



MPEX 2013 Workshop

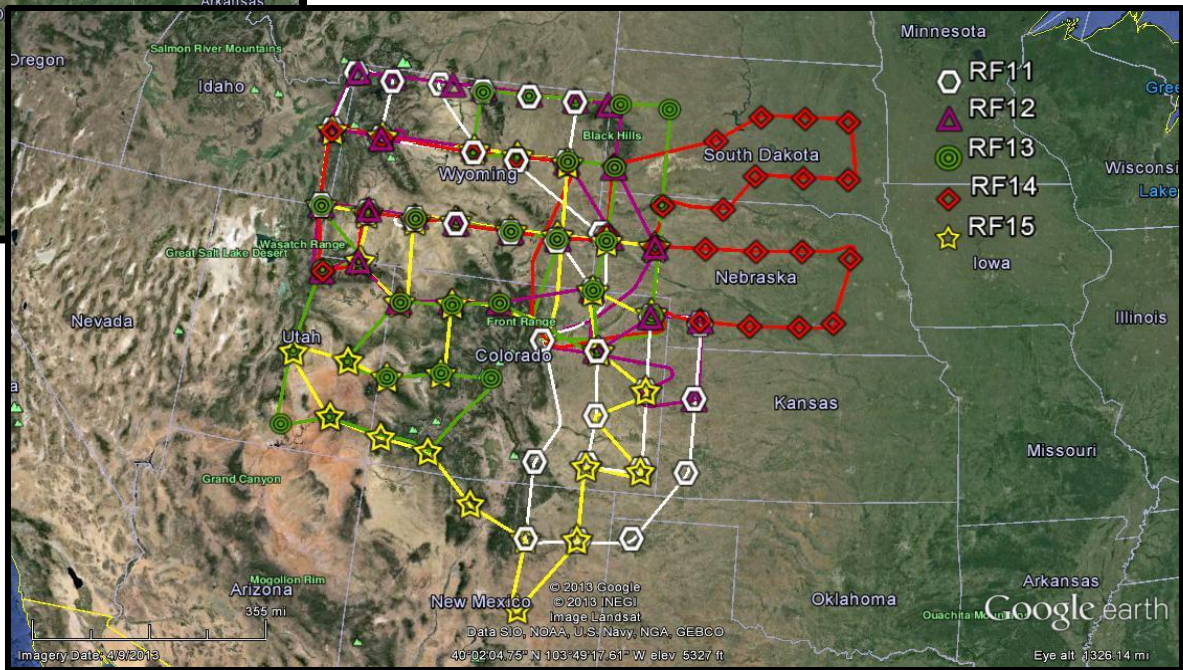
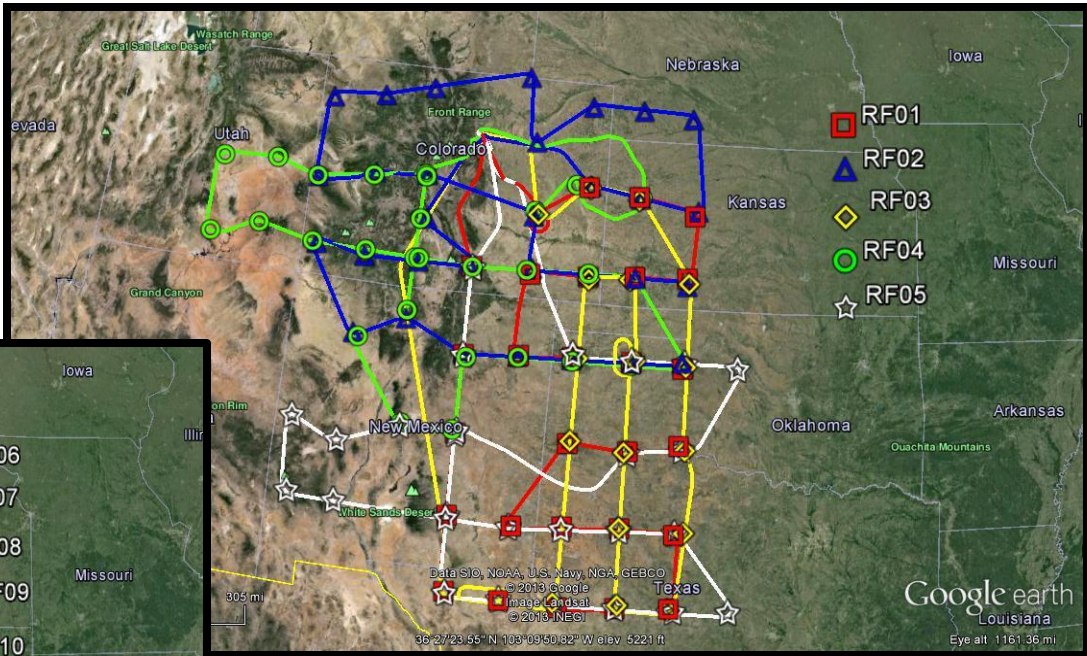
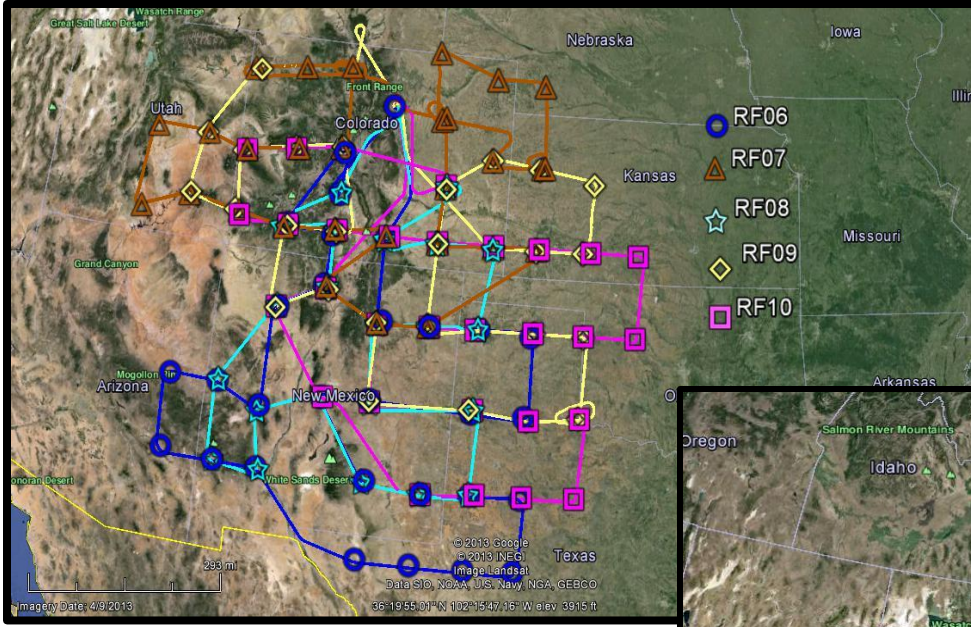
Overview of Dropsonde Data Quality and Data Visualization Tools

