

RAF aerosol & cloud particle data:

status of C-130 data & some research interests

air sampling

- *artifact particle production during cloud penetrations*
- *losses in tubing*
- *DRI CCN inlet*

CN, UFCN

rdma

nephelometers

PCASP

FSSP comparisons

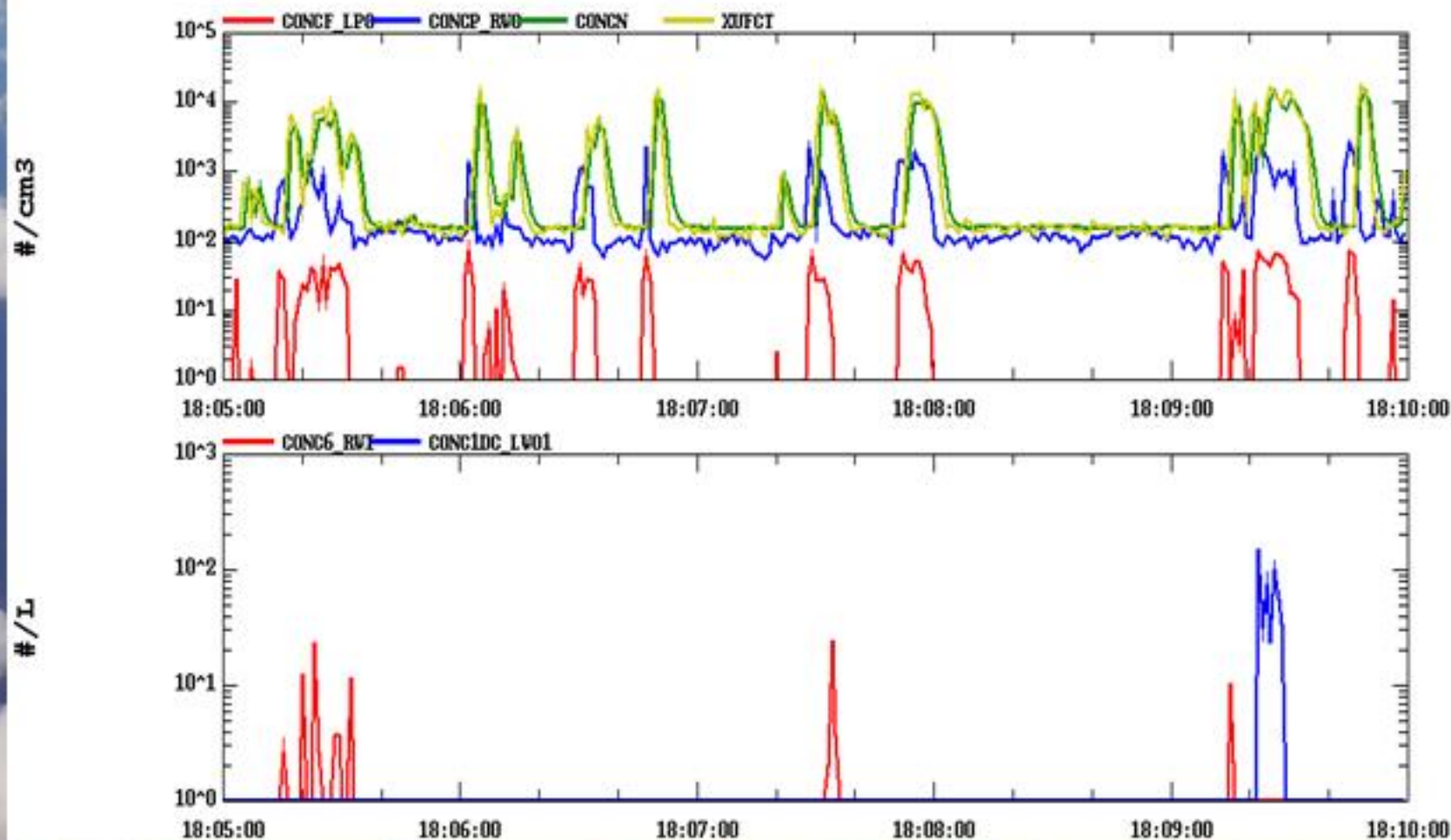
- *drop size & conc, splash artifacts*

submicron aerosol

- *generation & removal, spatial distribution, cloud processing (tracers), response to humidity, ..*

