Dropsonde RICO

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NCAR GPS Dropsonde Overview

NCAR Dropsonde History

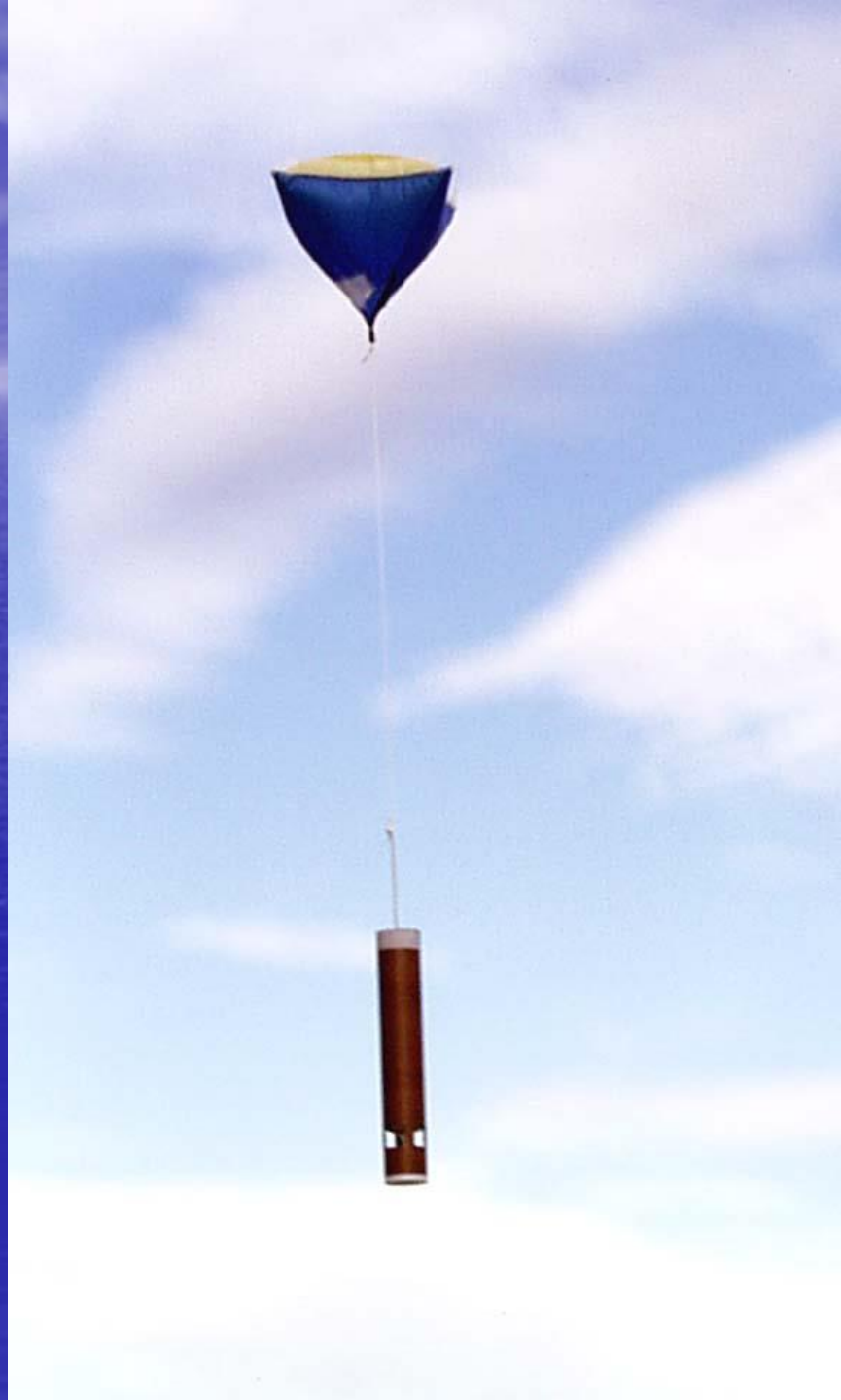
- NCAR developed the first dropsonde in the early 1970's
- Added Omega Wind Finding mid 1970's (ODW)
- Developed L2D2 (Lightweight LORAN Digital Dropsonde) in 1984
- Developed LOD2 (Light weight Omega Digital Dropsonde) 1986
- Developed GPS Dropsonde 1996 for DLR, NOAA, NCAR.
- Dropsonde Technology Licensed to Vaisala as RD-92

