

TITLE: Total aerosol number concentrations UCN, ColdCN, HotCN

AUTHOR(S):

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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 > 0.003um, CPC model 3025; "Cold CPC (CNcold)", unheated particles > 0.01um, CPC model 3010; "Hot CPC (CNhot)": heated to 350 C, CPC model 3010.

Collected during VOCALS on the NCAR C-130.

2.0 INSTRUMENT DESCRIPTION:

The aerosol number concentrations (cm⁻³) measured inside C-130 with TSI condensation nuclei counters to determine total aerosol number density, the number of particles between 0.003 and 0.01um (ultrafine CN) coupled with heaters operated at 350°C to obtain the fractional volatility of aerosol number > 0.01 um (Clarke, 1991).

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 both preserved (file names "*withclouds.ict") and removed (file names without "withcloud"). 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): CN_C130_20081109_R0withclouds.ict - with possible droplets shutter events INCLUDED and CN_C130_20081109_R0.ict - with droplets shutter events INCLUDED (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 precluded by "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: 20081109125906; STOP: 20081109213444 UTC
PLATFORM/SITE = C-130
INSTRUMENT = CPC, UCPC
LOCATION = mobile
DATA VERSION = 1.0 (20090429)

REMARKS = VAMOS Ocean-Cloud-Atmosphere-Land Study (VOCALS)
REMARKS = Sample Start time yyymmddhhmmss, 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 = VOCALS
REMARKS = 1 1
REMARKS = 2008 10 15 2008 11 15
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. In-cloud data are not masked.
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: VOCALS; 15 October - 15 November 2008, <http://www.eol.ucar.edu/projects/vocals/>;
REMARKS = STIPULATIONS_ON_USE: N/A
REMARKS = OTHER_COMMENTS: N/A
REMARKS = REVISION:R0
REMARKS = R0: Hot CPC concentration shows periodic structure (period ~ 100s, amplitude ~10%) due to TOAD 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
20081109125906.0000 733721.5410416666 46746 NaN 2594 1695
20081109125907.0000 733721.5410532408 46747 NaN 2349 1560
20081109125908.0000 733721.5410648148 46748 3204 2119 1322

5.0 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.