inlet splash artifacts

RICO, Flight #rf05
12/13/2004, 18:05:00-18:10:00



inlet splash artifacts

unreliable aerosol measurements in-cloud

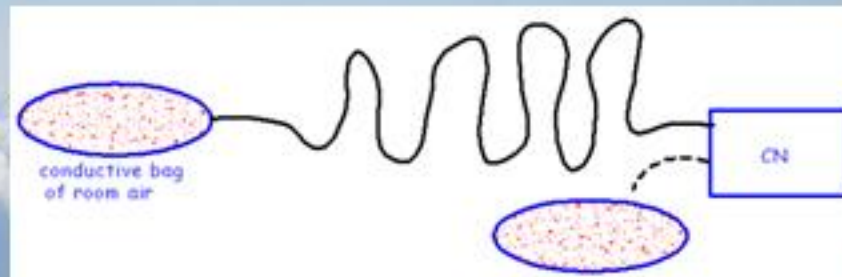
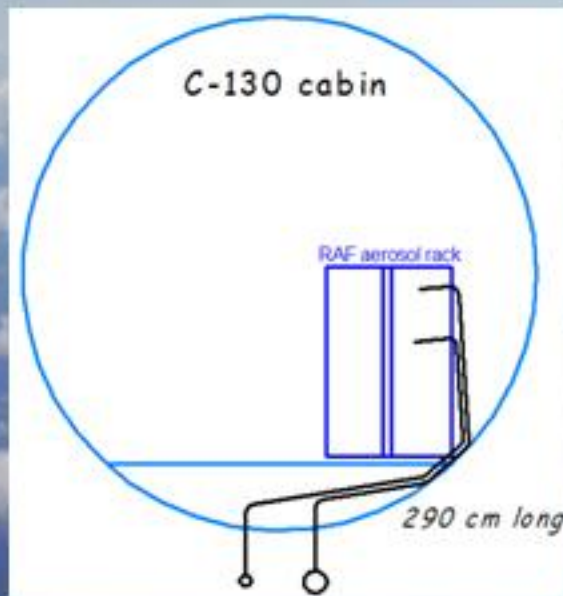
- CN & UltraFine CN
- RDMA
- nephelometers
- PCASP

CVI is mostly immune

air flow & splash modeling studies

need for "interstitial" air sample inlet

aerosol sampling losses in tubing

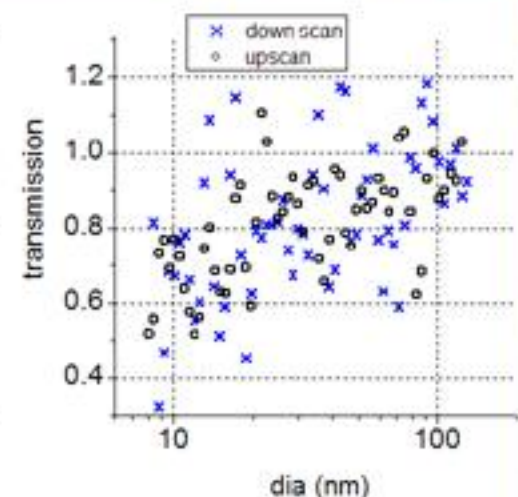
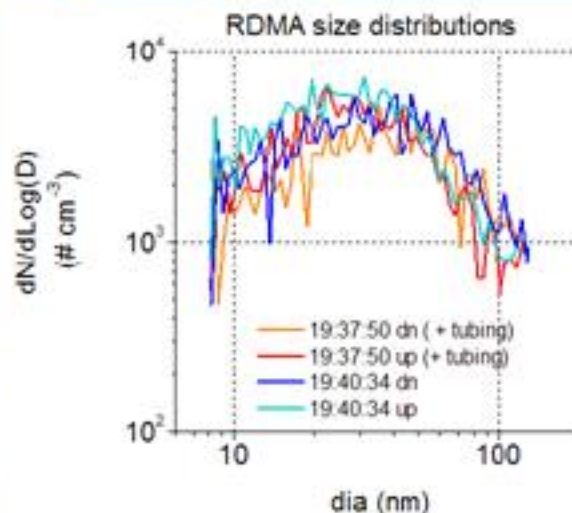
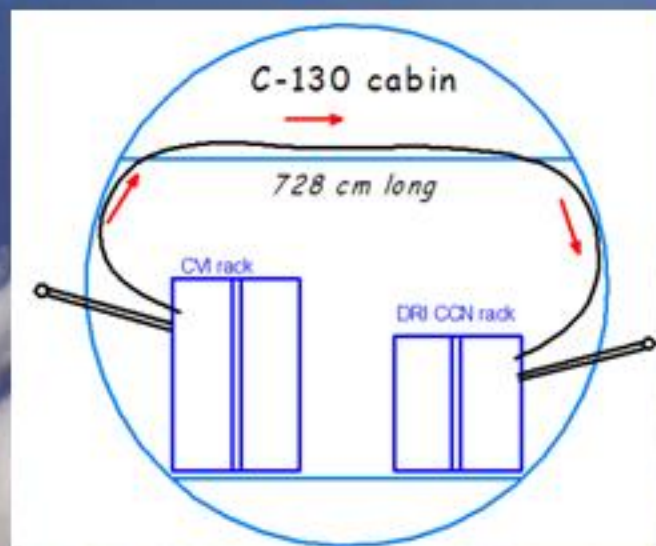