Overview of Dropsonde

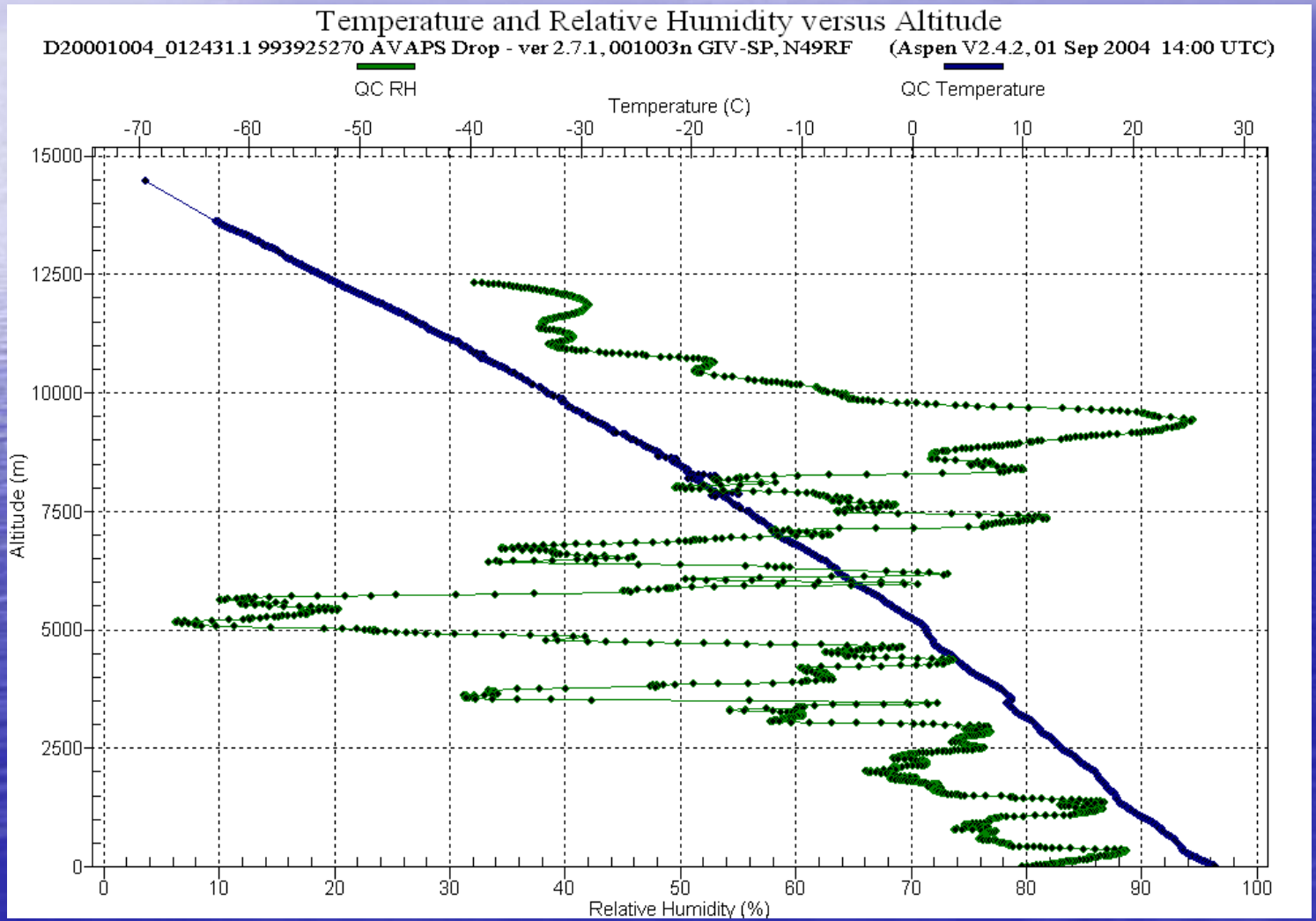
- Measures (PTH)
  - Pressure
  - Temperature
  - Humidity (2-sensors)
  - Wind speed and direction (GPS receiver)
- Sensor sample rate 2Hz (both PTH and GPS)
- Size: 2.75” Dia., 16” length
- Mass: 390 grams

Dropsonde Components

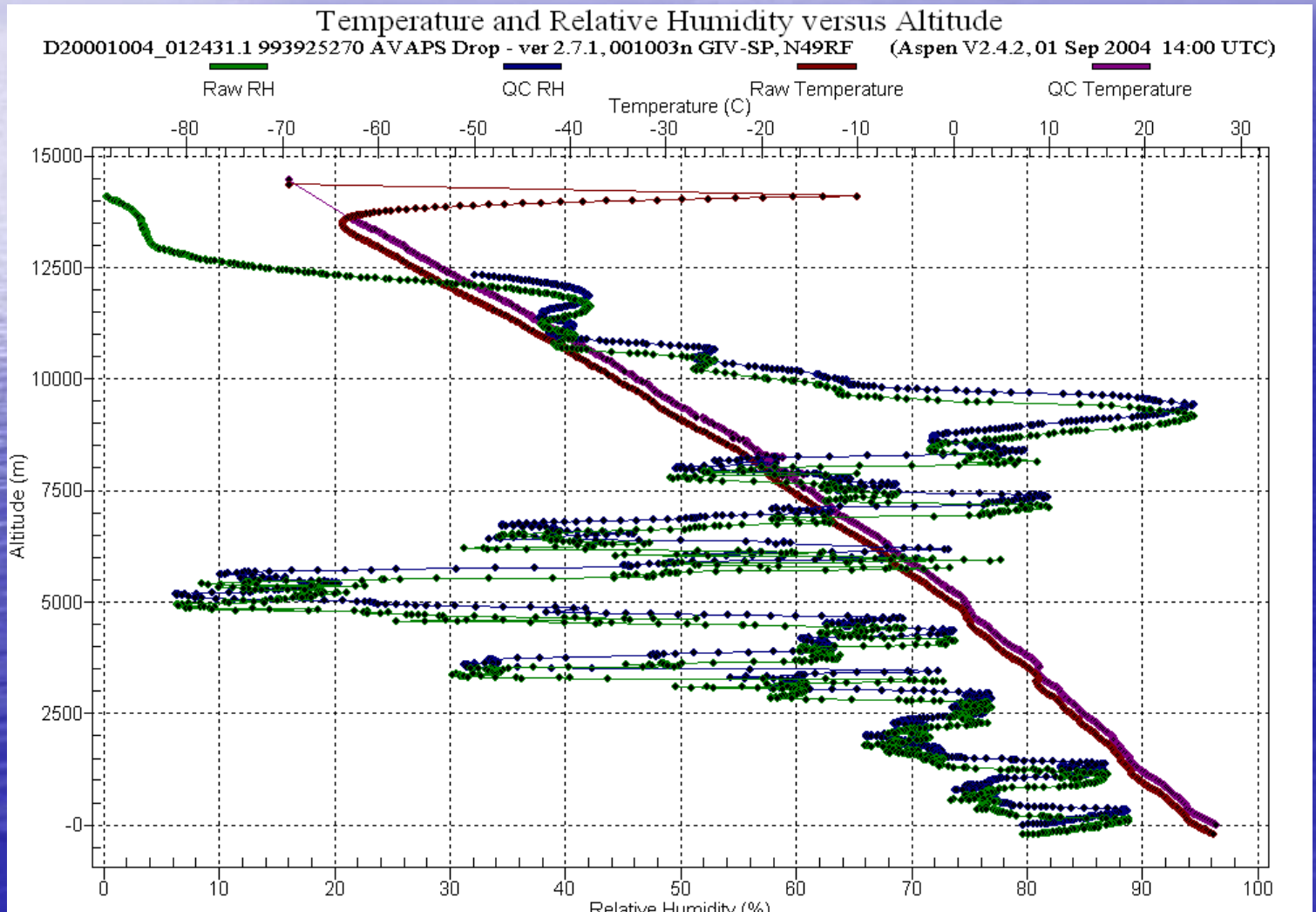
- Codeless GPS receiver
- PTH Vaisala module
- 400 MHz telemetry transmitter
- HC11 8-bit Microprocessor
- Lithium battery pack
- Sondes are manufactured by Vaisala inc, in Louisville, CO
  (licensed through UCAR)



