

UTC MatlabTime Start\_UTC ultrafine\_aerosol\_per\_cm3 cold\_aerosol\_per\_cm3 hot\_aerosol\_per\_cm3

UTC UTC sec 1/cm3 1/cm3 1/cm3 1/cm3

20070808180500.0000 733262.7534722223 65100 NaN 245 81

20070808180501.0000 733262.7534837963 65101 NaN 250 79

20070808180502.0000 733262.7534953704 65102 239 245 NaN.

## 5.0 DATA REMARKS:

Hot CPC concentration shows periodic structure (period ~ 100s, amplitude ~10%) due to TOAD temperature controller. The modulation need to be filtered out.

## 6.0 REFERENCES:

Clarke, A.D. (1991), A Thermo Optic Technique for Insitu Analysis of Size-Resolved Aerosol Physicochemistry, *Atmospheric Environment, Part A-General Topics*, 25, (3-4), 635-644.