Kate Young

MPEX Flight Tracks

May 15 – June 14 2013

Scientific objective: to explore how well sub-synoptic observations can improve numerical weather prediction.



NCAR GV was equipped with the new automated Airborne Vertical Atmospheric Profiling System (AVAPS) dropsonde system, used for the first time

A total of 426 quality controlled soundings are contained in the Qced MPEX dropsonde data set

Data Retrieval

- Accessible through EOL's CODIAC system
 - <http://data.eol.ucar.edu/codiac/dss/id?371.005>
(user:mpex , password: mesosyn!)
- Or through the MPEX Masterlist:
 - http://data.eol.ucar.edu/master_list/?project=MPEX
- Archive contains both High Res Data and QC TEMP drop message (based off of the final data set)

Data Fields Provided in EOL ASCII Format

Field No.	Parameter	Units	Measured/Calculated
1	Time	Seconds	-----
2	UTC Hour	Hours	-----
3	UTC Minute	Minutes	-----
4	UTC Second	Seconds	-----
5	Pressure	millibars	Measured
6	Dry-bulb Temp	Degrees C	Measured
7	Dew Point Temp	Degrees C	Calculated
8	Relative Humidity	Percent	Measured
9	U Wind Component	Meters/Second	Calculated
10	V Wind Component	Meters/Second	Calculated
11	Wind Speed	Meters/Second	Measured
12	Wind Direction	Degrees	Measured
13	Descent Rate	Meters/Second	Calculated
14	Geopotential Altitude	Meters	Calculated
15	Longitude	Degrees	Measured
16	Latitude	Degrees	Measured
17	GPS Altitude	Meters	Measured

Quality Control of Dropsonde data

In-Field Data Inspection

NOAA operators in operations center to evaluate data quality, create log entries and submit messages to GTS

Raw Profile Examination & Correction

- Launch Detect Errors (early/late/failed)
- Fast Falls
- Not to surface
- Sensor Failure

