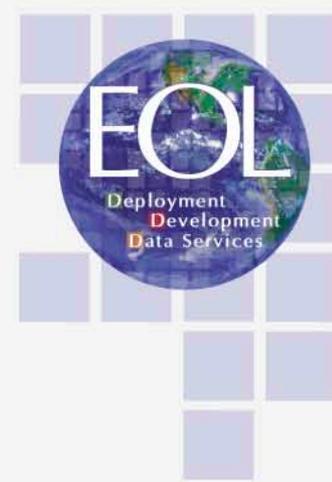# Dropsonde Data Quality Control:

GRIP Data Debrief

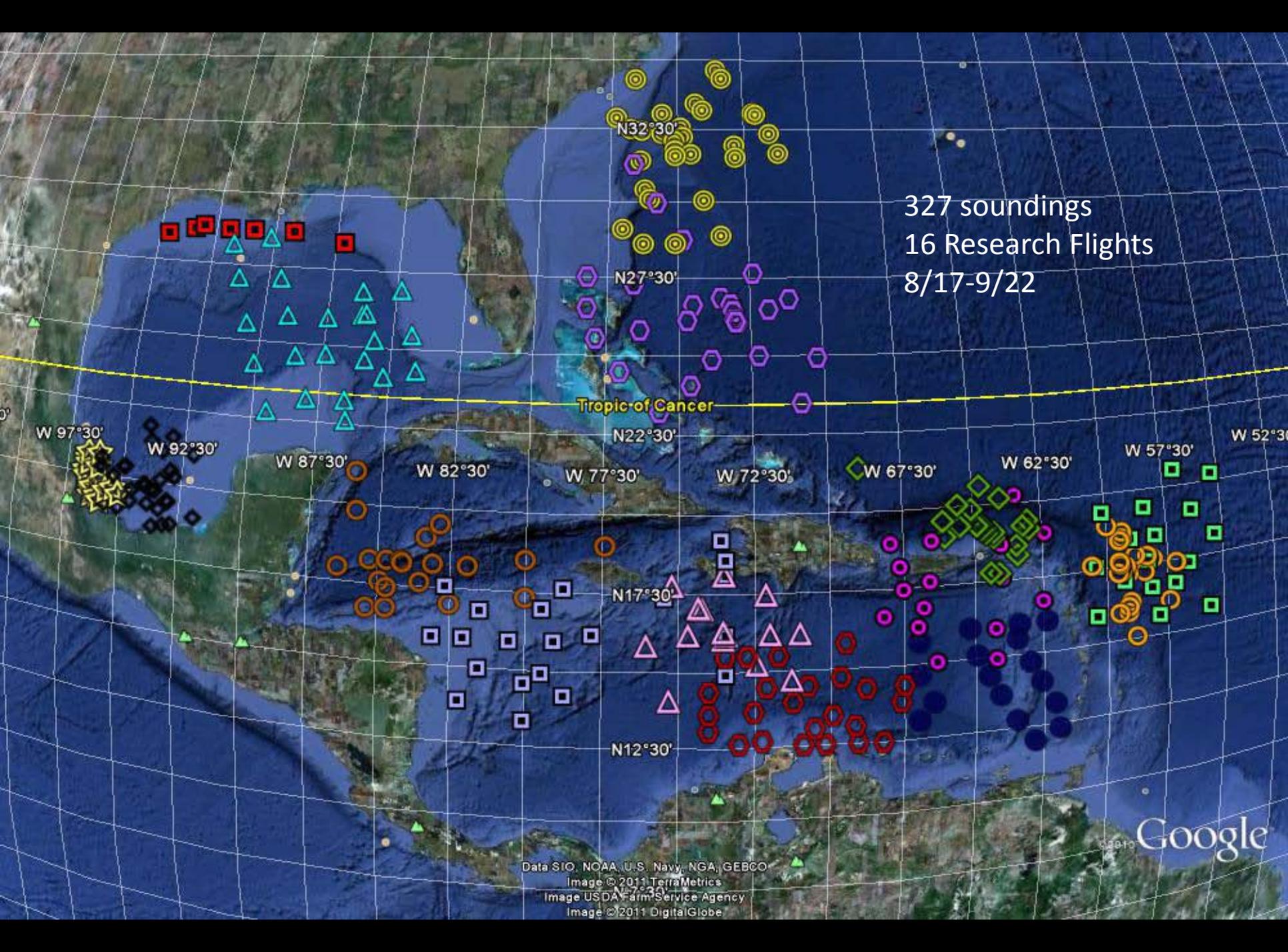Jeff Halverson, UMBC
Junhong Wang, NCAR

Outline

- Project Overview

- QC Results and Statistics
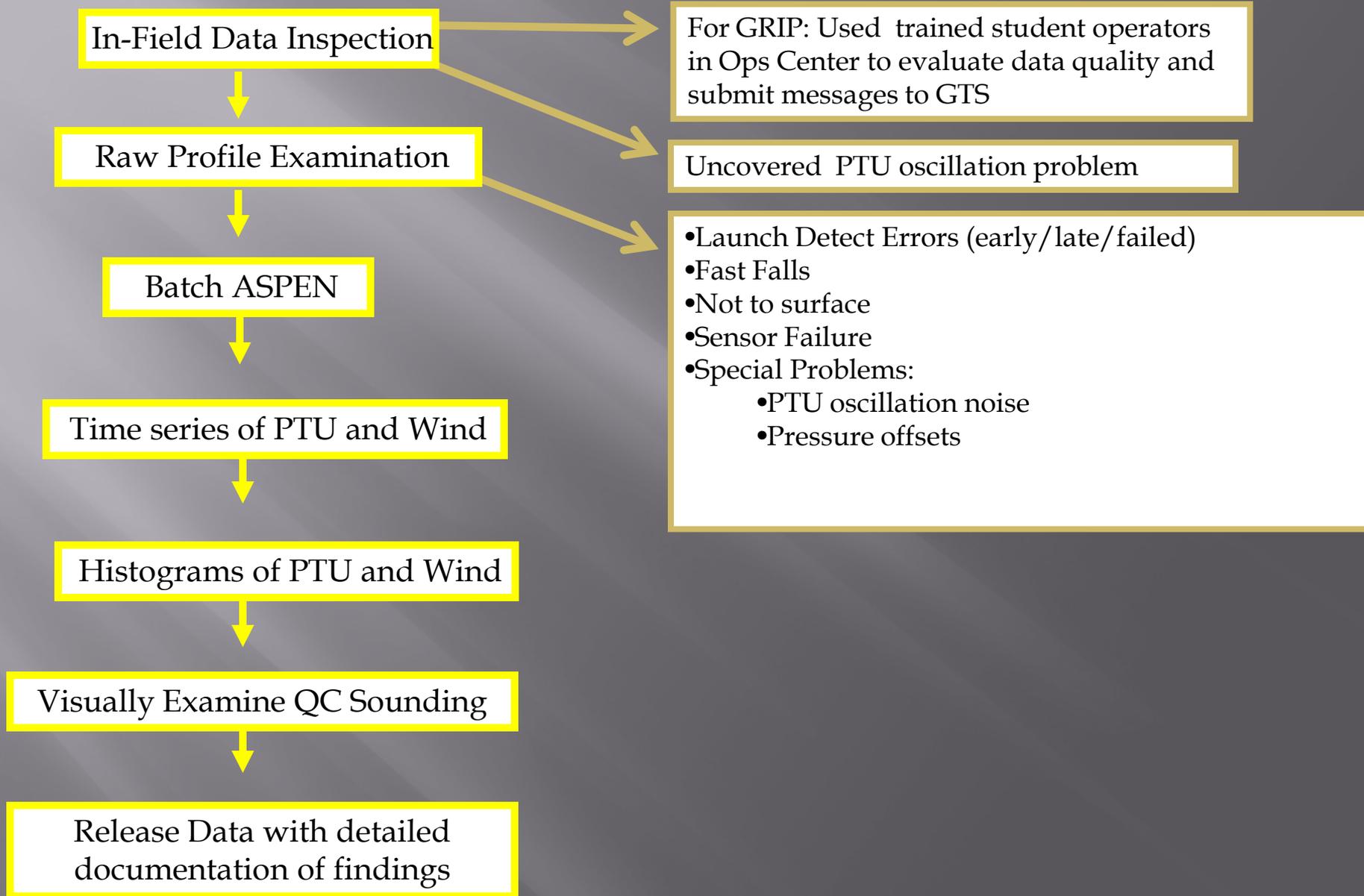
- Details regarding some problems found

GRIP

- The NCAR AVAPS provides high resolution vertical soundings of T, RH and GPS-derived winds from flight level to ocean surface
- All research aircraft (NASA, NOAA, Teal) use identical AVAPS and Vaisala dropsonde instruments
- NCAR does the quality control, releases final dataset

