Sub-micrometer Aerosol and Hygroscopic Flare Measurements from a Cabin Window Location on a King Air 200

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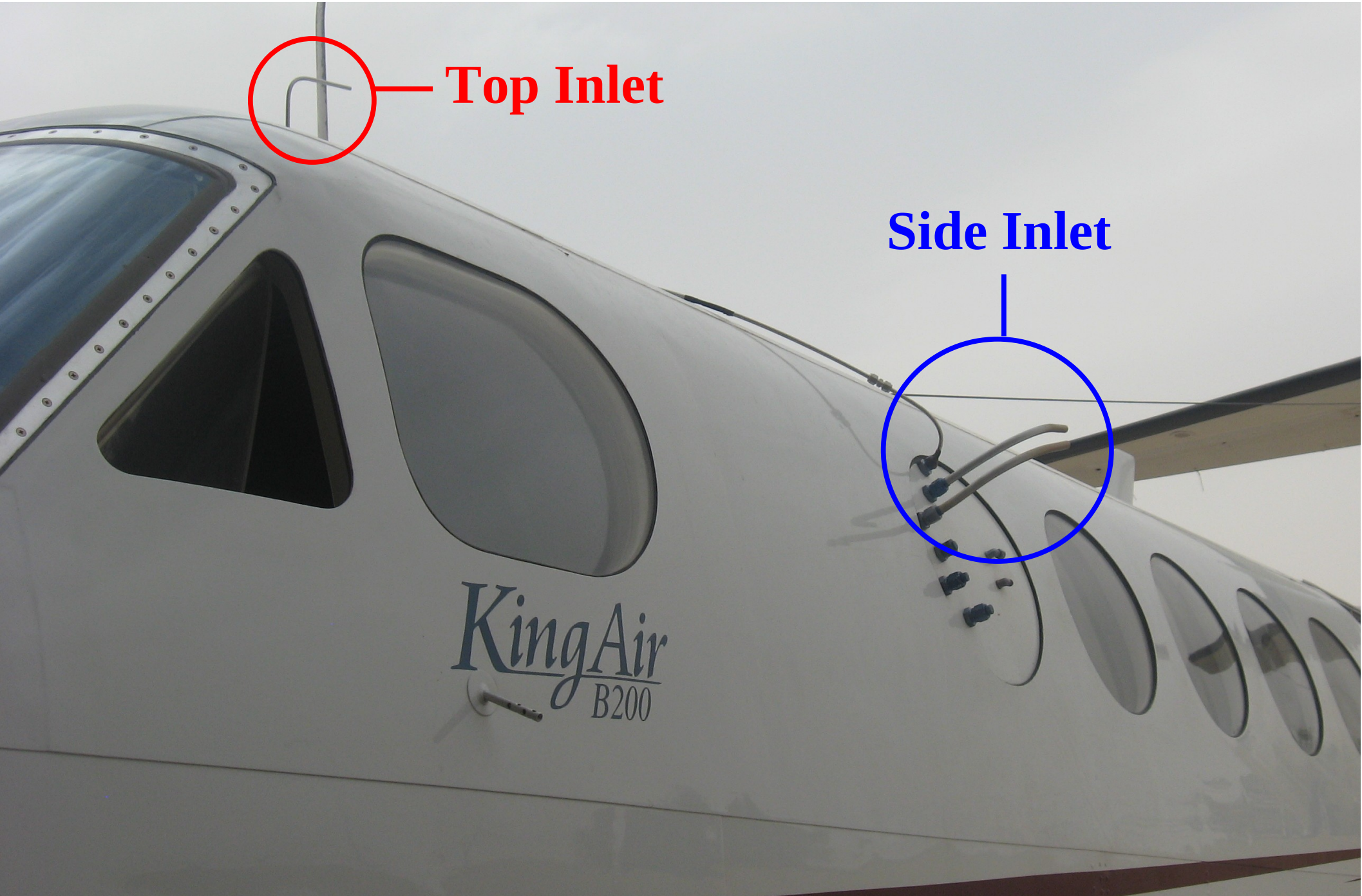
Research Objective

- Is the Cabin Window Location suitability for sub-micrometer aerosols.
- How different is the size distribution produced by hygroscopic flares from observed cloud base aerosol size distribution.