estimate sampling loss using room air CN
feed: 290 cm long, 8mm i.d.

- 6% loss of CN at 5 LPM

CVI-CCN feed: 728 cm long, 5mm i.d.

- 16% loss of CN at 1.5 LPM



DRI CCN inlet



face velocity at inlet:

XDRIF

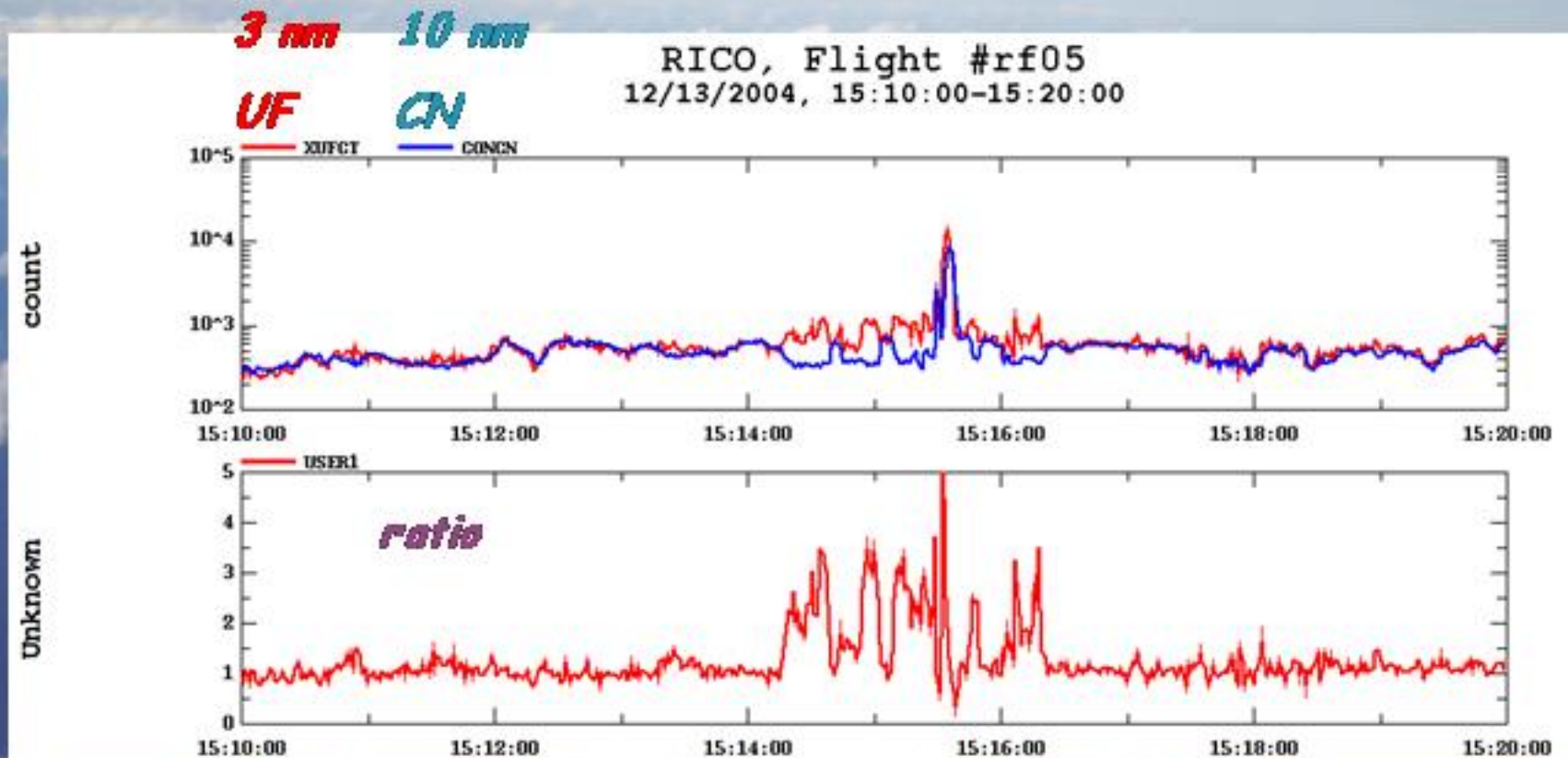
Hudson CCN Inlet - Diff. Pressure

→ calculate flow rate

→ estimate efficiency at insertion tee