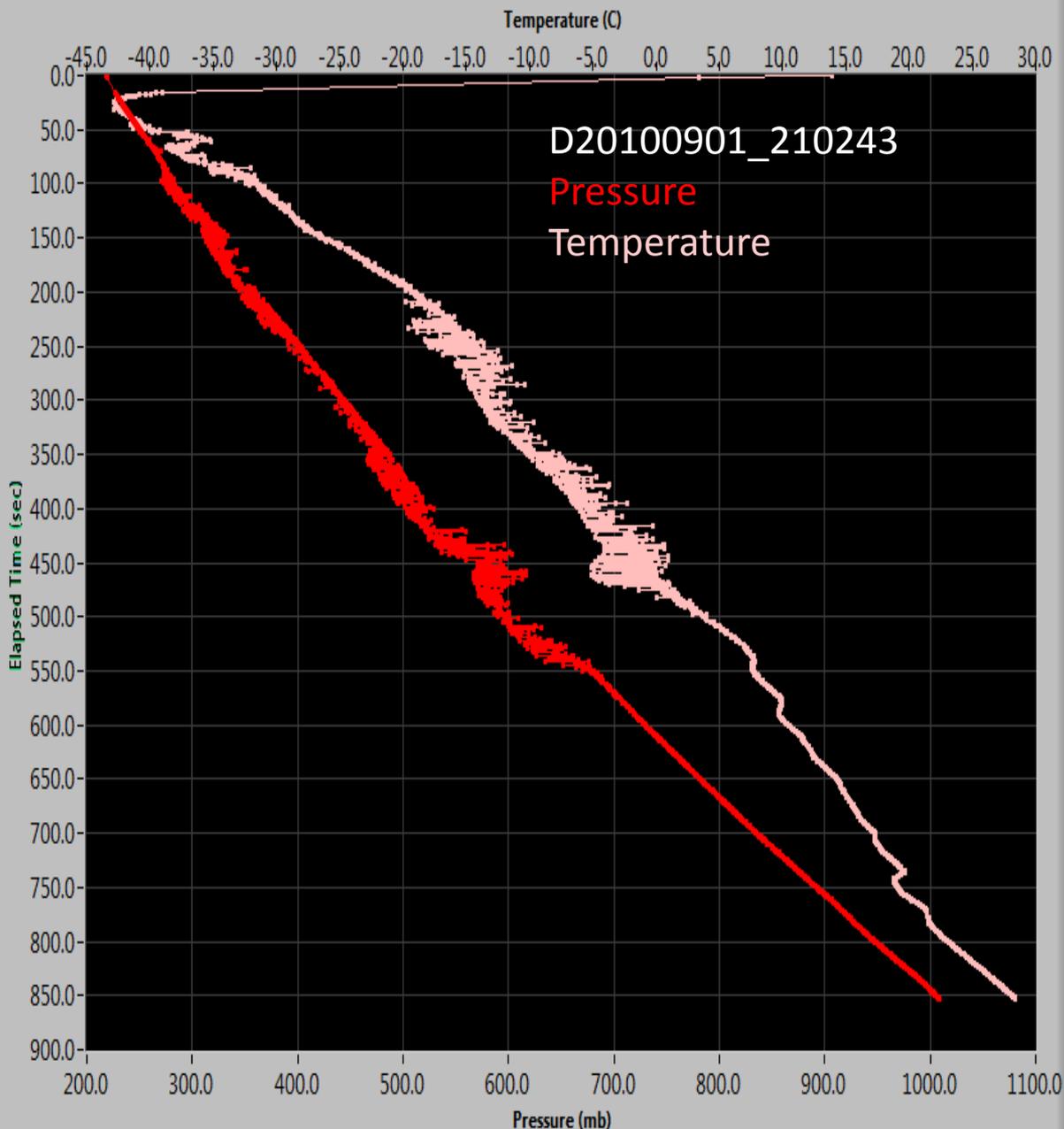327 soundings
16 Research Flights
8/17-9/22

Quality Control of Dropsonde data

In-Field Data Inspection

↓

Raw Profile Examination

↓

Batch ASPEN

↓

Time series of PTU and Wind

↓

Histograms of PTU and Wind

↓

Visually Examine QC Sounding

↓

Release Data with detailed documentation of findings

For GRIP: Used trained student operators in Ops Center to evaluate data quality and submit messages to GTS

Uncovered PTU oscillation problem

- Launch Detect Errors (early/late/failed)
- Fast Falls
- Not to surface
- Sensor Failure
- Special Problems:
    - PTU oscillation noise
    - Pressure offsets

Results and Statistics

➢ 342 dropsondes were deployed, 328 are included in the final data archive (14 removed).