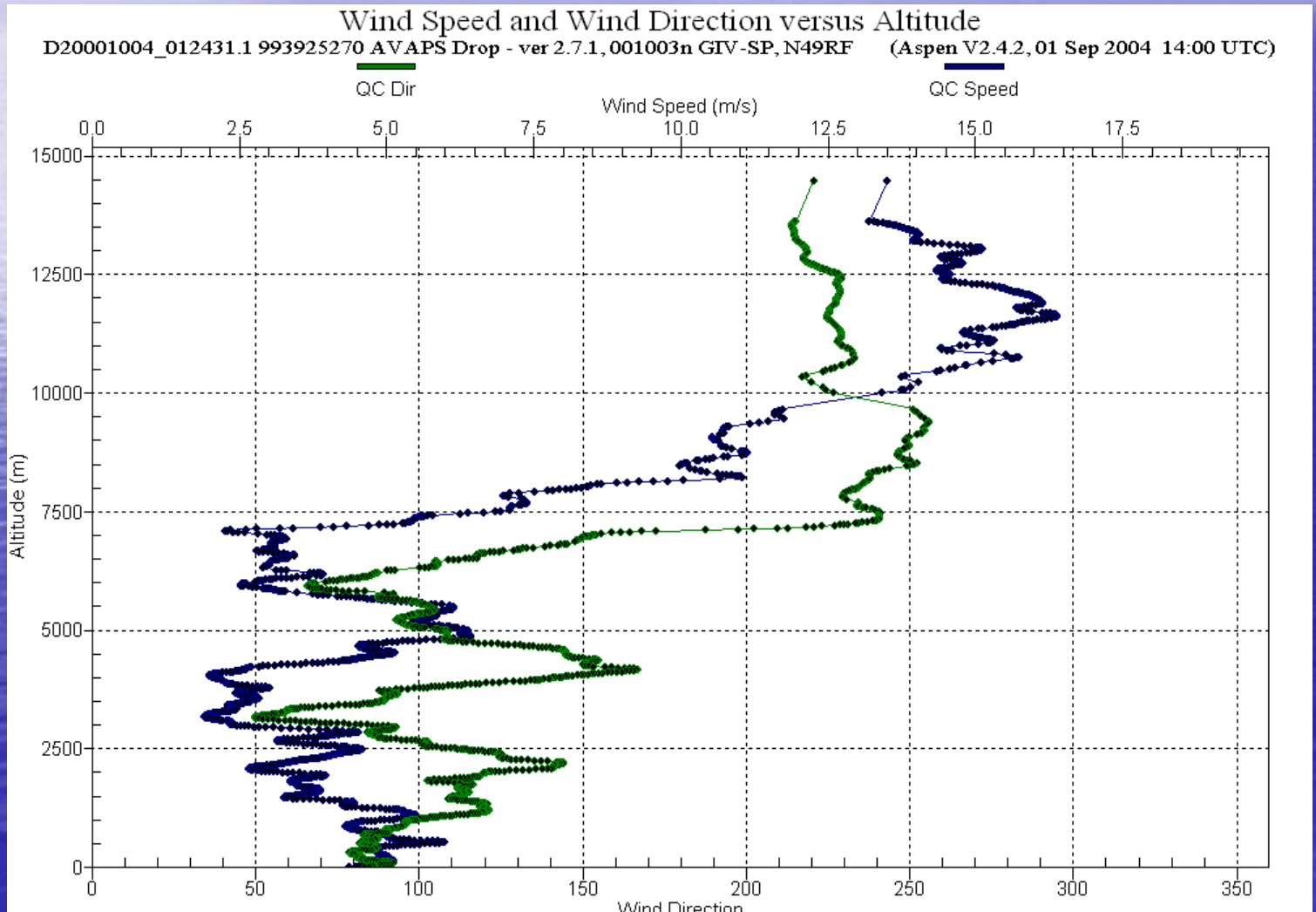
Temperature Humidity QC



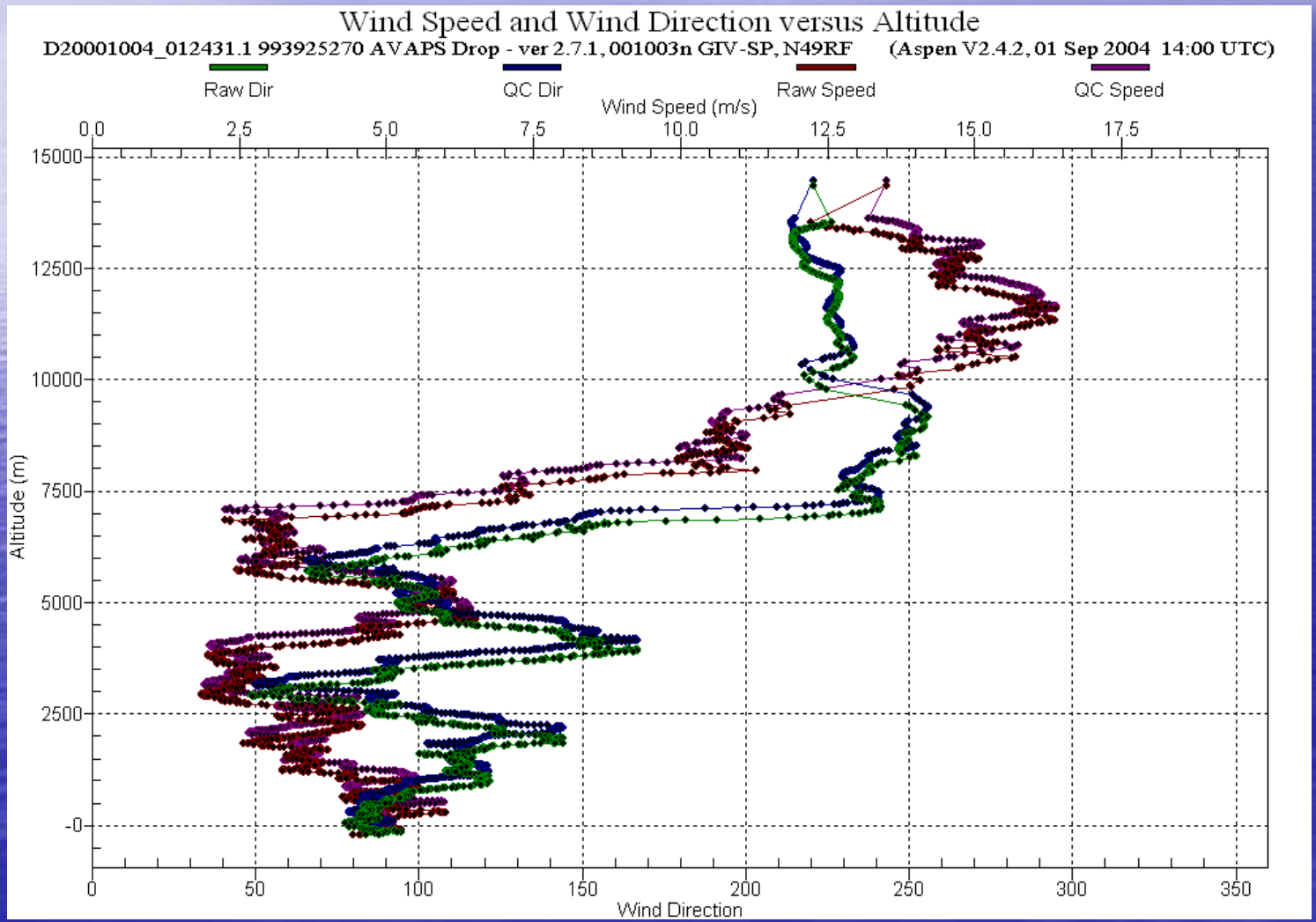
Temperature Humidity QC & raw



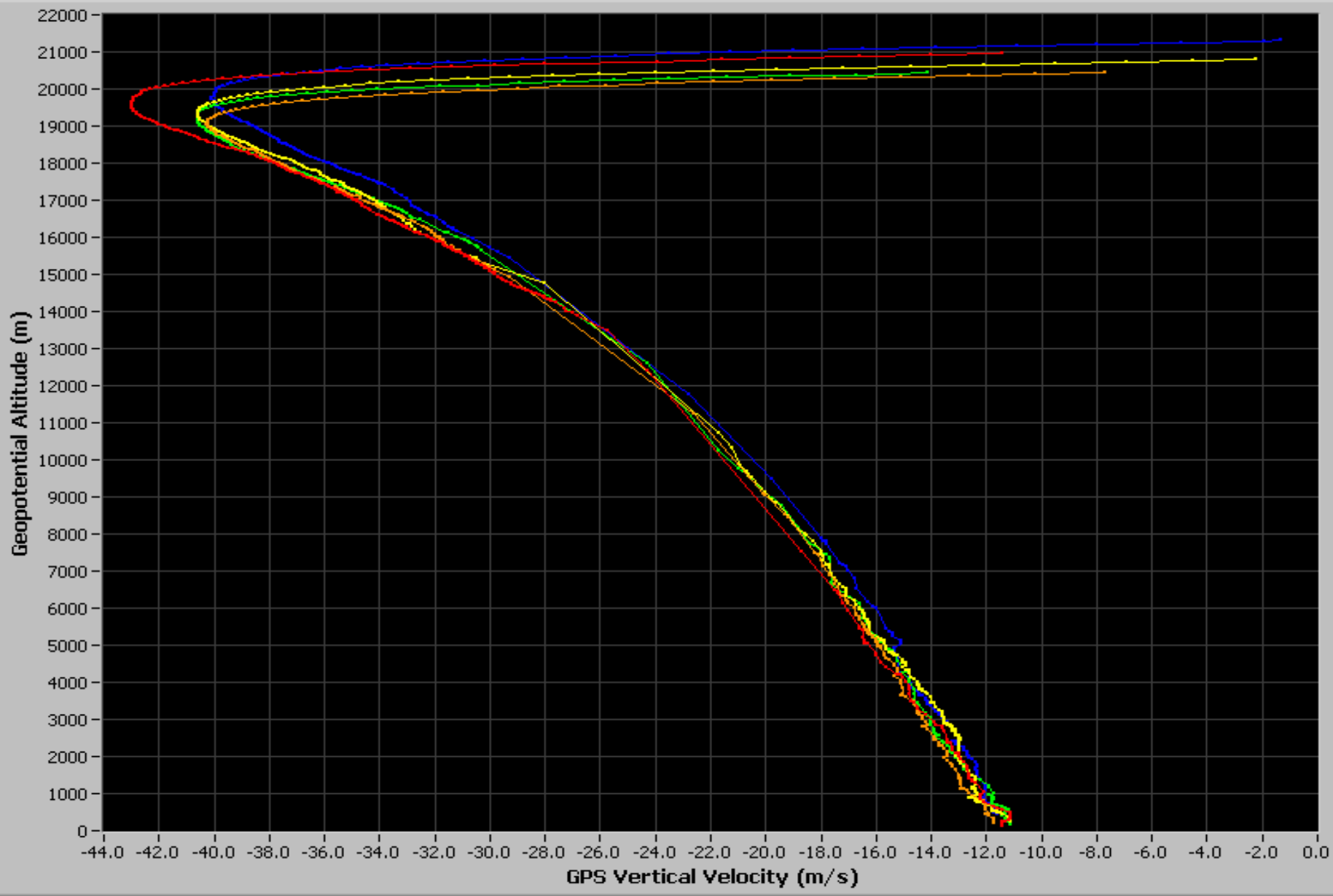
Wind Data QC


Wind Speed and Wind Direction versus Altitude
D20001004_012431.1 993925270 AVAPS Drop - ver 2.7.1, 001003n GIV-SP, N49RF (Aspen V2.4.2, 01 Sep 2004 14:00 UTC)
QC Dir
QC Speed
Wind Speed (m/s)
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
Altitude (m)
15000
12500
10000
7500
5000
2500
0
0
50
100
150
200
250
300
350
Wind Direction