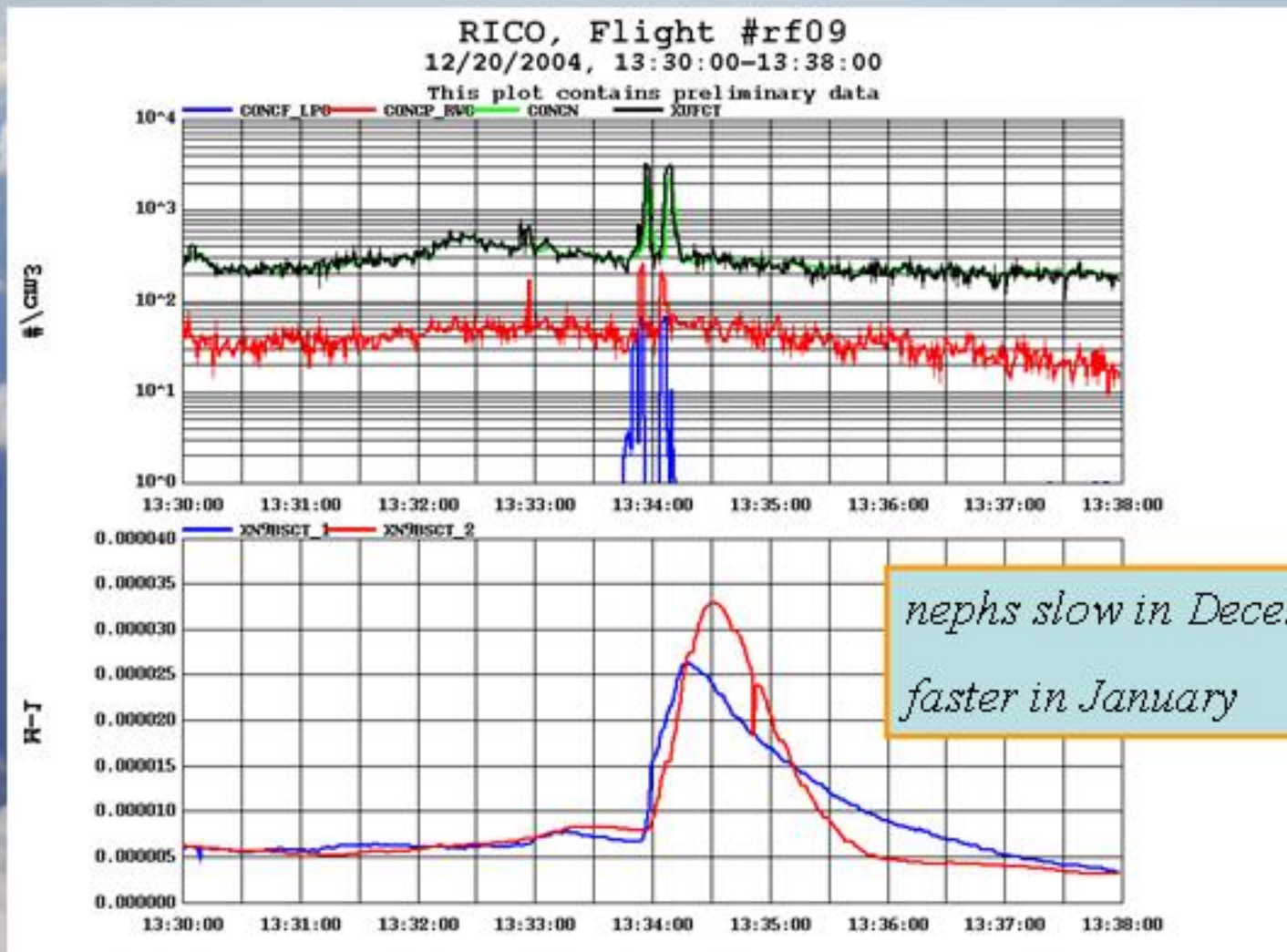
2004.12.04 18:22

CN, UFCN, rdma \rightarrow evidence of new particle formation



2004.12.04 18:22

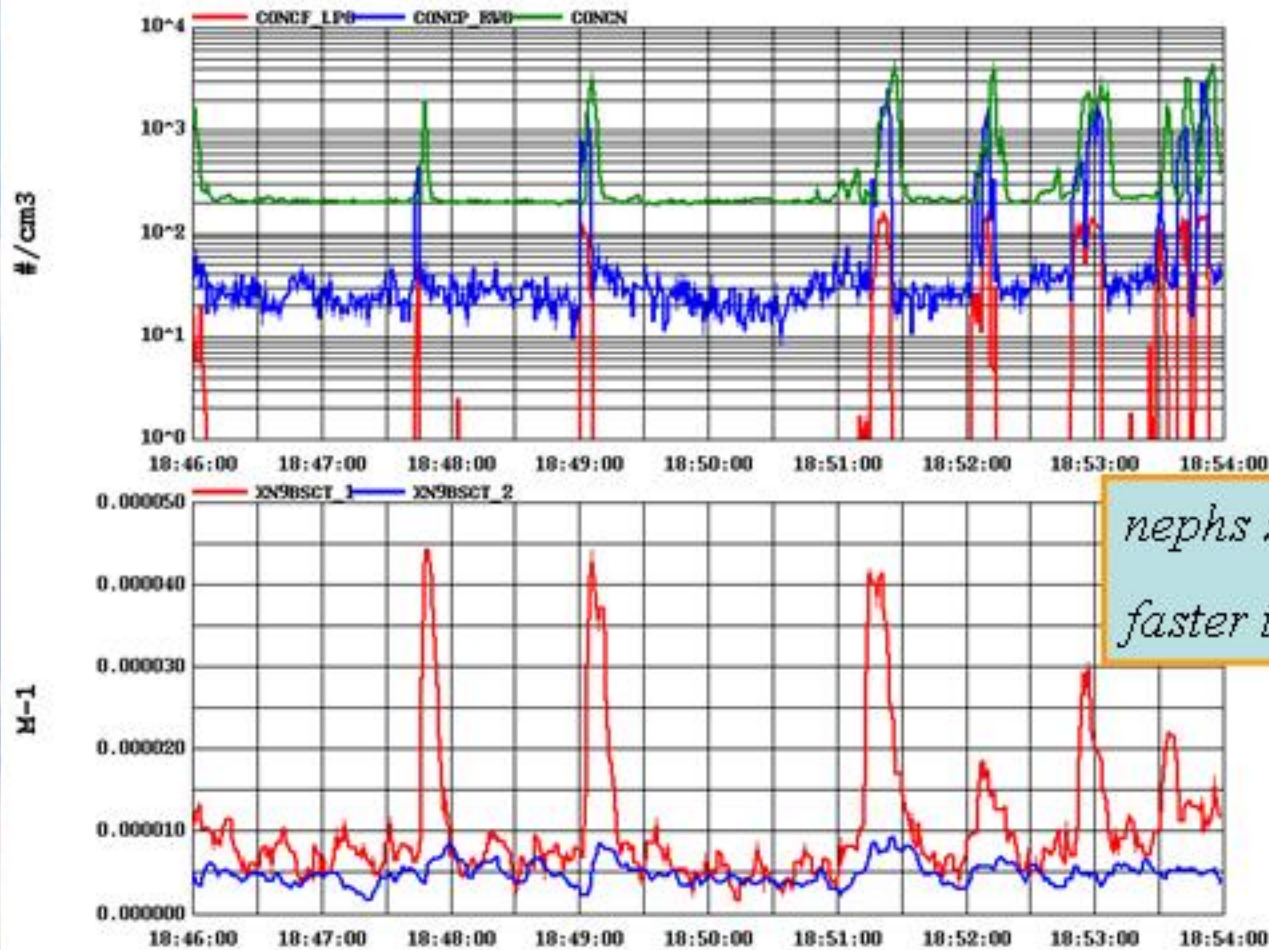