➢ 2 dropsonde launched w/ protective cap on.

➢ 97 soundings were affected by the PTU oscillation error and contain sparse data

➢ 3 soundings experienced interference from another sonde started on the same frequency .

➢ 6 soundings experienced large (often singular) spike in calculated dz/dt resulting from small yet abrupt change in pressure.

➢ 45 soundings failed to transmit data to the surface.

➢ 8 soundings were "fast fall" soundings, and 10 were "partial fast-fall".

➢ 1 sounding had failure of the T sensor

➢ FL RH is questionable.

➢ Seven soundings were identified as more extreme cases of signal dropouts.

➢ Launch detect errors (early, late, and failed)

PTU Oscillations

D20100901_210243
Pressure
Temperature

Issue

97 soundings had varying degrees of noise or oscillations in the pressure, temperature and/or RH data.
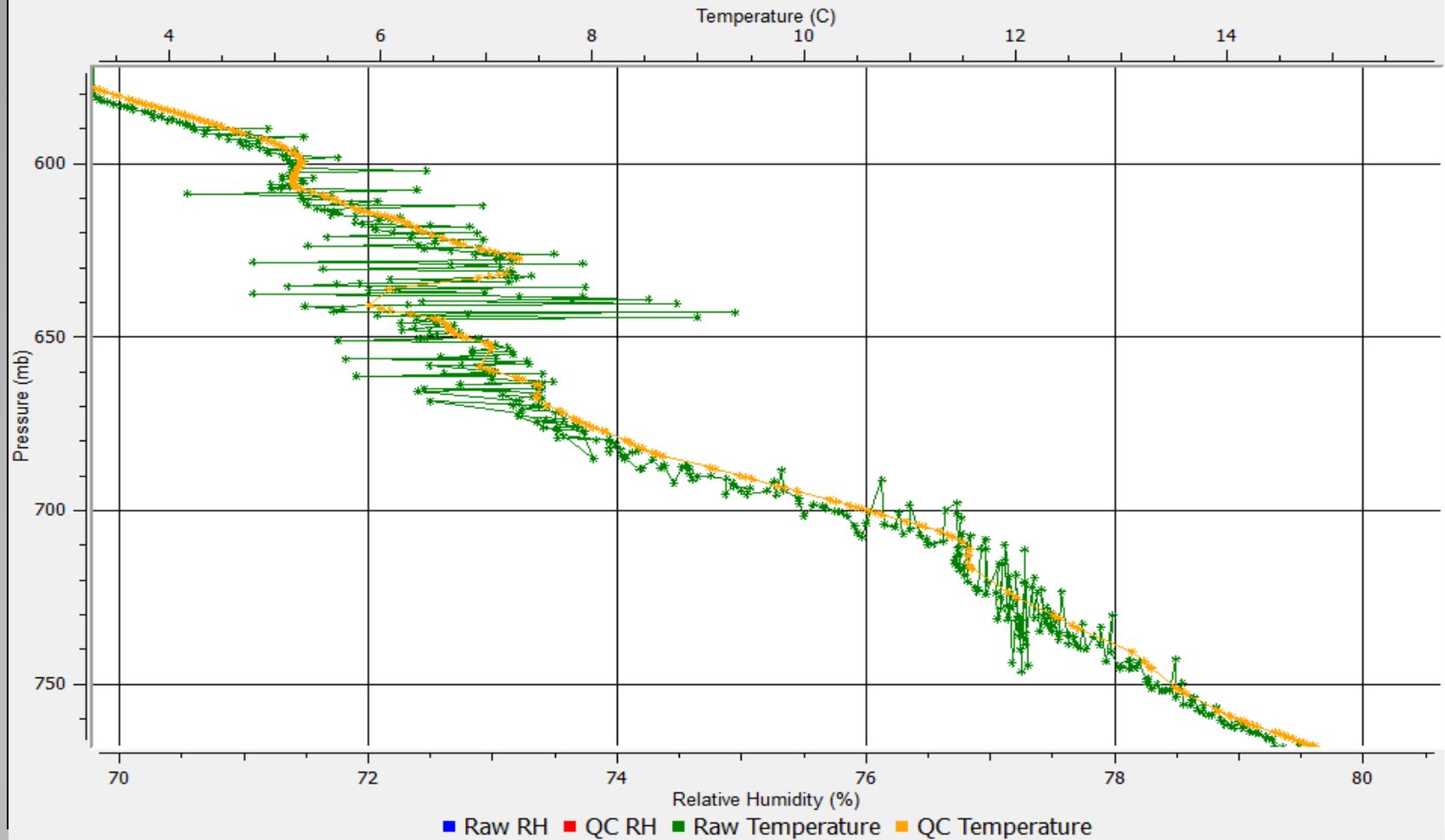
Cause