Flight Level Alt Correction

Ground Check Pressure Correction

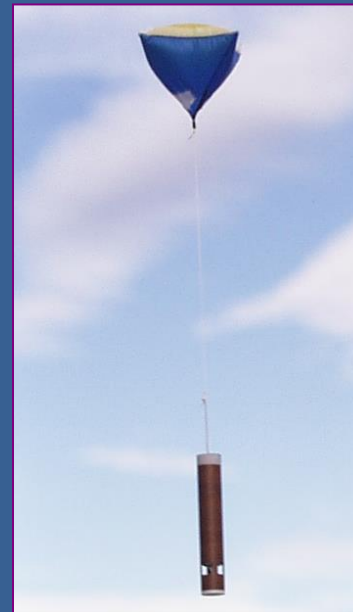
$$P = P^{RS} * P_0^{REF} / P_0^{RS}$$

Batch ASPEN

Time Series Plots of PTU and Wind

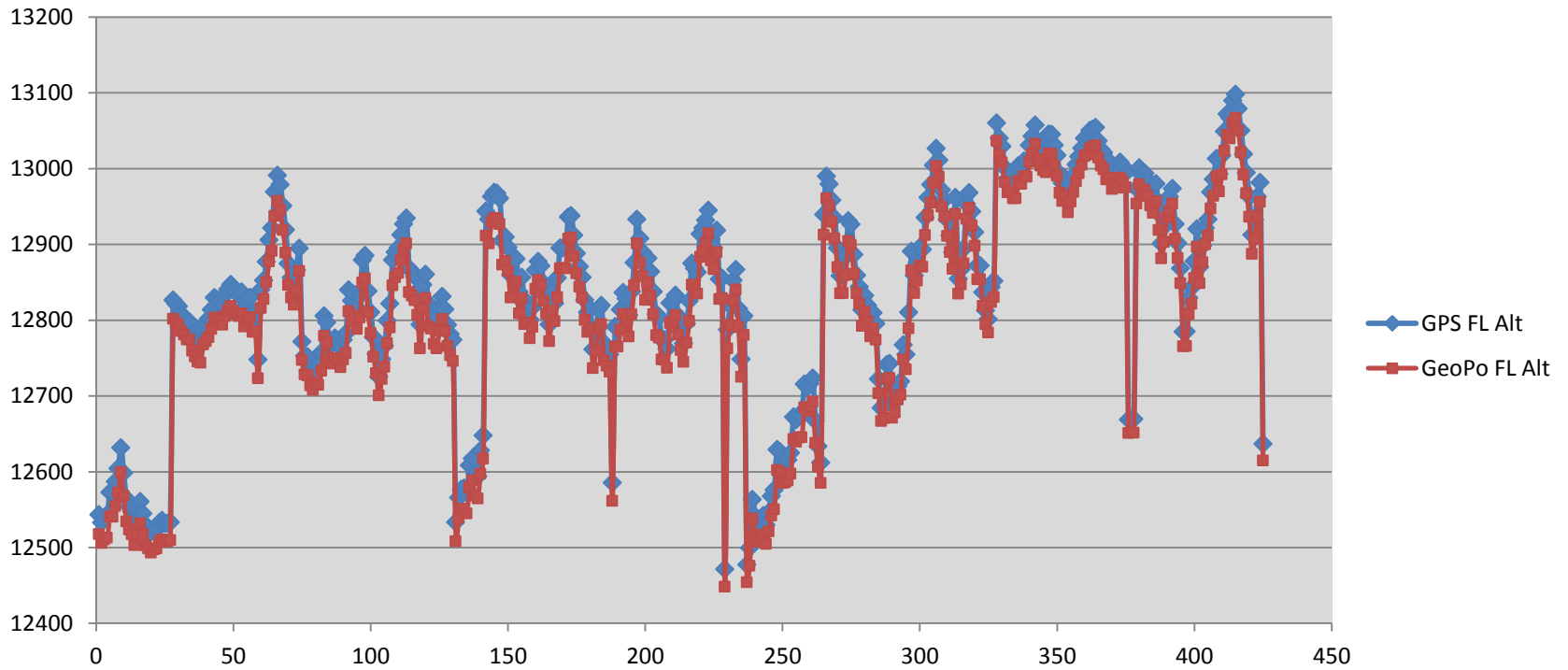
Histograms of PTU and Wind

Visually Examine QC Sounding

