README

Dual Column Cloud Condensation Nuclei Counter (Dual-CCN, DMT)
GoAmazon, 2014

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1   Data source

The data were collected onboard the G1 aircraft, operated by the PNNL ARM Aerial Facility during GoAmazon, 2014(IOP1 and IOP2).

1.1   Location

The ARM Aerial Facility Gulfstream-1 (G-1) was deployed in Amazon basin to obtain measurements of cloud, trace gas, and aerosol properties. Two types of flight patterns out of the Manaus airport will be used. In the first, the plume will be crisscrossed at multiple downwind distances so that evolution of properties along the plume can be determined. The Manaus plume is well-defined because of persistent easterly winds. An upwind transect as well as continuations of transects beyond plume boundaries will yield a direct comparison between pristine and polluted air masses. In the second type of flight pattern, the aircraft will fly along a gradient downwind of Manaus to capture the spatial extent of the plume.

1.2   Time period of collection

Two intensive operational periods—the first from 16 February to 27 March 2014 (IOP1), and the second from 1 September to 10 October 2014 (IOP2)—were conducted to obtain measurements of cloud, trace gas, and aerosol properties.

1.3   Instrument description

The dual column cloud condensation nuclei counter uses a vertically orientated temperature gradient within a ceramic cylinder to create a supersaturated environment. By varying temperature profiles within the column different supersaturations are achieved. Aerosol particles passing through the column either activate or remain unactivated. An optical particle counter at the base of the column counts the number of droplets resulting from the activation of the aerosols.

A constant pressure inlet maintained the instrument at a pressure close to 600 mBar. Column A was maintained at a supersaturation around 0.25% and column B was maintained at a supersaturation around 0.50%.

2   Data structure
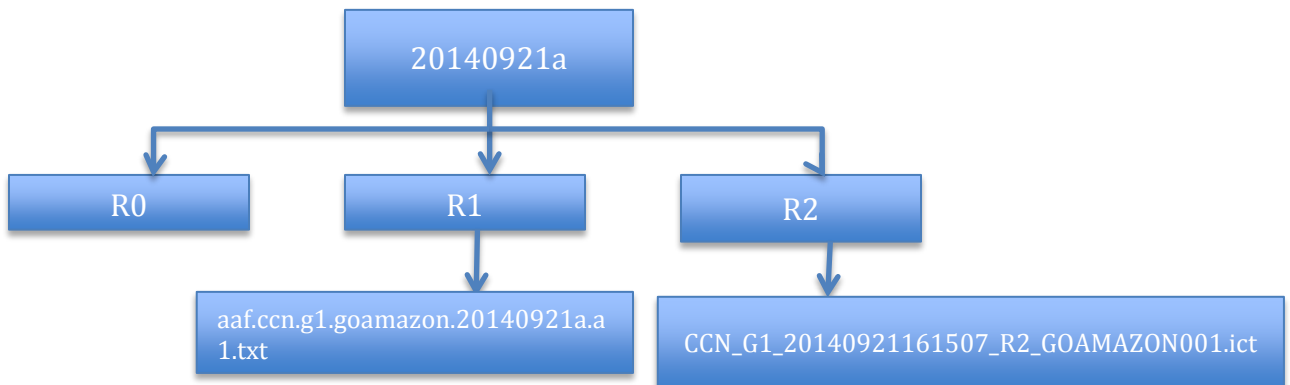
2.1 Level R0

Level "R0" data consist of raw data and housekeeping data files for dual CCN counter.

2.2 Level R1

Level R1 data consist of measured CCN number concentrations in column A and column B reported at 1 Hz. The corresponding delta T and supersaturation are also reported.
File name includes takeoff time for the flight and used the ARM naming convention.

2.3 Level R2

Level R2 data are the final dataset and contain measured CCN number concentrations in column A and column B reported at 1 Hz. Data quality flag is applied in a2 data. File name includes takeoff time for the flight. Metadata has been added to the header of each file and follows the ICARTT standard.

3 File Format

File naming conventions: "CCN_G1_YYYYMMDDHHMMSS_R#_campaign_name001.ict" and "aaf.CCN_avg001s.g1.camp_name.YYYYMMDD.HHMMSS.a1.txt"

The file is comma delimited. HHMMSS represents the takeoff time.

3.1 Data description

Table 1: Format description example for CCN

Index	Variable Name	Units	Range or Frequency	From Instrument:	Description Definition
1	Start_UTC	second	1 s	Dual-CCN	YYYY-MM-DD hh:mm:ss Synchronized daily with m300.
2	DT_A	Degrees, °C	1 s	Dual-CCN	Temperature difference in column
3	SS_A	%	1 s	Dual-CCN	Supersaturation
4	CCN_Conc_A	#/cc	1 s	Dual-CCN	Total number concentration after constant pressure inlet
5	DT_B	Degrees, °C	1 s	Dual-CCN	Temperature difference in column
6	SS_B	%	1 s	Dual-CCN	Supersaturation
7	CCN_Conc_B	#/cc	1 s	Dual-CCN	Total number concentration after constant pressure inlet
8	Flag	integer	1 s	Dual-CCN, IWG	Flag=0: good Flag=1: questionable Flag=2: bad
9	P_mbar	mBar	1 s	Dual-CCN	Pressure after constant pressure inlet
10	T_C	°C	1 s	Dual-CCN	Temperature after constant pressure inlet
11	CCN_Conc_A_Isok	#/cc	1 s	Dual-CCN	Total number concentration converted to isokinetic inlet

					condition.
12	CCN_Conc_B_Isok	#/cc	1 s	Dual-CCN	Total number concentration converted to isokinetic inlet condition.
13	IsokP_mbar	mBar	1 s	SEA M300 DAQ, Isokinetic inlet	Isokinetic inlet pressure
14	IsokT_C	°C	1 s	SEA M300 DAQ, Isokinetic inlet	Isokinetic inlet temperature

Note:
1. Flag=2 under the listed conditions:
   a. Aerosol flow fluctuation > 10%
   b. Condenser column temperatures are not stable, fluctuation >±0.5 °C
2. Flag=1 under the listed condition:
   a. 10% >Aerosol flow fluctuation > 5%
   b. CCN counter 1st stage monitor > 0.5
   c. Sampling inside of clouds
3. CCN counter data are not available on 20140311a and 20140314a flight, due to instrument failure.