RF energy from the dropsonde transmitter antenna inducing noise in the PTU module which was caused by a manufacturing change in the PTU module and tolerance of electronic components in the dropsonde.
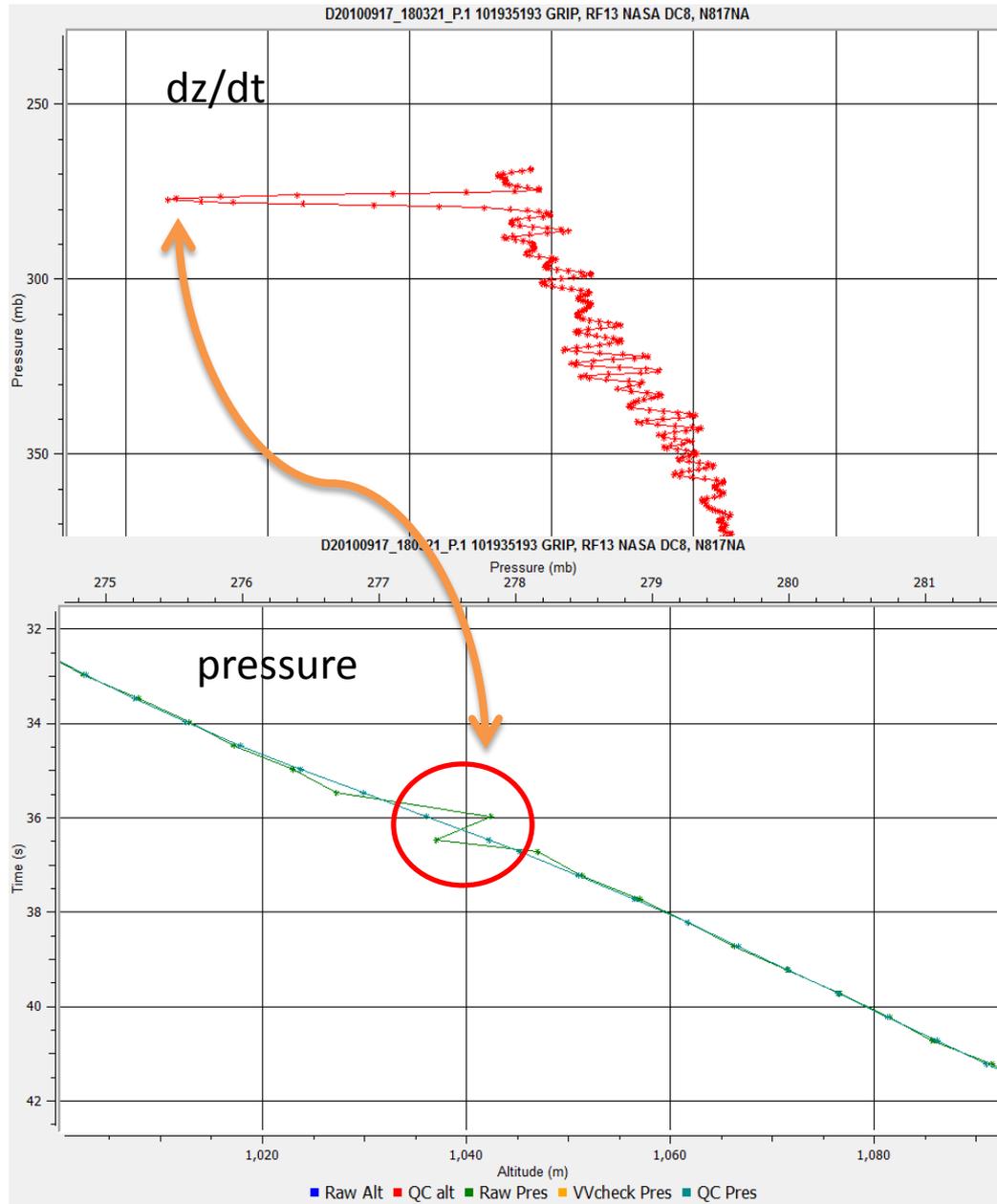
Corrections

•The problem was resolved in the manufacturing for new sondes.