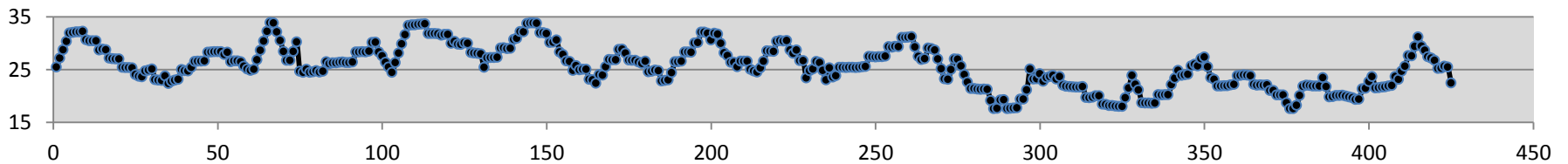


Altitude Correction

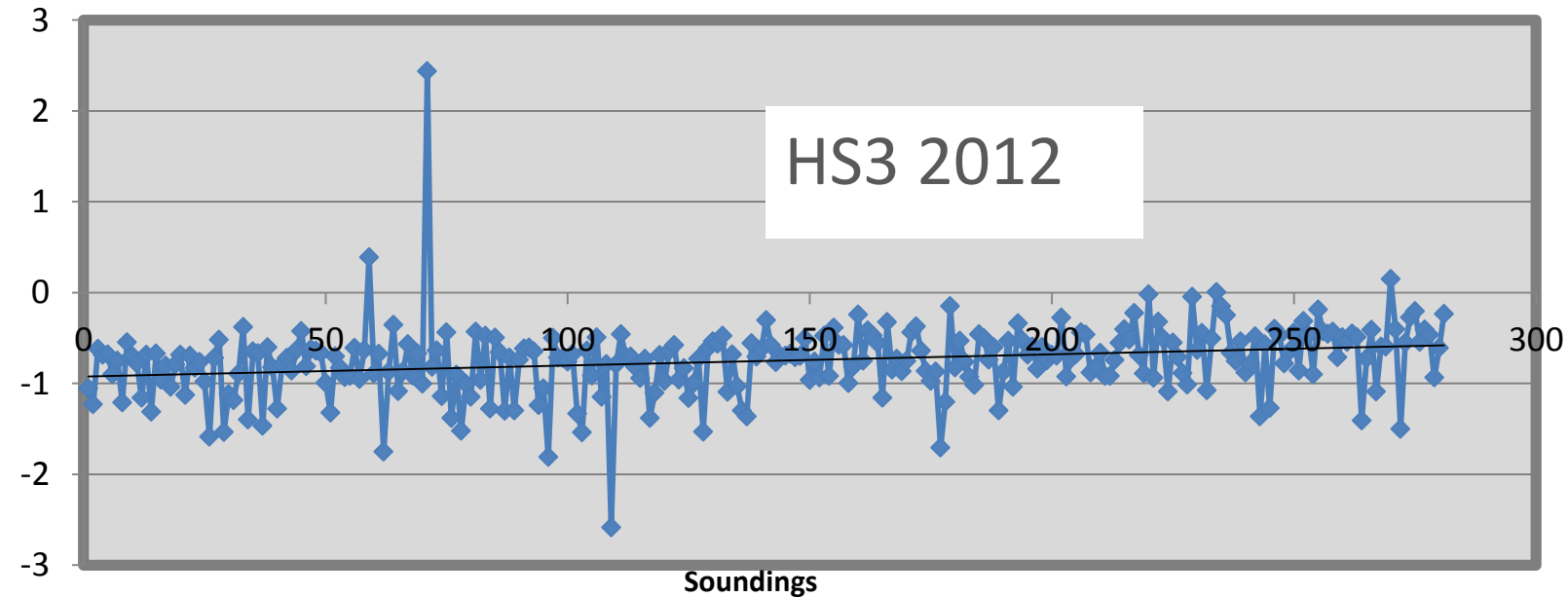
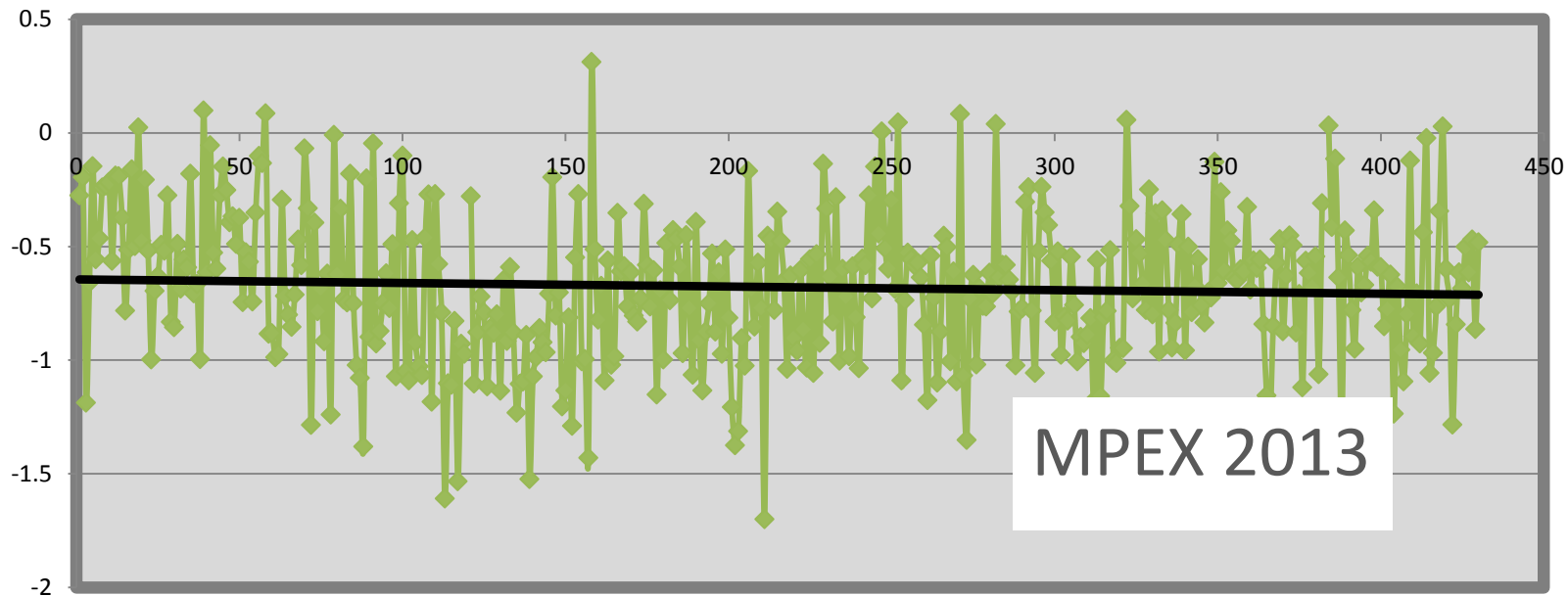
All flight level data contained in the sounding files are subjected to an altitude correction that converts GPS altitude (ie geometric altitude,MSL) to geopotential altitude



