Extra Notes on VOCALS Data Presentation in Seattle

1) **Position, Ground Speed & Winds**:

a. DGPS data were affected by the proximity of multiple antennae to the DG antenna. Signal is unusually noisy and requires extensive post processing, therefore data not included in base data files. Likely to be archived separately if signal quality warrants it.
b. IRS position & ground speed data affected by the Schuler oscillation so are less accurate than the GPS at any given time.
c. Flew multiple GPS's but Novatel performed best so it was used as the reference.
d. Per standard practice included both the IRS and GPS corrected winds in the final data set. Recommend GPS corrected data.

2) Reference Altitude (ALTX):

a. Variable satellite coverage left gaps in GGALT data
b. PALT calculation uses a fixed std surface pressure. For flights in maritime and/tropical conditions I adjust the std surface temperature used in the calculation to adjust the std atmospheric lapse rate. This puts PALT into better agreement with other measurements of altitude. Would account for differences between other aircraft and us. (Side Note: C-130 avionics altimeter has a known error of ~150 ft. This could account for some of the difference in inter-comparison targeted altitudes.)
c. DGPS data noisy.
d. Radar altimeter data used as reference input to ALTX.

3) Reference Temperature (ATX)

a. OPHIR limited to 1 Hz response. Independent calibration in this case. Not tied to std element per normal usage. Considered less accurate in clear air and can see the surface in sharp turns. Avoids in-cloud wetting. Gives more accurate measurement in cloud and is more characteristic on cloud exit while liquid evaporates from std elements.
b. Unheated std element used as reference due to best accuracy and time response. Suitable for clear air heat fluxes. In cloud wetting is minimal in these types of clouds, but intervals can be identified of sensor wetting can be identified by comparison to OPHIR.

4) Reference Humidity (PI Choice)

a. Chilled mirror dew point temperature is the most accurate, but its slower response time and tendency to overshoot rapid increases in Td near cloud boundaries made it less useful as the reference sensor. In PI discussions it was decided to use the UV hygrometer data in calculations of derived, moisture related thermodynamic variables (RHUM, THETAE, etc). However, for core humidity variables (MR, RHODT) data from both sensors were included.
b. UV hygrometer is not an independent measurement and is subject to some in flight drift. Flt-by-flt calibration fits against the dew point sensors were used to produce the UV data. A certain amount of the in flight drift has been removed using a loose couple technique that does not affect the high rate response – so data are suitable for moisture flux calculations. However, residual drift can be noted on certain cloud passes where RHUM will be sub-saturated. For most accurate mean data the dew point variables should be used. Sensor also uses sensitivity at high altitude / very low humidity conditions. Data from the UV should not be used under these conditions.

5) Surface Temperature (TSURF)

a. RSTB signal affected by amount of moisture in sample path.
b. Assumed mean humidity profile for all flights to parameterize a rough altitude correction.
c. Do not use TSURF for cloud top temperatures. Use raw RSTB.

6) CDP Cloud Droplet Data

a. Shift in bin size calibration required by in field maintenance on optics.
b. Original processing used a single stage linear fit to bead calibrations data. This lead to under sizing of drops larger than 16um. Data reprocessed with two stage curve fit. Note: shift in bin calibration tied to work on optics. Cal fit A for (rf01 – rf04) loss of data on rf03 & 04. Cal fit B for (rf06 – rf14) with adjustments as noted below. Cal fit C for (rf05).
c. Tracked sizing performance on a flt-by-flt basis using post flight test with French pollen (rf07 – rf14 only). One bin shift to bin sizing applied to rf08-rf10 to account for changes noted in pollen tests.
d. Droplets larger than the bin 30 top limit that trigger a response from the instrument are counted and accumulated into bin 30. Accumulation bin 30 removed from total concentration calculation. Still available in raw data.

7) PCASP Aerosol Data

a. Post project calibration of the probe was conducted by UW. Initial processing used bin size calibration recommended by UW. Upon further review, it was found that those cal points were generated using the wrong bin threshold values. Data reprocessed with revised bin sizes – also from UW. Sample flow calibration determined at the same time.
b. Excessive noise noted in bin 1. These data removed from calculations of total concentration. Raw bin data still available.

8) RAF FSSP-100 Cloud Probe Data

a. Single stage linear calibration used. Stable for each probe. Excessive noise in lowest bins for modified probe (rf01 – rf10). Data removed from calculation of total concentration but available in raw counts.
b. Droplets larger than the bin 30 top limit that trigger a response from the instrument are counted and accumulated into bin 30. Accumulation bin 30 removed from total concentration calculation. Still available in raw data.
c. Probes swapped between rf10 & rf11. Noise on second probe limited to bin 1. These data removed from calculations of total concentration. Raw bin data still available.

9) User Supplied Data

a. There is a difference between the RAF standard C-130 data files and the final products that appear in the official archive. We limit the base files to direct NCAR measurements plus User data collected on the C-130 ADS system and they are stored in netCDF format. User data are usually archived as separate data files and can vary in format – generally some form of ascii. A large percentage of the User data from VOCALS falls into this category. Any questions related to these measurements should go directly to the PI's responsible.