time delays - *nephelometers*



2004.12.04 18:22

time delays - *nephelometers*

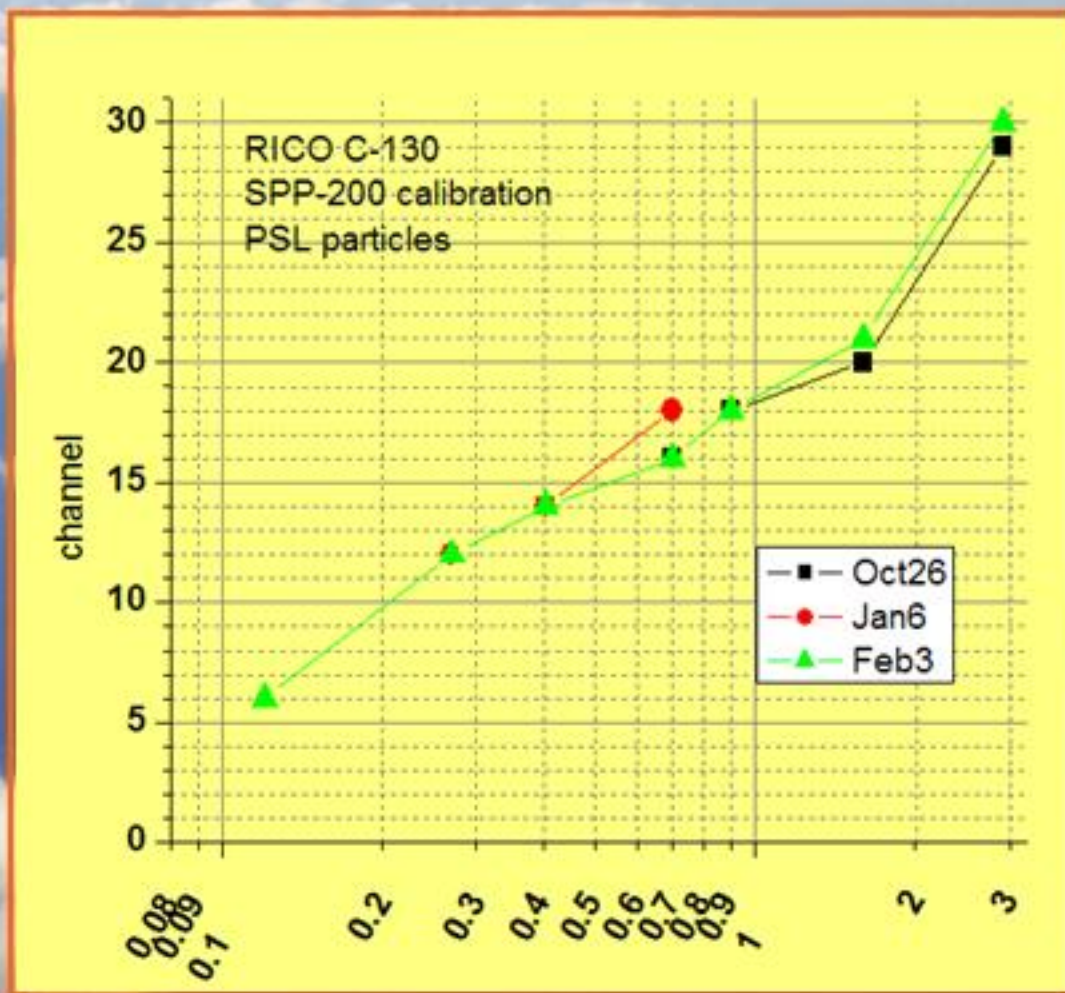
RICO, Flight #rf14
01/14/2005, 18:46:00-18:54:00