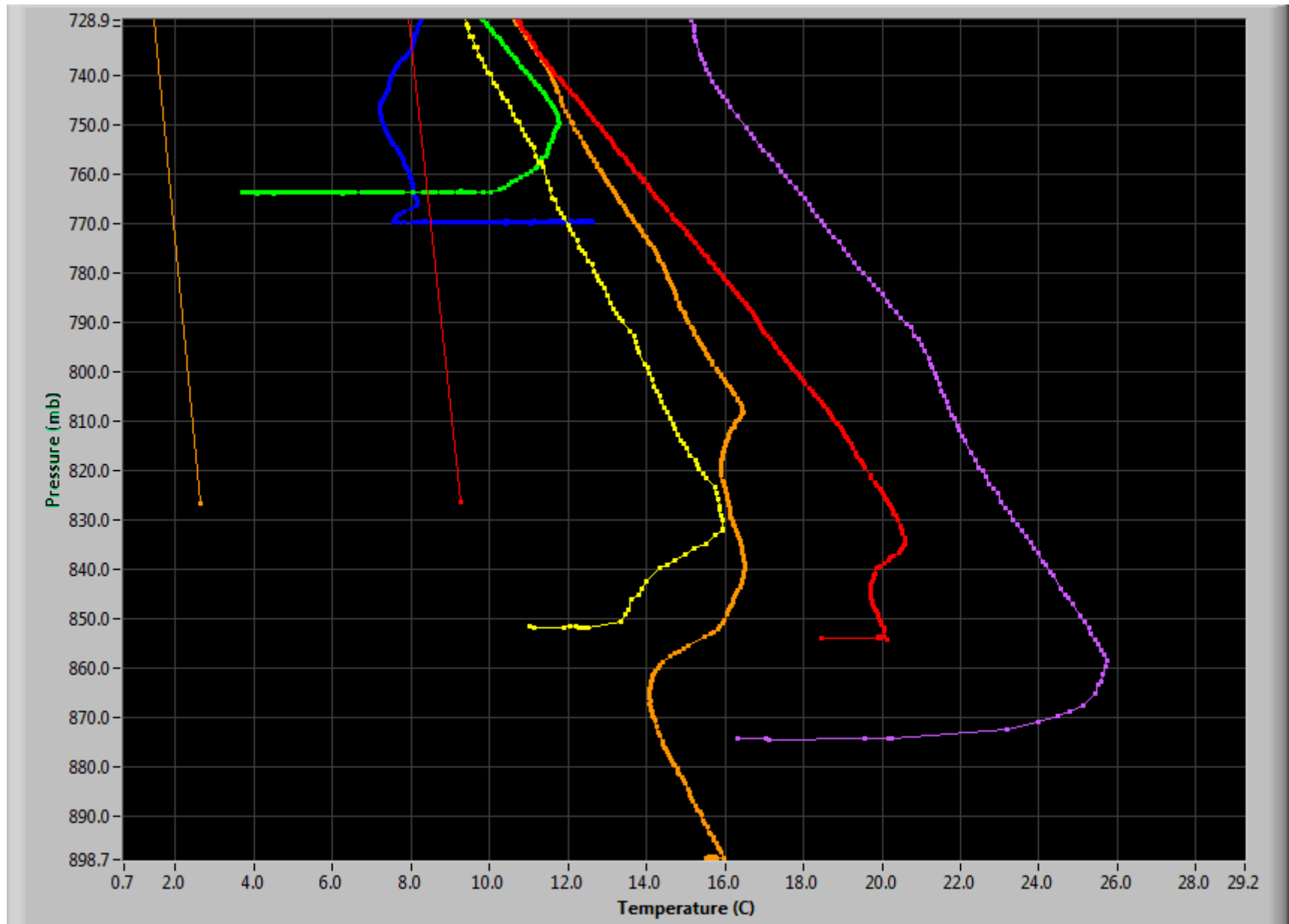
FL Alt Diff (GPS - GEO)



Ground Check Pressure Correction (Sonde – Reference)



