The DAWN Lidar During CPEX 2017: Performance Assessment, Data Processing and Data Products

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**DAWN Lidar During CPEX 2017**

Over 5000 DAWN wind profiles taken over 16 missions:
- Vertical profiles of wind and aerosol (SNR) every 5-15 km
- Vertical resolution of 50-100 m; Vertical extent of 4-12 km.
- Over 80% of all DAWN profiles on all provided needed measurements in the upper portions of the vertical column
- Almost 50% of the DAWN profiles provided PBL measurements
- Full profiles were obtained almost 20% of the time

**DAWN Data Processing**

1) DAWN signal return from every shot of each look used to derive LOS winds/SNR. Includes removal of LOS velocity contributions from platform motion/attitude, and frequency “jitter”.
2) Base vertical profiles (black dots below) derived from either a 2-look or 5-look step stare. Levenberg-Marquardt solving algorithm used.
3) Adaptive integration over various integration depths used to optimize processing in mid-level weak signal (colored dots below).

**DAWN Data Products**

1) LOS velocities and SNR along each LOS of every scan, includes height, latitude, and longitude at each range gate (for data assimilation).
2) Vertical profiles of SNR, wind speed, wind direction, u. v. “goodness of fit” and number of looks used in the determination of each profile.
3) Data will be archived at and available from the NASA LaRC Atmospheric Science Data Center (by Feb 2019).


1) DC-8 airborne campaign based out of Ft. Lauderdale, FL
2) Instruments : DAWN, HDSS Dropsondes, APR-2, HAMSR, MTHP
3) Obtained a comprehensive set of observations, especially from DAWN, in undisturbed, scattered and organized deep convection.

**DAWN-Dropsonde Comparisons**

162 DAWN-Dropsonde comparison pairs were identified with 15687 comparison points. Main reason for RMSD (difference) is spatial and temporal separation of dropsonde and DAWN, especially in convective environments. 5 Look scanning was preferred in undisturbed conditions and 2 Looks, with longer integration, often used in active convection.

**5 LOOK STATISTICS**

- Number = 8617
- Mean ∆WS = 0.14
- Mean ABS(∆WS)=1.01
- ∆WS RMSD= 1.43
- Mean ∆WD = 0.14
- Mean ABS(∆WD)=10.1
- ∆WS RMSE= 18.4

**2 LOOK STATISTICS**

- Number= 6970
- Mean ∆WS = 1.02
- Mean ABS(∆WS)=2.10
- ∆WS RMSD= 2.5
- Mean ∆WD = 1.16
- Mean ABS(∆WD)=19.1
- ∆WS RMSE= 28.4

2 micron Coherent 100mJ 10Hz 2 sec LOS nominal integration (range 1-20 sec)