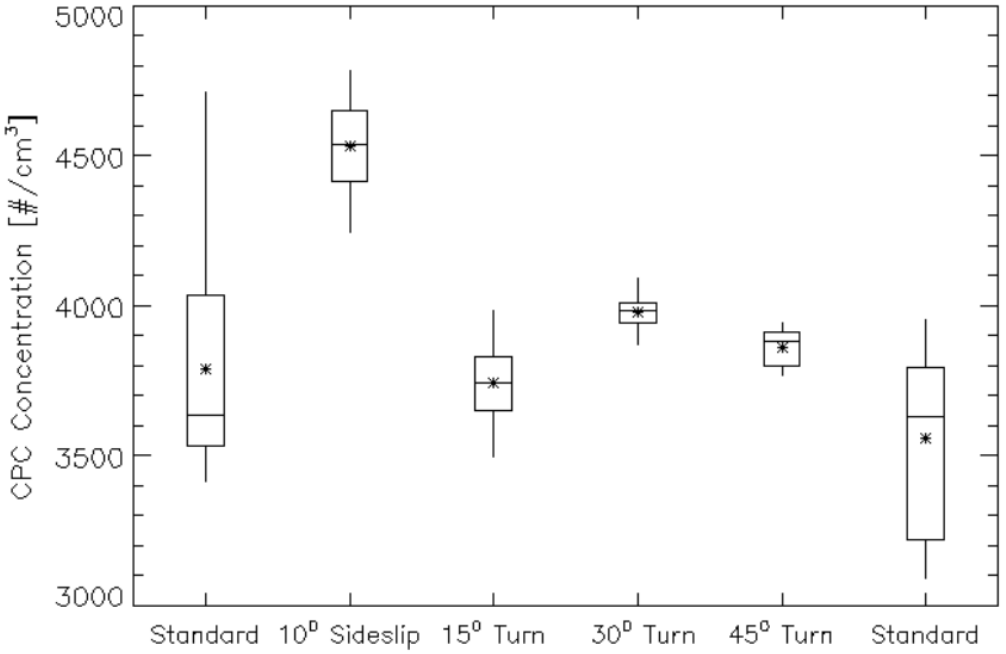
King Air 200
Saudi Arabia
Spring 2009

Inlet System

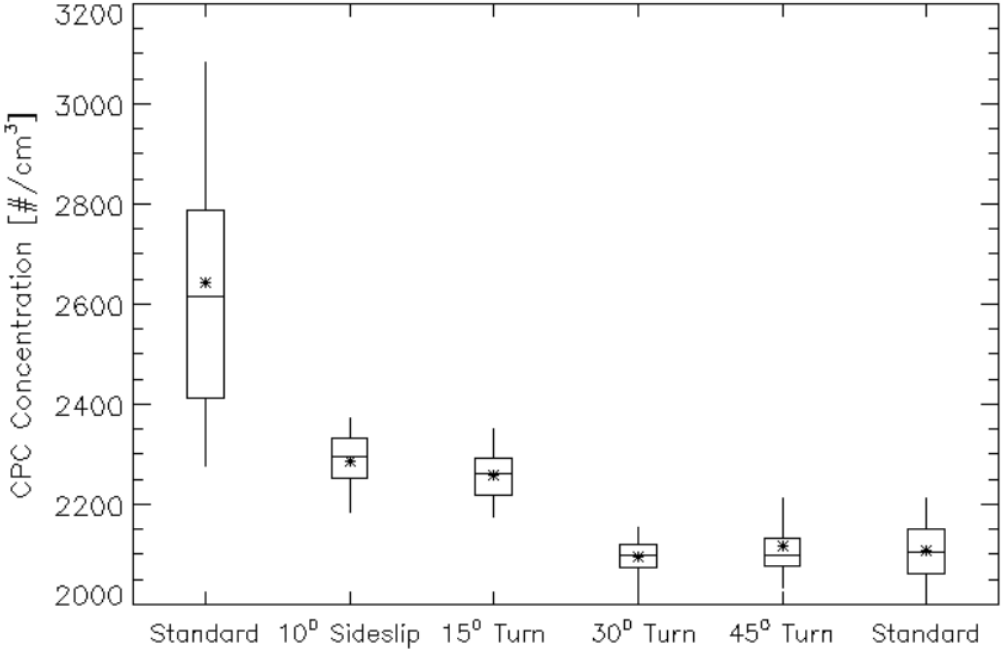


CPC Comparison

Leg 1 – Window Inlet



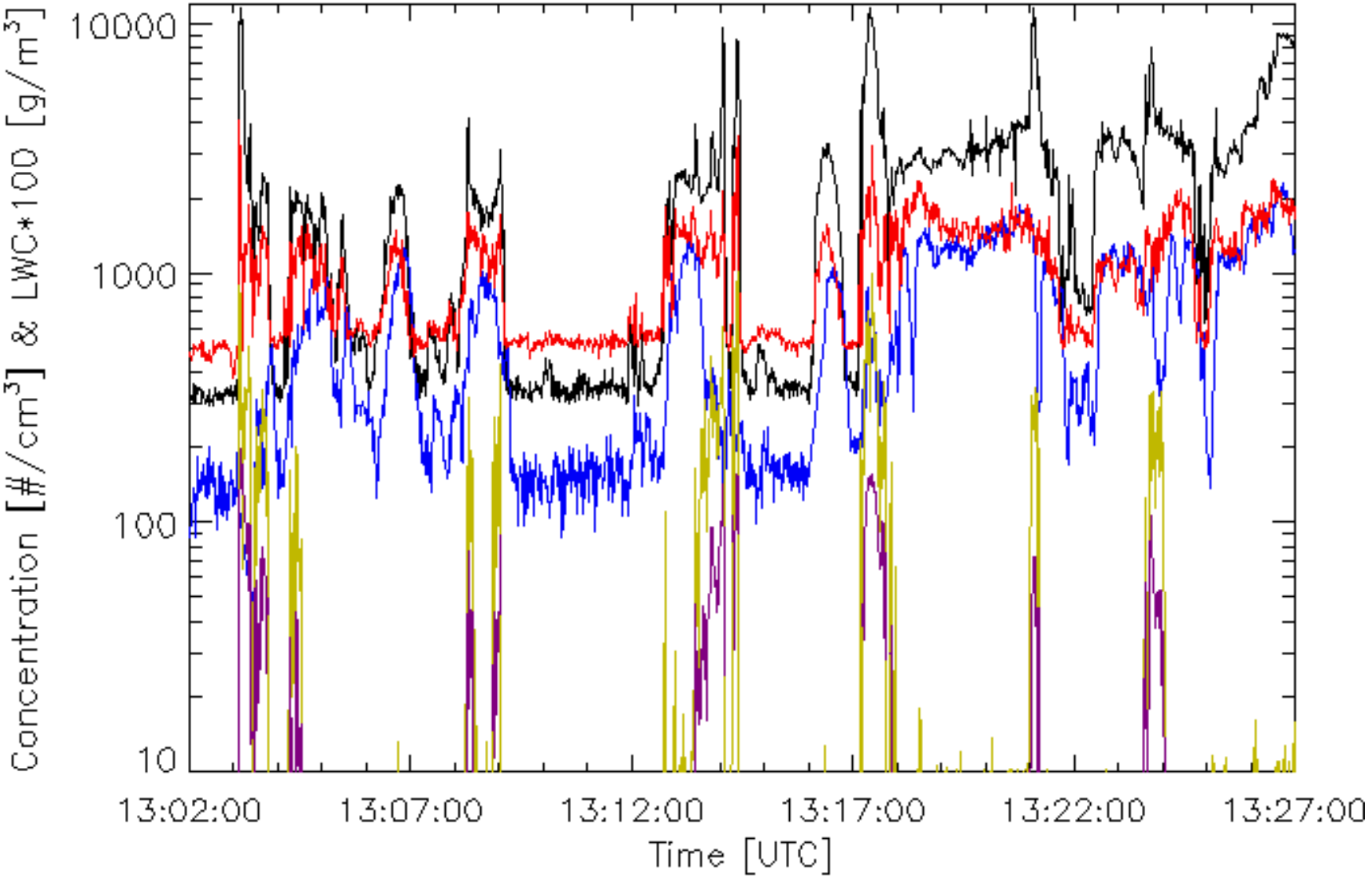
Leg 2 – Top Inlet