Ground Data Removal

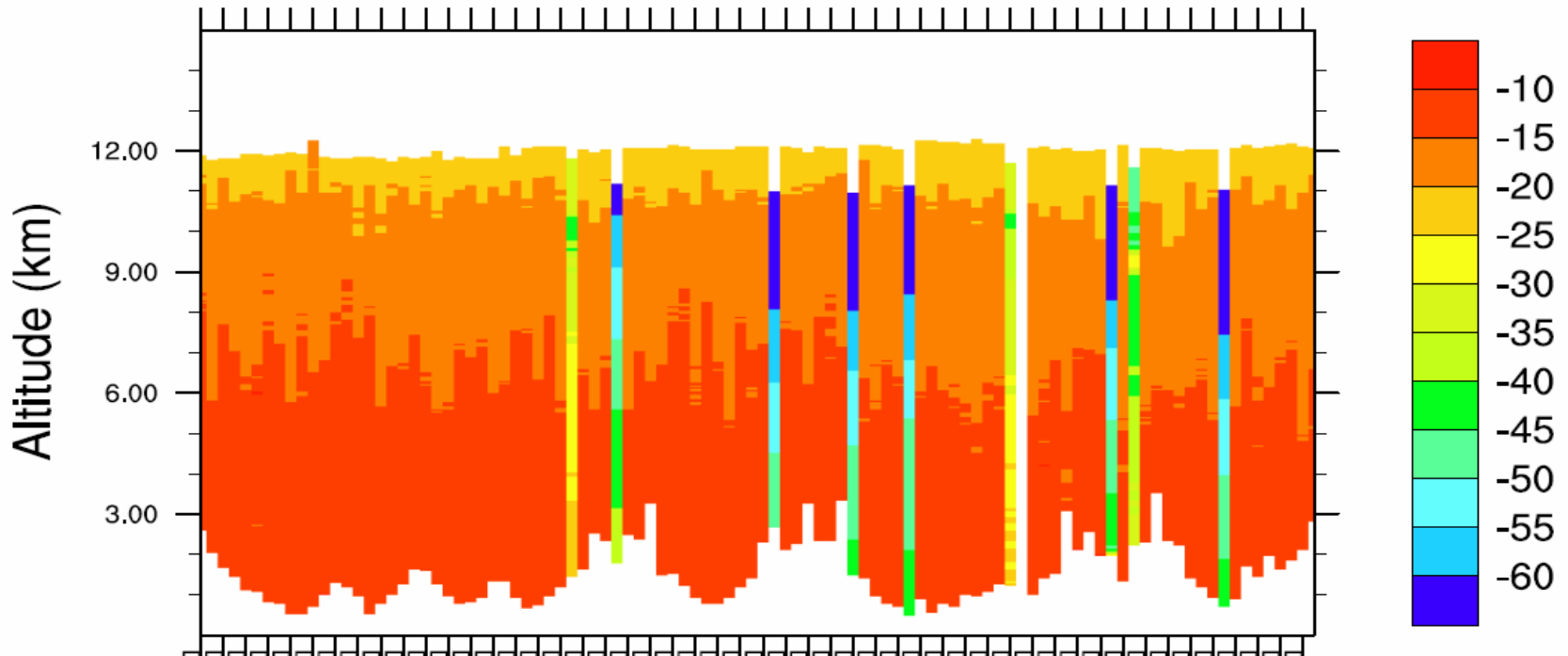


Fast Falls

- 23 Partial FF
- 39 Complete FF
- Complete FF subdivided into 3 categories:
 - Wobblers – Fall rates >15 m/s @ sfc, relatively clean winds (**10%**)
 - Tumblers – Fall rates >15 m/s @ sfc, noisy winds (**28%**)
 - Bullets – Fall rates > 40 m/s, smooth wind profiles but lag RH measurements (**62%**)

Fast Falls

MPEX 2013 Dropsondes (1-100) - DZ/DT



Issue/Cause:

The parachute failed to deploy or deployed late (a "partial fast fall")

Results:

- Falling at a faster rate (and sometimes tumbling)
- Unreliable winds
- Lag in RH measurement

Corrections:

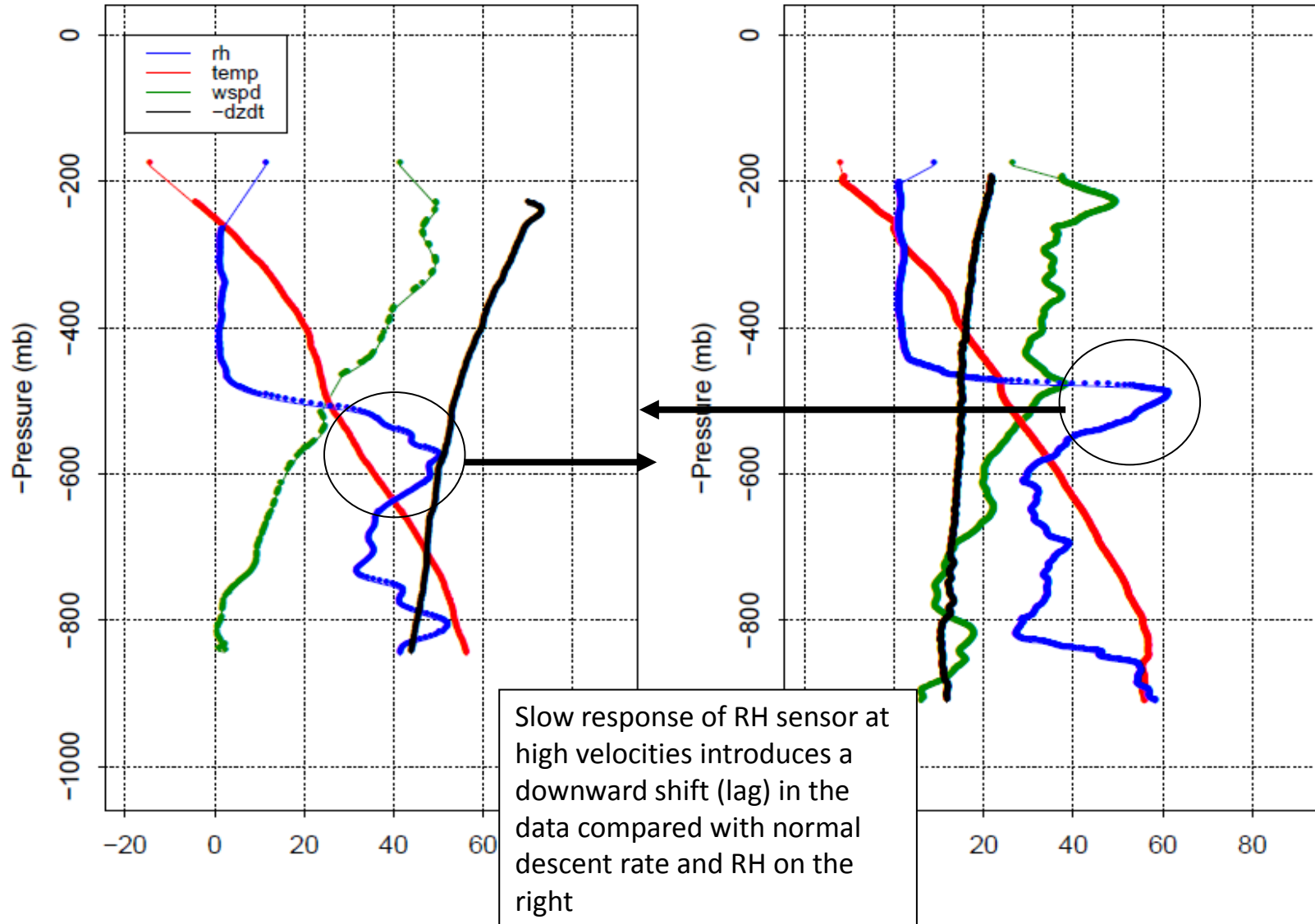
None. Freq of ff was high so rather than setting wind speed, wind direction and u/v winds to missing, data files were flagged.