•These files were processed through ASPEN with more restrictive QC parameters than are typically used. This removed virtually all evidence of the oscillations. As a result, these soundings can be data sparse.

PTU Oscillations

D20100815_130754_P.2 100155283 PREDICT, RF 01 NCAR GV, 677F

Temperature (C)

Pressure (mb)

Relative Humidity (%)

■ Raw RH ■ QC RH ■ Raw Temperature ■ QC Temperature

dz/dt spikes

D20100917_180321_P.1 101935193 GRIP, RF13 NASA DC8, N817NA

dz/dt

pressure

Issue
In 6 soundings there was a large negative spike in dz/dt caused by an abrupt pressure offset.

Cause
Time tag differences between the AVAPS PC clock and GPS time from the dropsondes. This occurred if the dropsonde did not have GPS satellite lock prior to launch and the PC clock significantly drifted.

Corrections
During these periods (usually about 5 seconds) the calculated descent rates and vertical winds were set to missing.

Data not to the surface

GRIP Dropsondes 2010
Last Available Pressure (mb)
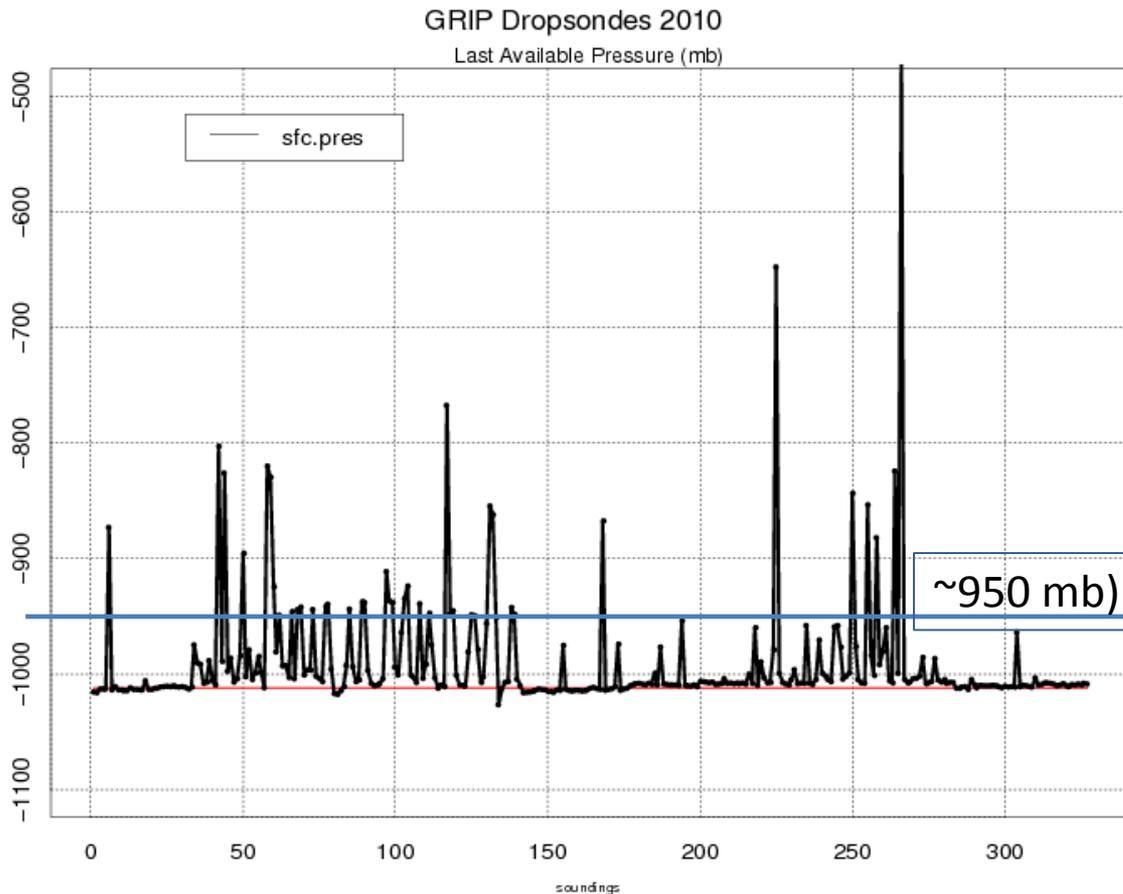
Issue/Cause

Forty five dropsondes did not provide useful data to the surface due to a loss of signal or PTU oscillations near the lower portion of the sounding.