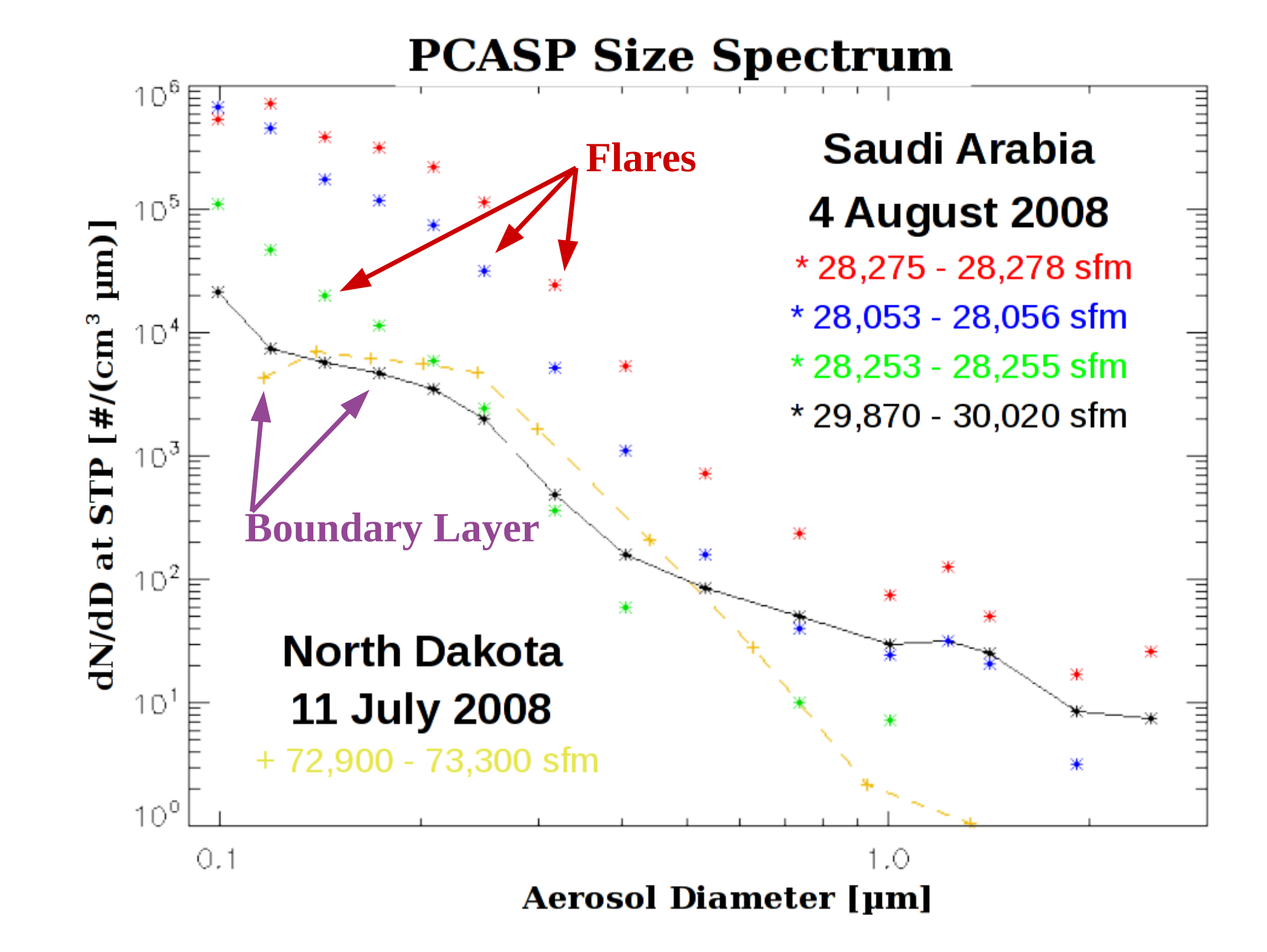
Statistical distribution of 1 Hz CPC measurements obtained during aircraft maneuvers designed to direct exhaust towards the window inlet. The 5, 25, 50, 75, and 95 percentiles are given by the box-and-whiskers, while the stars denote the mean values

Intersitial Aerosol Sampling

Liquid Water Content (g/m^3) **Dust (1-3 um)** **Optical Aerosols (0.1-3 um)**
Cloud Condensation Nuclei (0.6 %) **Condensation Particle**