Sonde ID

Fast Falls

D20130530_104250_P.1Q

D20130530_105801_P.2Q



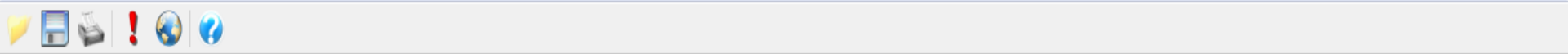
Data Quality Summary



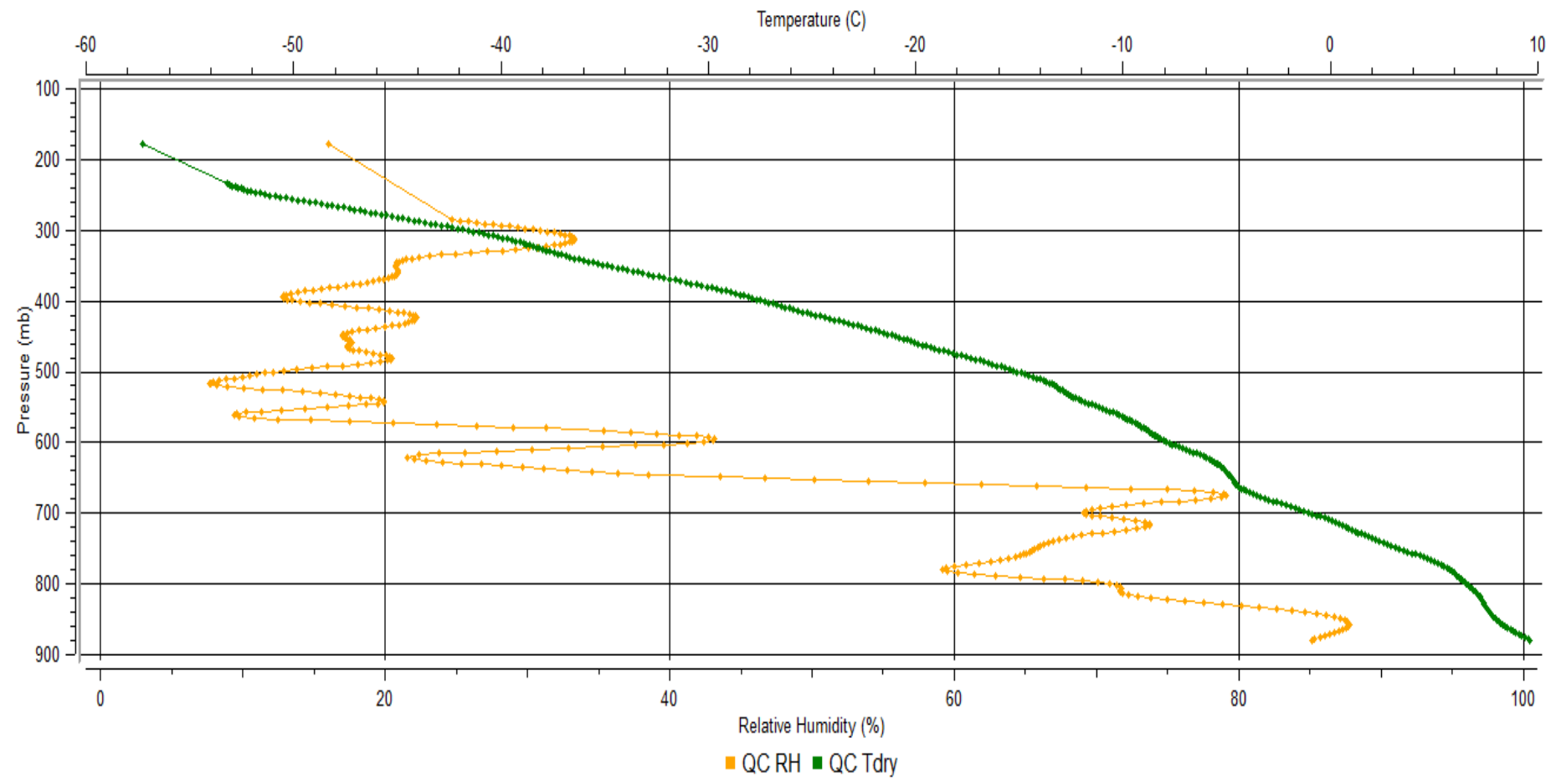
- 62 (~14%) were fast falls
 - 23 partial ff
 - 39 complete ff
- 2 broken sensors (one T, one RH)
- 3 contain no pressure calculated geopotential alt
(1 – no T data, 2- no flight level GV PTU data)