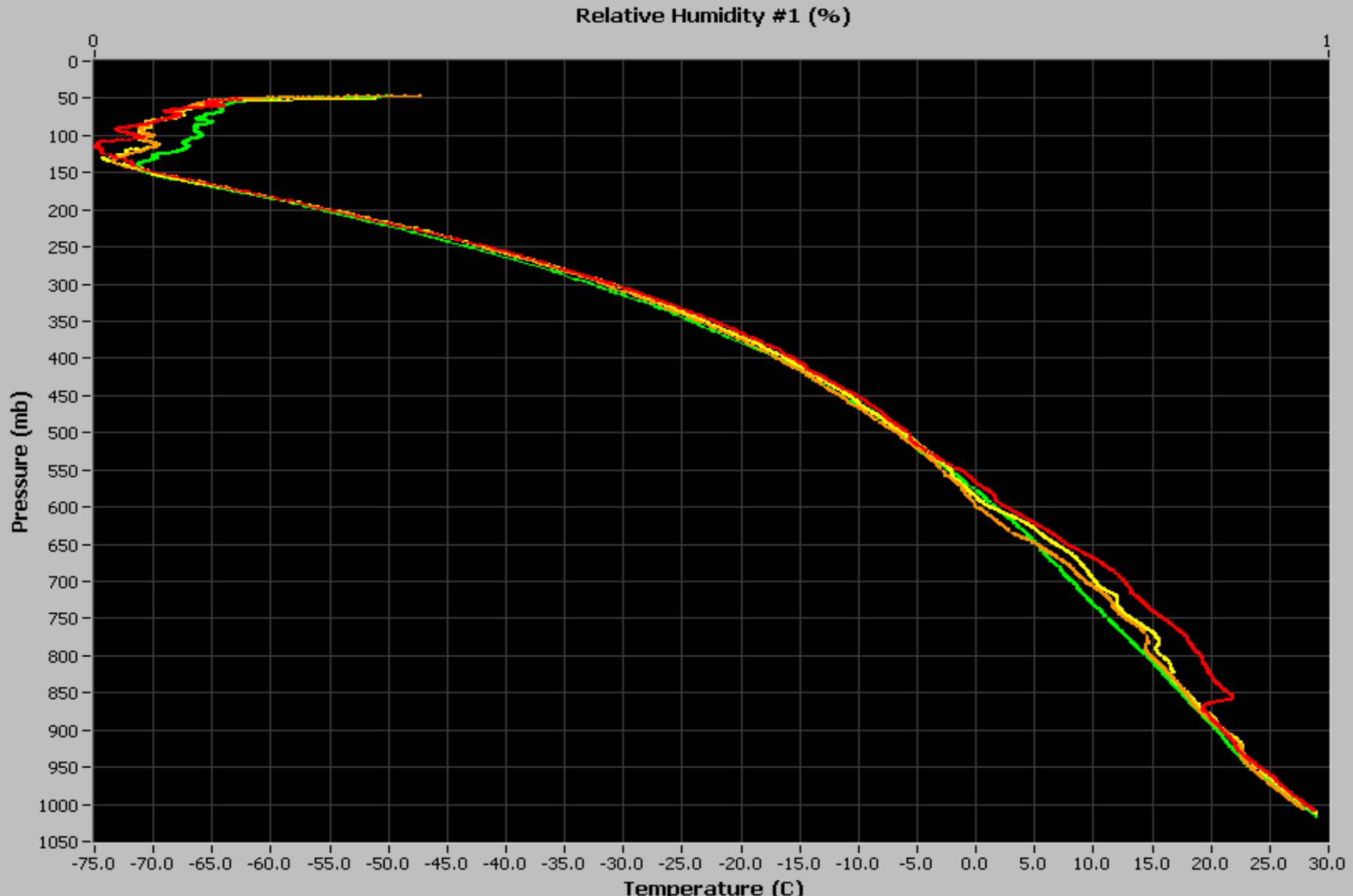
Wind Data QC and raw



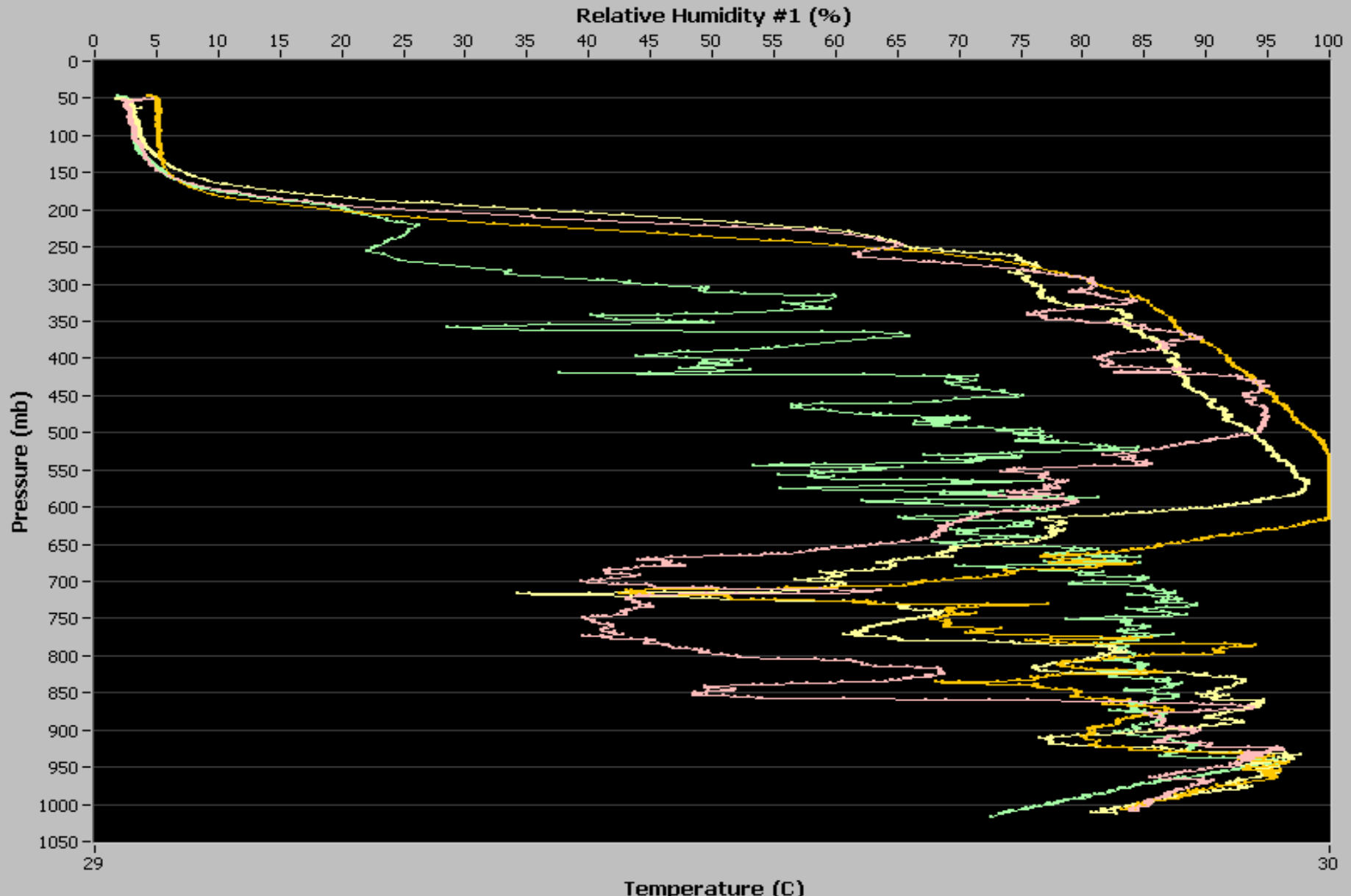
Dropsonde Fall Velocity



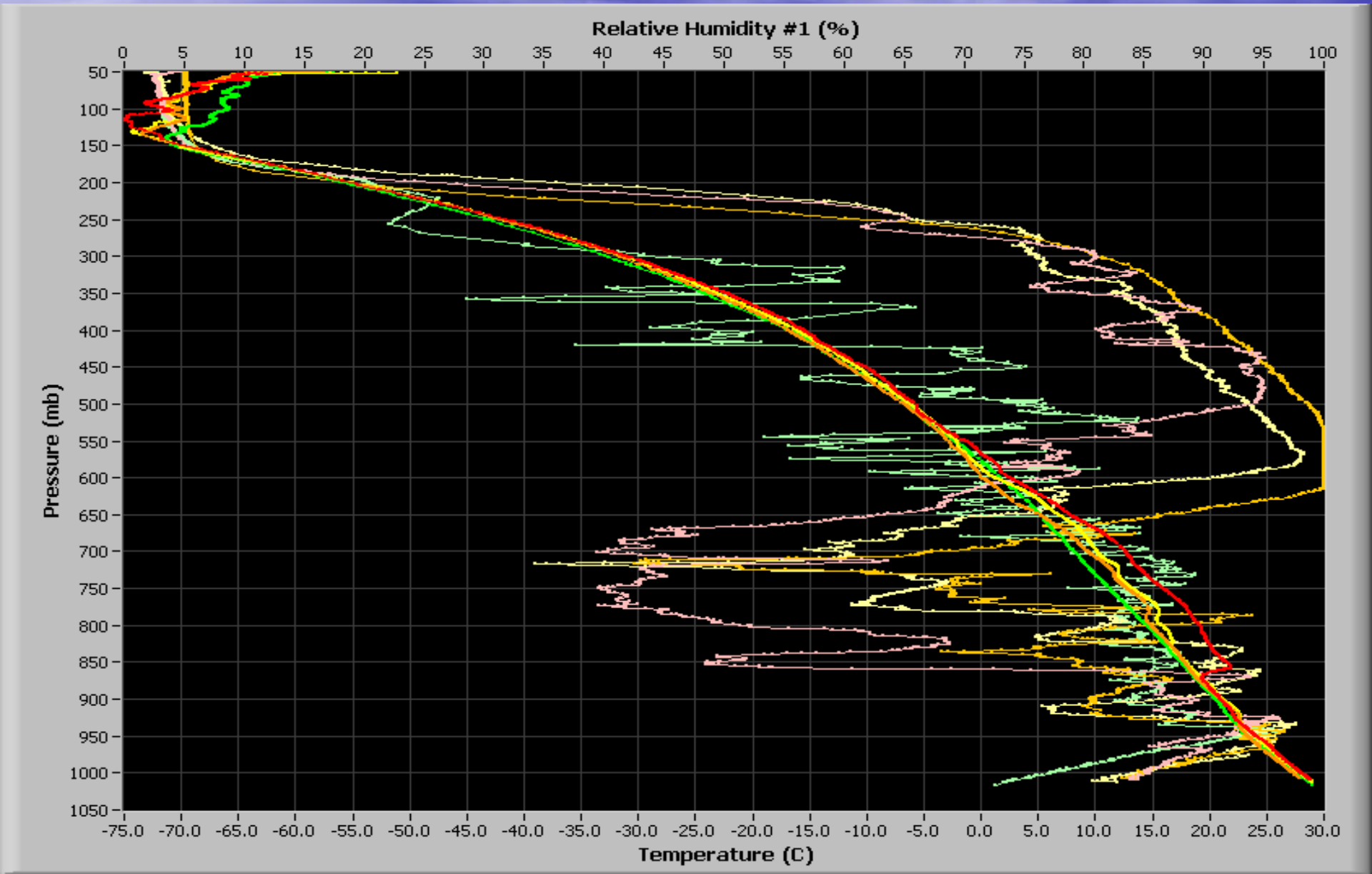
ER-2 Temperature Profile



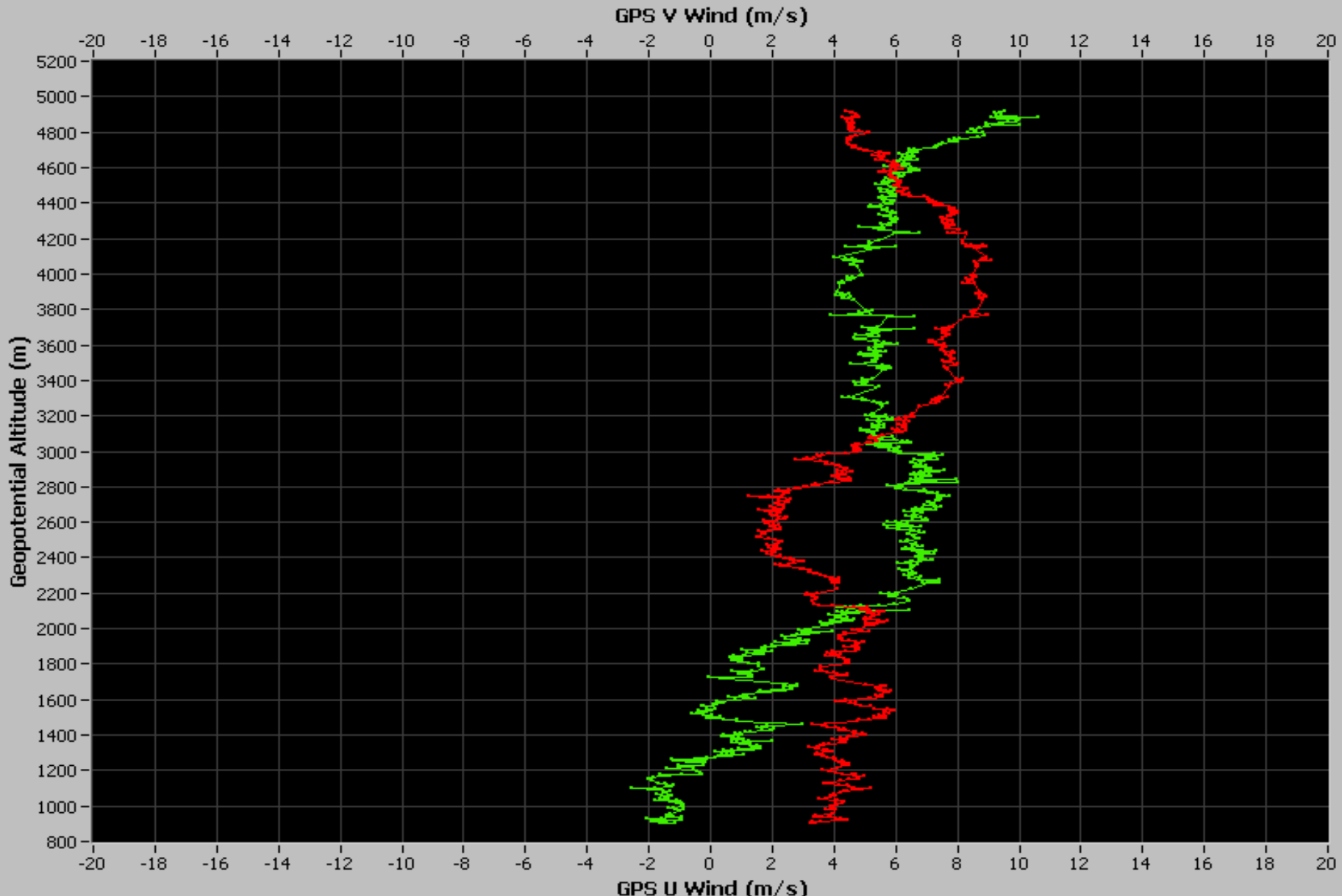
ER-2 Humidity Profile



ER-2 Temperature & Humidity Profile

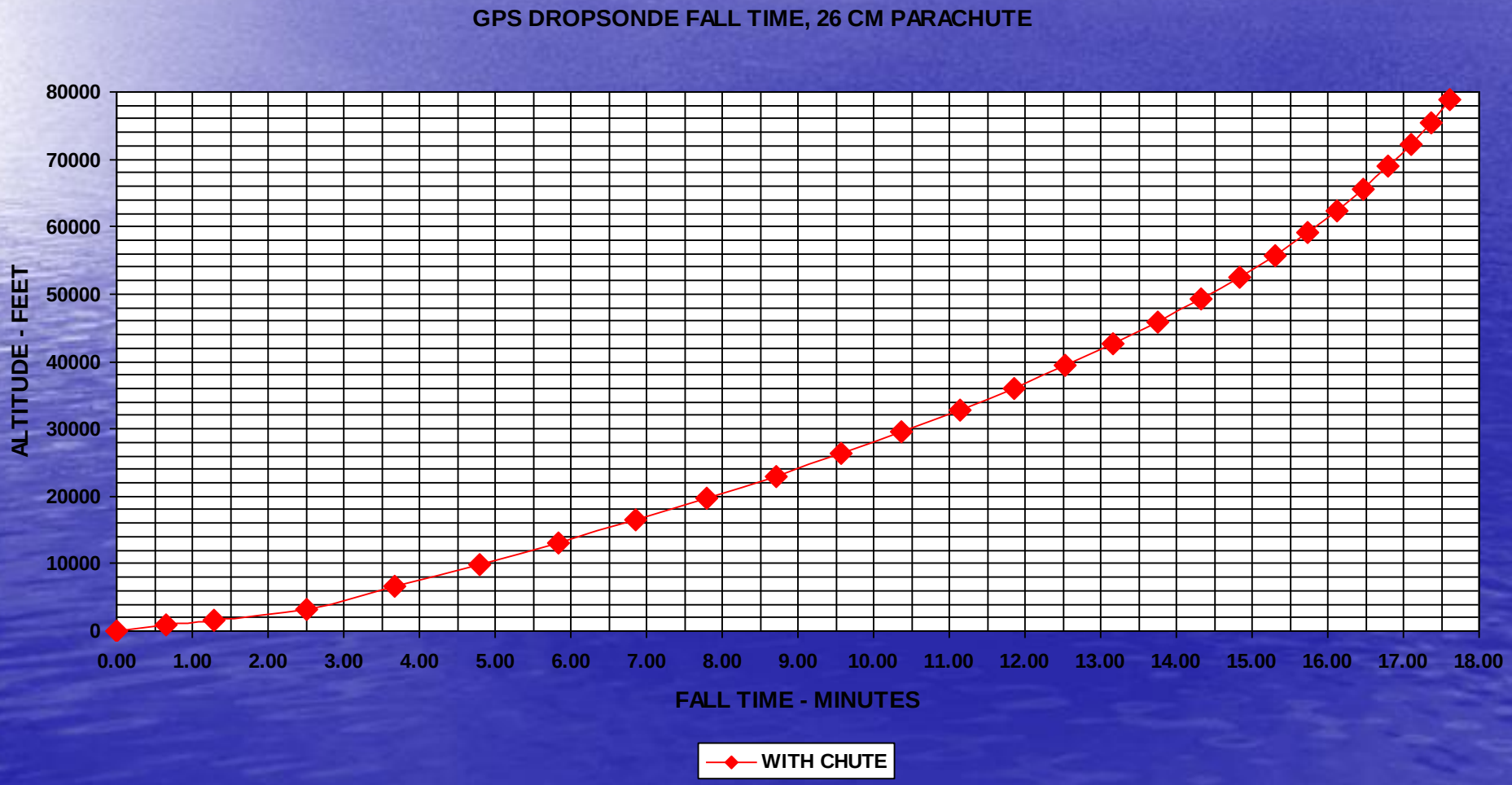


DLR Falcon U & V GPS Winds



Sonde Fall Time

Typical Fall Times