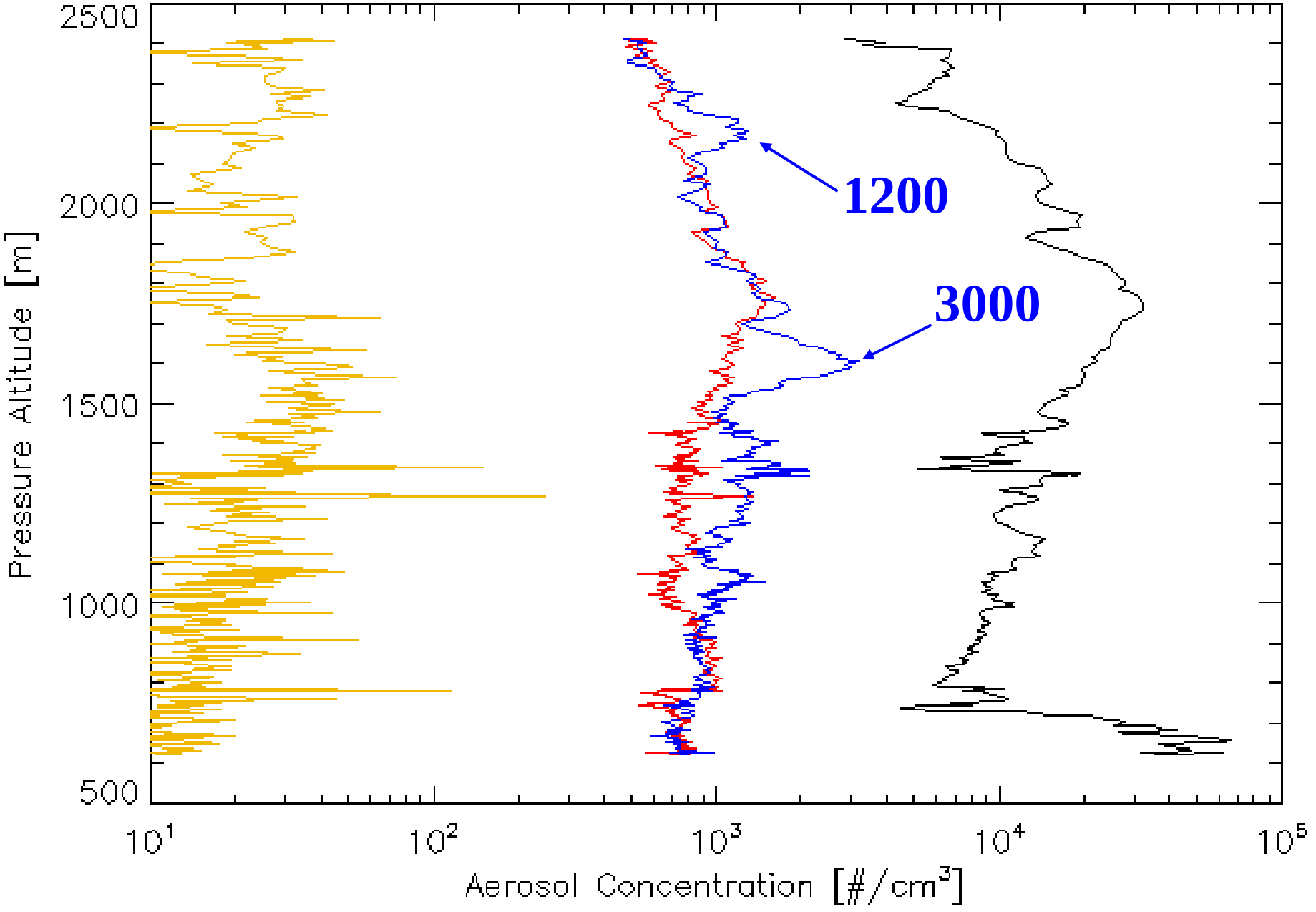
Time series of aerosol concentration during cumulus cloud penetration on the 12 April 2009 Saudi Arabia Flight.


PCASP Size Spectrum
Flares
Saudi Arabia
4 August 2008
* 28,275 - 28,278 sfm
* 28,053 - 28,056 sfm
* 28,253 - 28,255 sfm
* 29,870 - 30,020 sfm
Boundary Layer
North Dakota
11 July 2008
+ 72,900 - 73,300 sfm
dN/dD at STP [#/(cm³ µm)]
Aerosol Diameter [µm]
0.1
1.0

