Processing of dropwindsonde data has been performed by two different software packages on the NOAA and other aircraft.

1. EDITSONDE, written and maintained by the HRD, is used on all P-3 missions and, until 2006, on all G-IV flights. This software was created with the original dropwindsonde design (Hock and Franklin).

2. Other aircraft employ ASPEN, maintained by the Earth Observing Laboratory (EOL) Division of the National Center for Atmospheric Research (NCAR).

The automatic portions of the two software packages produce similar (but not identical) results, especially in the TC core. The operation of the software is very different as is the capability to manually edit the data.

ASPEN operates in a nearly fully automatic mode and provides few checks or abilities to view and edit the data. It can only be run on computers running the Microsoft Windows operating systems.

EDITSONDE is designed to be interactive, employing a specific sequence of algorithms based on graphical and text displays presented to the operator. It can also be run in a semi-automatic mode with minimum intervention by the operator. It can only be run on certain UNIX-based HP workstations because of the graphic libraries used.

Common errors are data biases, faulty/noisy winds due to bad telemetry, incorrect assignment of the “splash” point resulting in erroneous height calculations, excessive data noise, and sensor wetting errors.

Both techniques remove most gross errors and filter noisy data. Some erroneous data remain without manual intervention.

ASPEN allows removal of erroneous data only at the mandatory or significant levels of the TEMPROP message. EDITSONDE has the capability to manually correct or remove any portion of the data for any measured variable.

ASPEN has no mechanism for bias removal, whereas EDITSONDE easily performs this task.

EDITSONDE has the capability to plot synoptic maps to ensure sonde-to-sonde consistency.

Diagnostics of surface pressure calculations, critical for proper assignment of heights, are part of EDITSONDE, whereas ASPEN does not currently have this capability.

The Joint Hurricane Testbed has funded the development of a single software package that combines the ease of use of ASPEN yet includes many capabilities of EDITSONDE.

It will be written in C++ and operate on multiple computer platforms with standard operating systems and graphics packages.

The code will be open source to allow modifications to be implemented and tested by all organizations that use the data.

It will be able to run in an automatic mode for operations or to allow for detailed data inspection and correction for research.

Two random samples of 100 dropwindsondes that were dropped into the eyewall from the NOAA P-3s and in the synoptic environment from the NOAA G-IV jet were chosen for investigation.

Seventy-eight of the 100 eyewall soundings required some operator intervention, particularly those that failed to transmit data to the sea-surface. Other manual procedures include corrections for a pressure or dry relative humidity bias, corrections to flight-level data from a delayed launch detect, additional filtering of noisy data, and corrections for sensor wetting. Twenty-five needed correction to the automatic selection of the “splash” point to correctly determine the heights.

Some of these corrections are not possible with ASPEN.