Corrections

~950 mb)

The geopotential altitude, contained in these soundings, was calculated from flight level downward.

Fast Falls and Partial Fast Falls

Fast Fall

Partial
Fast Fall

Actual dz/dt

Typical dz/dt

Wind Speed
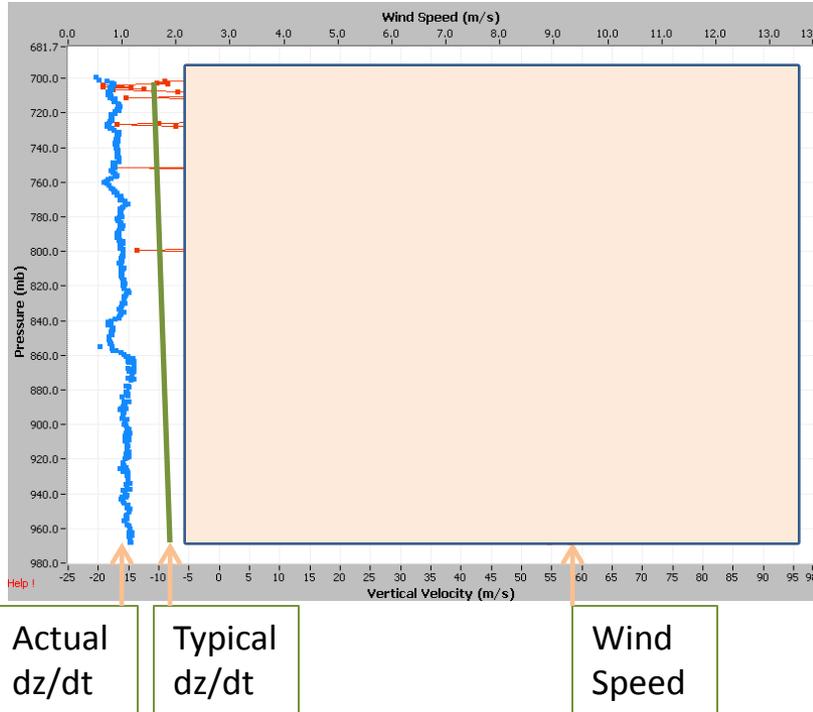
Issue/Cause

"Fast falls" are drops where the parachute failed to deploy or deployed late (a "partial fast fall"). During GRIP there were 8 fast fall drops and 10 partial fast fall drops.