Descent Profile 9 April 2009

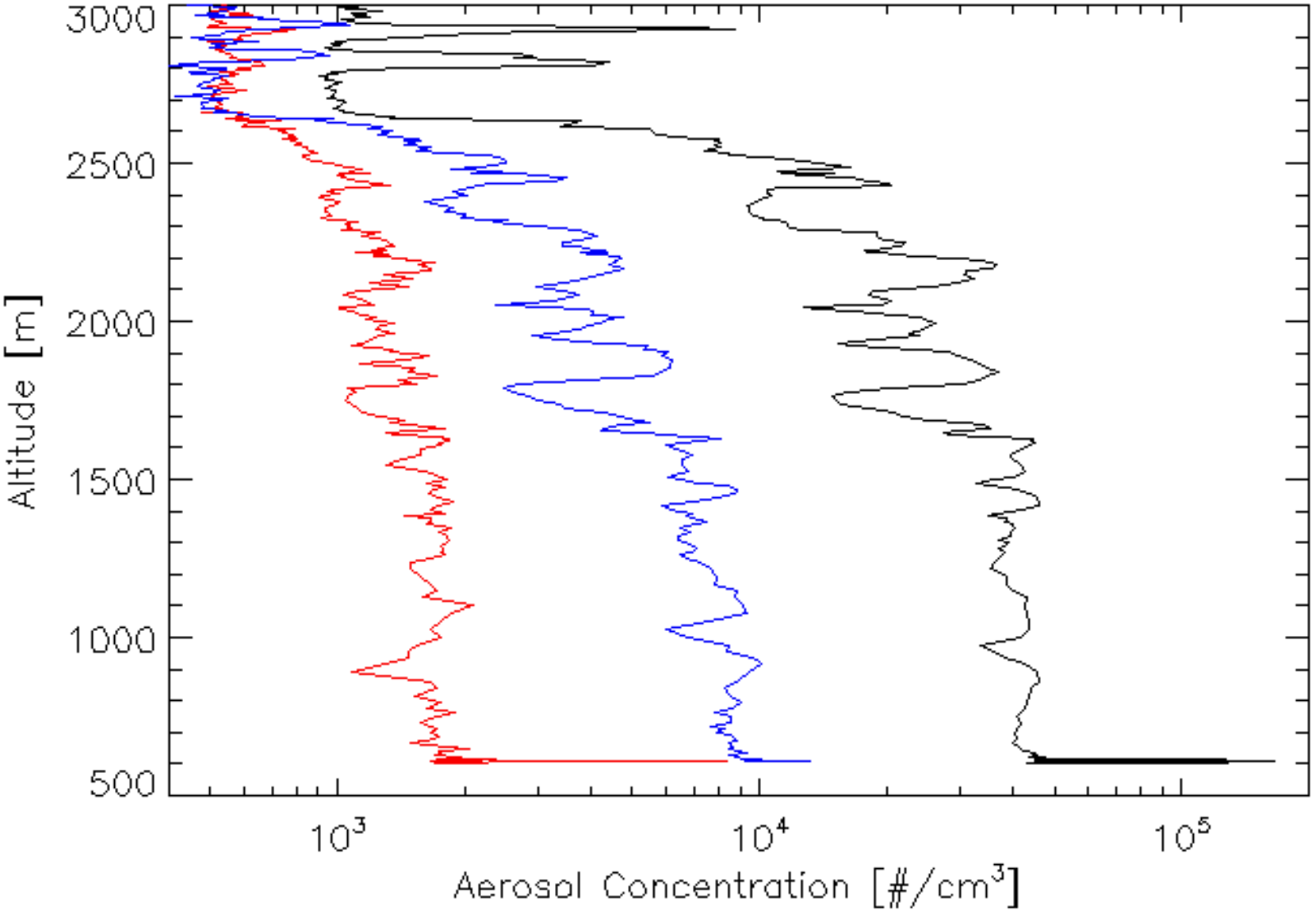
Dust (1-3 um) Optical Aerosols (0.1-3 um)

Cloud Condensation Nuclei (0.6 %) Condensation Particle



Ascent Profile 12 April 2009

Optical Aerosols (0.1-3 um) **Cloud Condensation Nuclei (0.6 %)** **Condensation Particle**



Vertical profile of 1 Hz aerosol concentration during aircraft ascent on the 12 April 2009 Saudi Arabia flight.

Conclusions

- CPC and CCN counter do not show any spikes that would indicate engine exhaust contamination during any of the test maneuvers. Therefore, it is concluded that there is not an issue with pollution from the aircraft's engines when sampling from the front side window location on the King Air 200
- Cloud base CCN measurements in Saudi Arabia are variable with some very high concentrations.

Thanks for Listening

Any Questions