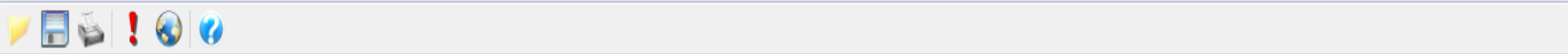
Data Visualization Using Atmospheric Sounding Processing Environment (ASPEN)

Send software requests to: kbeierle@ucar.edu



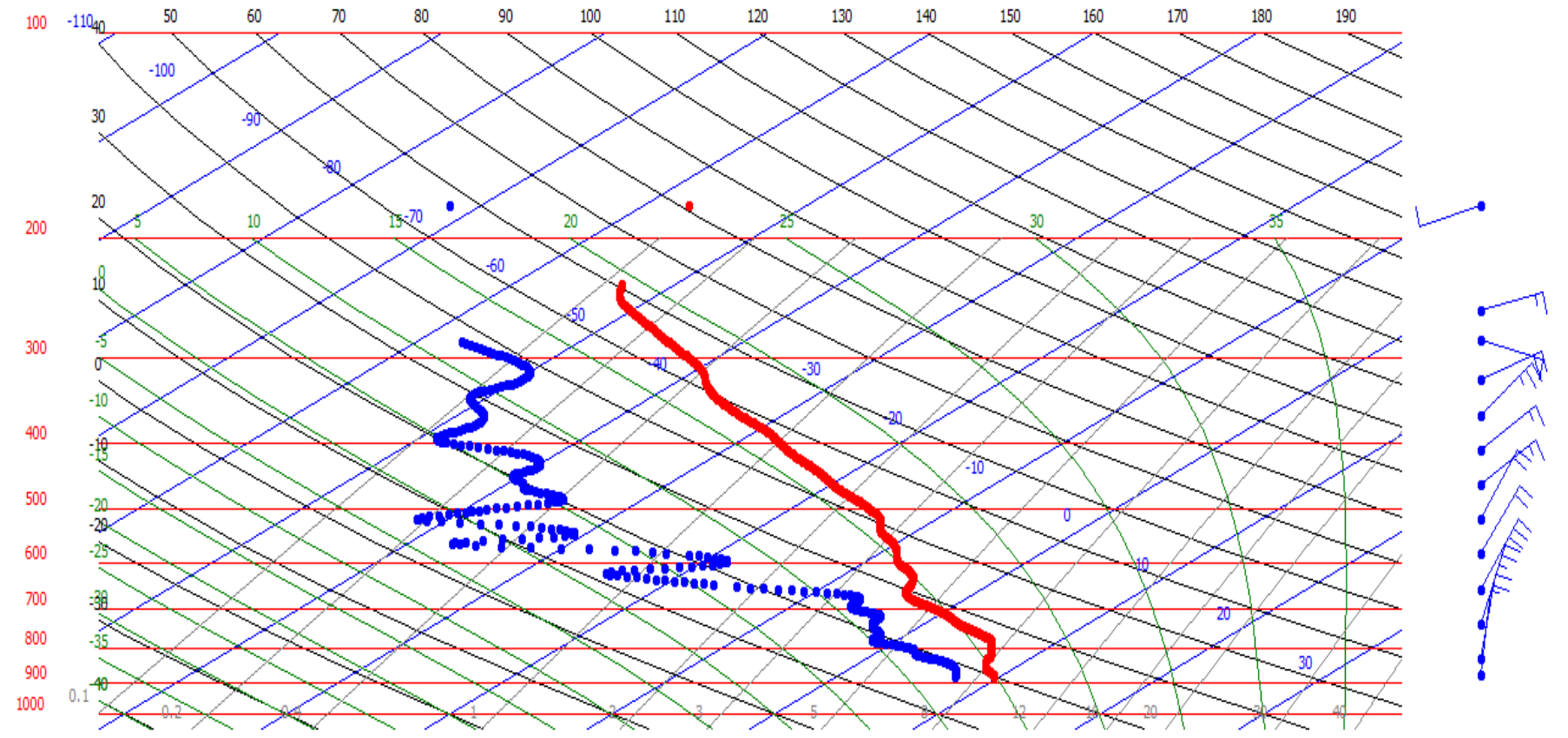
D20130509_135755_P.1 101645017 MPEX, Gulfstream V, N677F





Raw QC Levels Mark Points Draw Lines

D20130509_135755_P.1 101645017 MPEX, Gulfstream V, N677F
N40.5913 W102.4600



Aspen 3.1, 19 Nov 2013 17:56 UTC