nephls slow in December
faster in January

PCASP (0.1 to 3 μm)

date	flight #	SPP-200
12/03/2004	135ff01	
12/04/2004	135ff02	
12/07/2004	135rf01	
12/08/2004	135rf02	
12/09/2004	135rf03	
12/10/2004	135rf04	
12/13/2004	135rf05	
12/16/2004	135rf06	
12/17/2004	135rf07	leak
12/19/2004	135rf08	?
12/20/2004	135rf09	?
12/21/2004	135ff03	
01/03/2005	135ff04	
01/05/2005	135rf10	
01/07/2005	135rf11	
01/11/2005	135rf12	
01/12/2005	135rf13	
01/14/2005	135rf14	
01/16/2005	135rf15	
01/18/2005	135rf16	
01/19/2005	135rf17	
01/23/2005	135rf18 dark t/o	
01/24/2005	135rf19 dark t/o	
01/26/2005	135ff05	
01/27/2005	135ff06	



2004.12.04 18:22



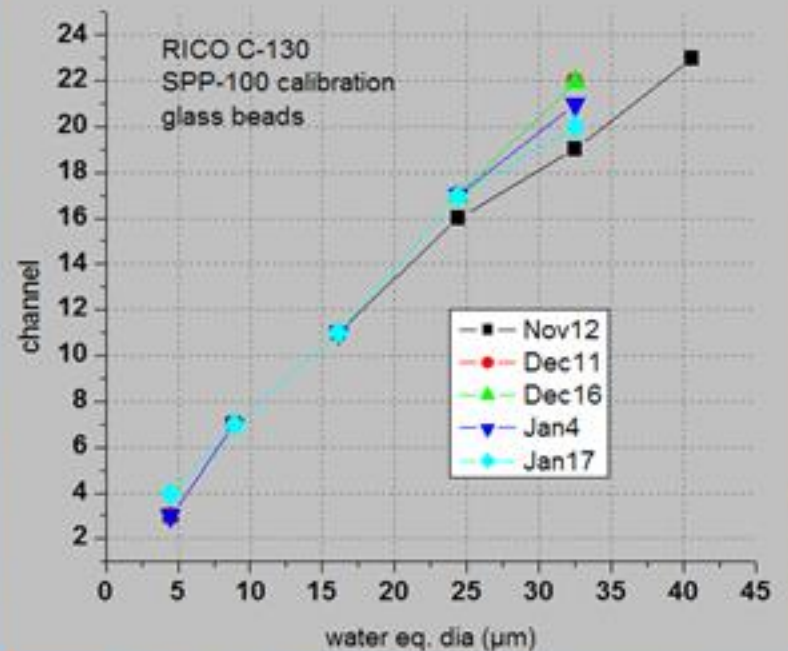
SPP-100 FSSP

particle size distribution & conc

~ 2 to 47 μm dia (30 bins)

problems:

- probe sleeping RF-05
- probe dead RF-18 (end), RF-19



2004.12.04 18:22

OAP-260X

size distribution & conc

- 50-620 μm

calibrations

- spinning disk

problems

- spurious counts in clear air
RF-15, 17



data comparisons

C-130:

FSSP vs fastFSSP vs PDI vs ..

vs UWyo K/A

vs UK BAe-146

- *drop size & concentration*
- *splash artifacts*
- submicron aerosol
 - *UWyo CCN & CN*
 - *generation & removal, spatial distribution (SABL), effects of cloud processing (tracers),*

some reminders

RAF analysis software

- ncplot, ncpp, .. (*nix, Mac)
- aeros (*nix, MS-Windows)

<http://www.atd.ucar.edu/raf/Software/>

RDMA

radial differential mobility analyzer

aerosol size distribution & concentration

- 8 to 130 nm, 60 channels
- one size distribution ~90 seconds

calibrations

- 80 & 100 nm PSL

status:

- part of C-130 netcdf file as "missing data"
 - *later release can overwrite with real values*
- apply corrections for air density
 - *affects sizes & concentrations*
- submission date: end of ~~August~~