10,000 ft. – 4.5 Minutes
20,000 ft. – 8 minutes
30,000 ft. – 10.5 Minutes



Aircraft Data System

- 4- Channel Telemetry Chassis
  - 400 MHz Receivers
  - GPS Proccessing Card
  - PTH Buffer
  - Sonde Interface
- Computer System
  - AVAPS Drop Software
  - ASPEN Software (Post Processing QC, Temp Drop, Skew-T)

Aircraft D

- 4 channel system allows for up to 4 sondes in the air simultaneously
- Channel can be re-used typical within 4 minutes of previous drop
- System requires one operator, if rapid drops are required two operators may be necessary

RICO Dropsonde Overview

- 280 Dropsondes
- NCAR C-130 Aircraft
- Standard 4 channel system
- ~ 12 Dropsonde released per flight
- Dropsondes released over water east of Barbuda

RICO Dropsonde Staffing

- One ATD Operator in the field (Korn)
  - Dropsonde Operator for aircraft flights
  - Sonde inventory
  - Preliminary QC of the data
  - Data archival
  - Interface with the P.I.'s
  - Equipment maintenance
- One operator can release dropsonde at a rate of one sonde every ~ 5 minutes, if drops ar required more frequent than a student assistant is required.

Technical Issues

- Dropsonde GPS Receiver (Winds)
  - Aircraft P-Static (in high E-Fields)
  - Manufacturing Reliability
  - RF Multi-path