Results in the dropsondes falling at a faster rate (and sometimes tumbling) causing the wind speed and direction to be unreliable.
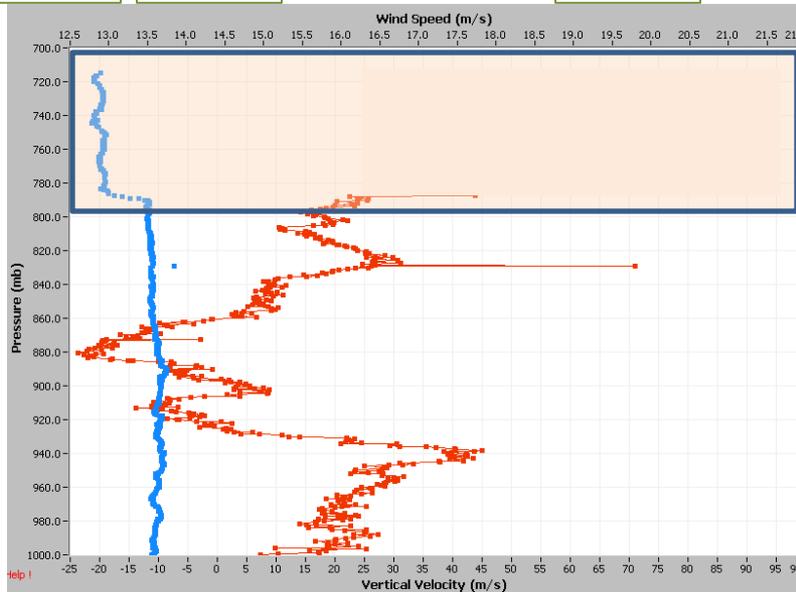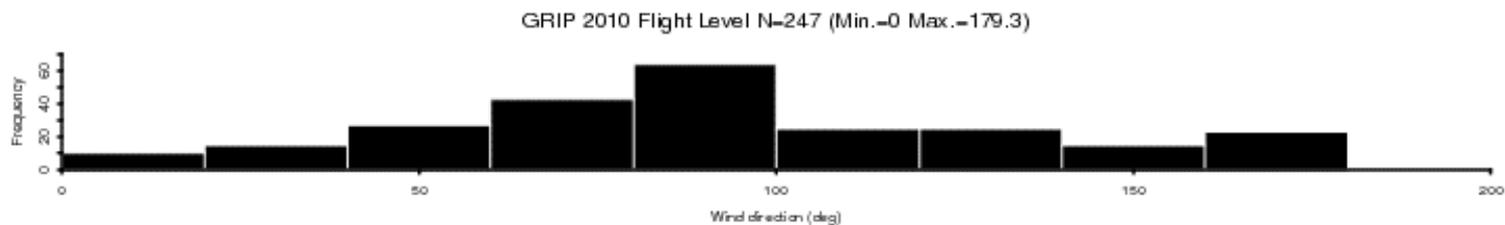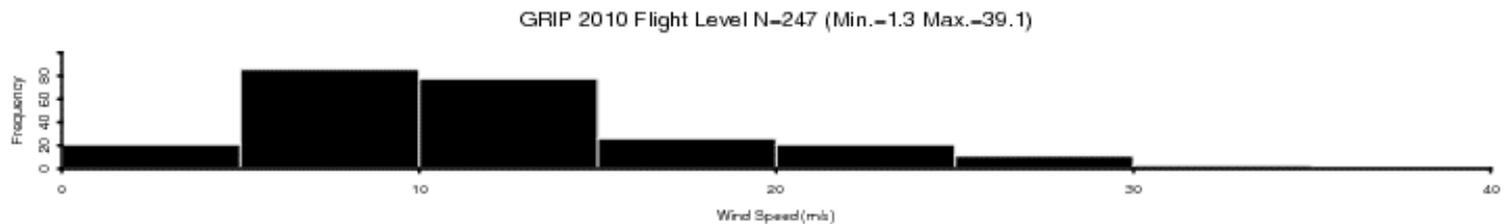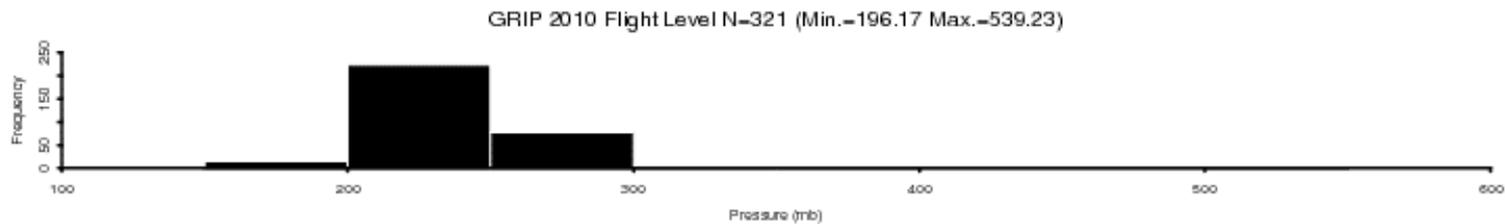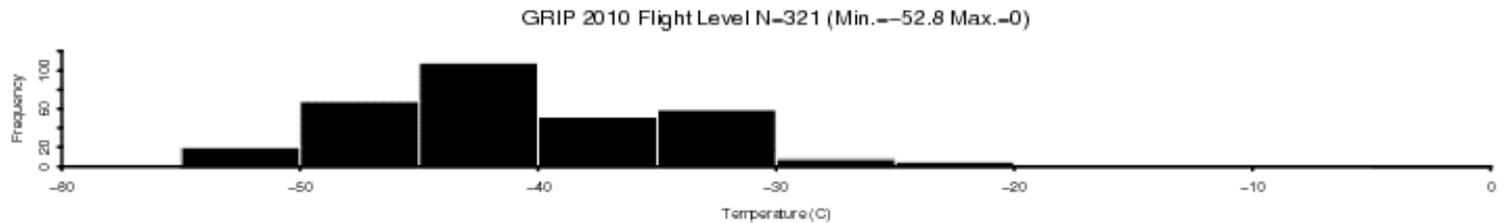
Corrections

For these soundings the wind speed, wind direction and vertical wind parameters were set to missing during the period of fast fall.

Questionable FL Aircraft RH

Where To Get QC Dropsonde Data

- The direct link to the data set is: http://data.eol.ucar.edu/codiac/dss/id=126.016