Preliminary Analysis of June 24 Test Flight HDSS Data

Michael M. Bell
University of Hawai‘i
Goals and Methodology

• Evaluate WB-57 HDSS XDD sondes vs. USAF AVAPS RD-94 sondes

• Evaluate “streamer” vs. “fast-fall” sondes

• Compare data points using similar QC methodology (ASPEN) at nearby locations (Thanks to Jason Dunion for USAF QC)

  • Compute difference if GPS altitude difference < 10 m

  • Subjective evaluation suggested < 50 km separation produced similar statistics

  • Comparison limited to 400 hPa and below (>2000 points except for streamer winds which were ~800)
USAF RD-94 vs. “Streamer” (E3D8) and Fast Fall (199B)

Graph showing temperature variations with data points and labels for temperature and dew point (°C), potential temperature (θe(K)), lifting index (LI), CAPE (J), and CIN (J).
Percentile Plot

HDSS - USAF Distribution (50 km limit)

- m/s
- m/s
- K
- K
- hPa

Difference
Pressure Difference between Streamer and Fast-fall

- “Vertical velocity check” fails in ASPEN due to mismatch between pressure and GPS velocity, removing ~80% of QCed winds
RMS Difference between HDSS and RD-94

RMS Difference between HDSS and USAF

- FF 2 V
- FF 1 V
- Streamer V
- FF 2 U
- FF 1 U
- Streamer U
- FF 2 TD
- FF 1 TD
- Streamer TD
- FF 2 T
- FF 1 T
- Streamer T
- FF 2 P
- FF 1 P
- Streamer P

RMS Difference
Summary

- Differences between WB-57 HDSS XDD and USAF AVAPS RD-94 at the same altitude (<10 m vertically) and general location (< 50 km horizontally) are generally small and have low bias, except:
  
  - 4 hPa difference in pressure for streamer vs. USAF, with similar difference to fast-fall sondes

  - “Vertical velocity check” fails in ASPEN due to pressure & GPS discrepancy and removes ~80% of QCed winds

- Largest differences in dewpoint due to slow RH sensor

- Streamer bias and RMS higher than fast-fall sondes for all variables

  - **Very limited sample size**, but 2 good fast-falls compare better with USAF sondes than streamer in this test