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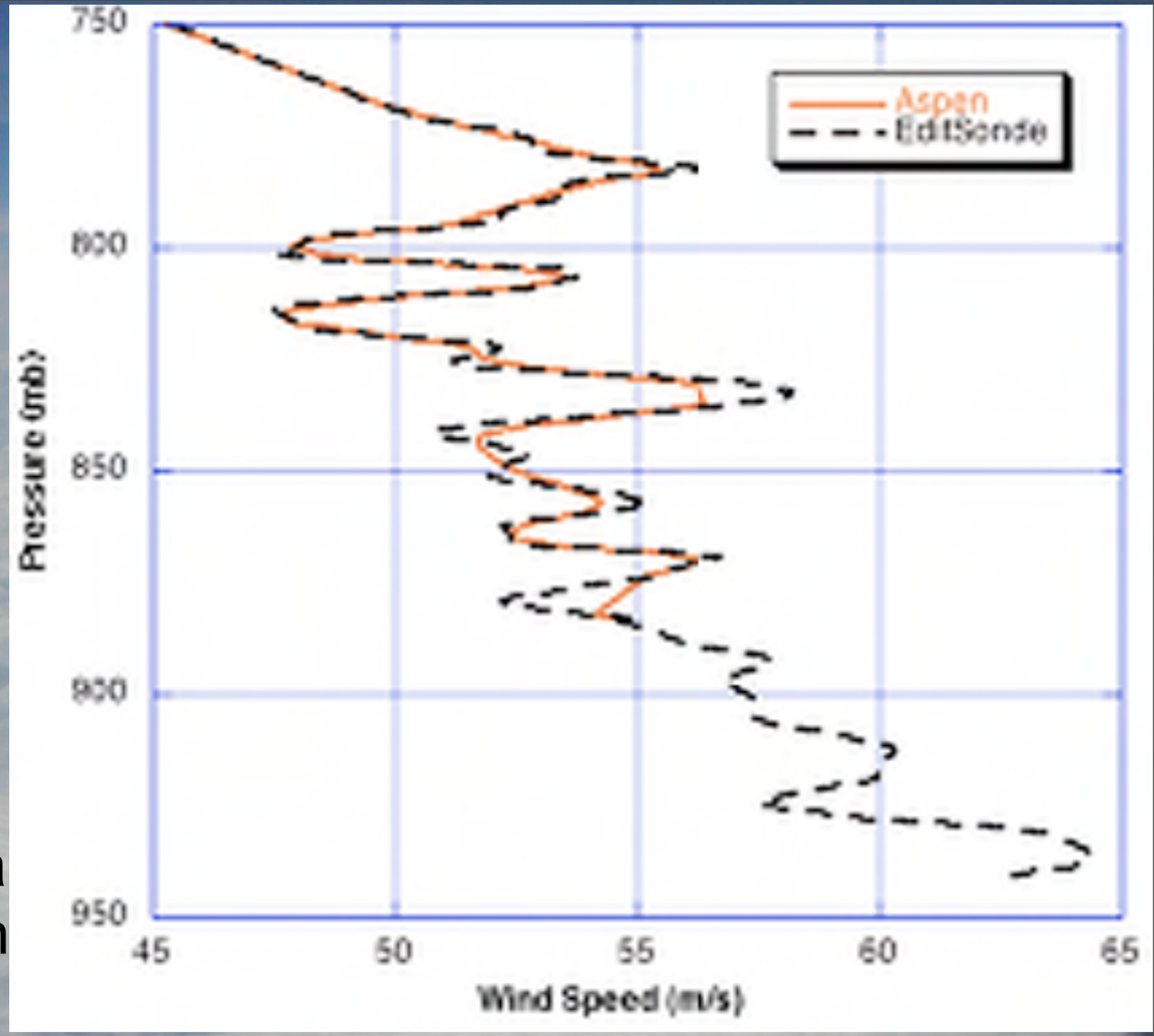
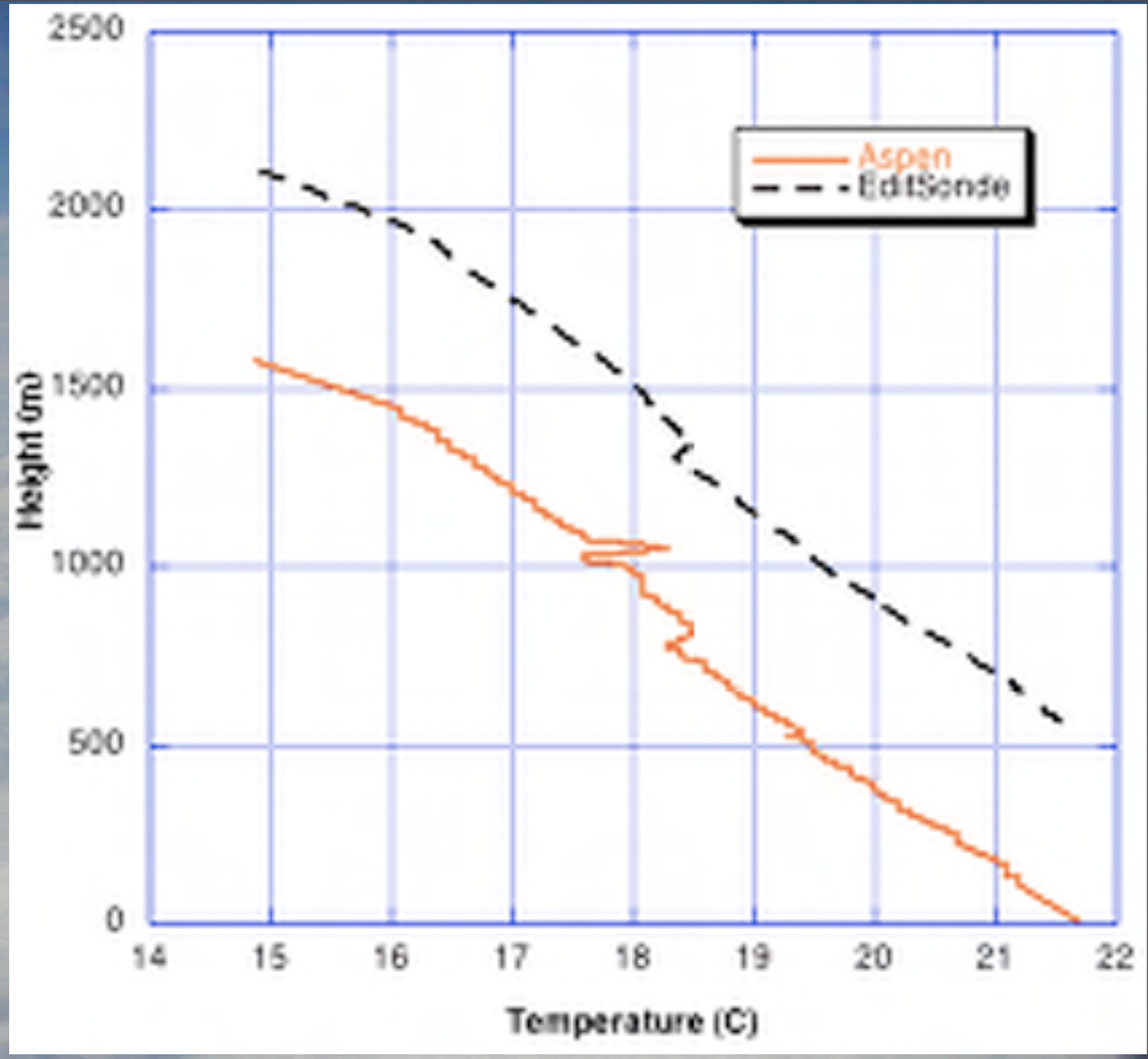
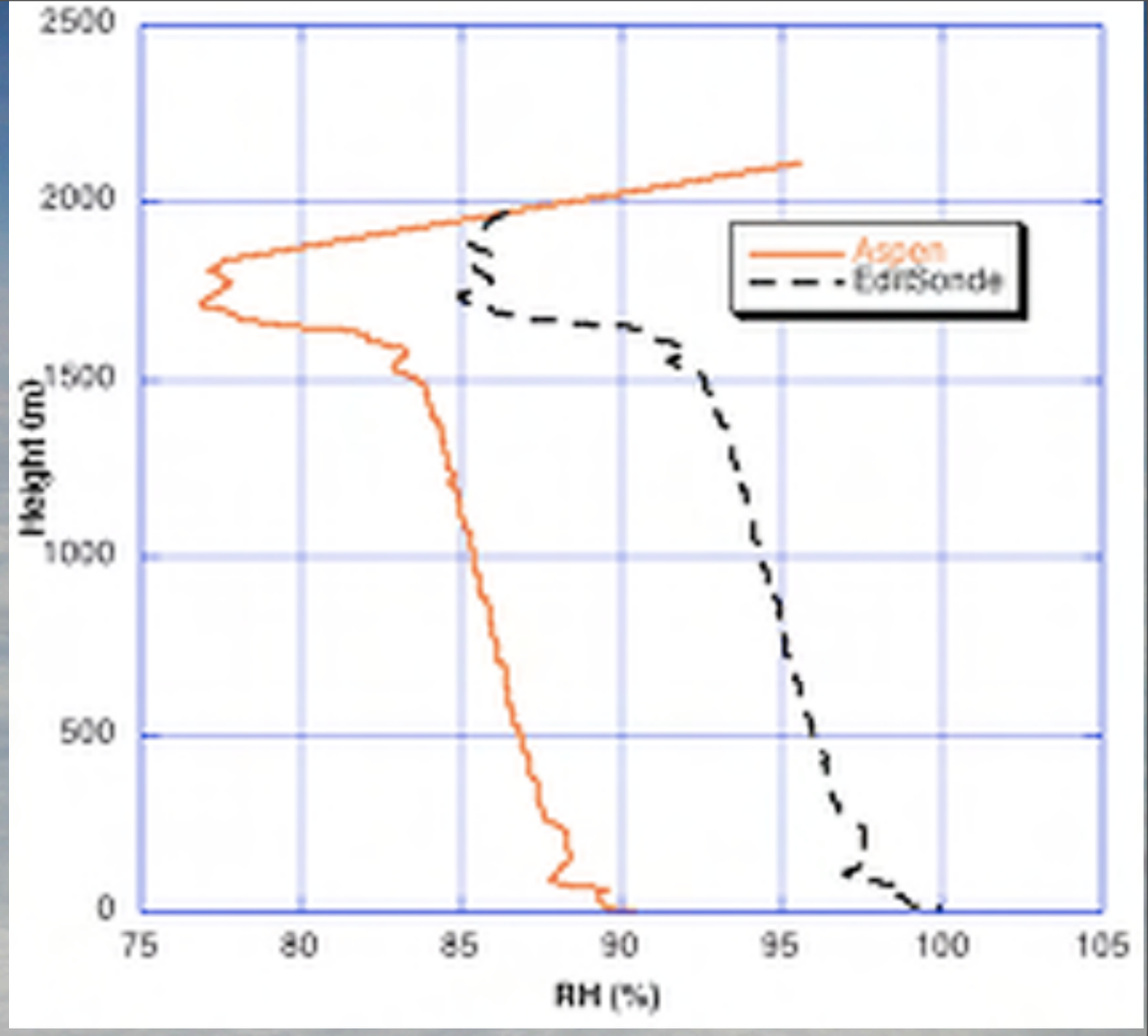


This sounding has a large offset in the two temperature profiles due to a failure of the instrument to transmit down to the surface. The automatic ASPEN algorithm incorrectly identified the last data record as a “splash” point, resulting in incorrect height assignment. ASPEN can override this, but does not have the diagnostics to readily determine the correct splash. Though the temperature offset is the main difference, additional noise and spikes remain in the ASPEN profile.

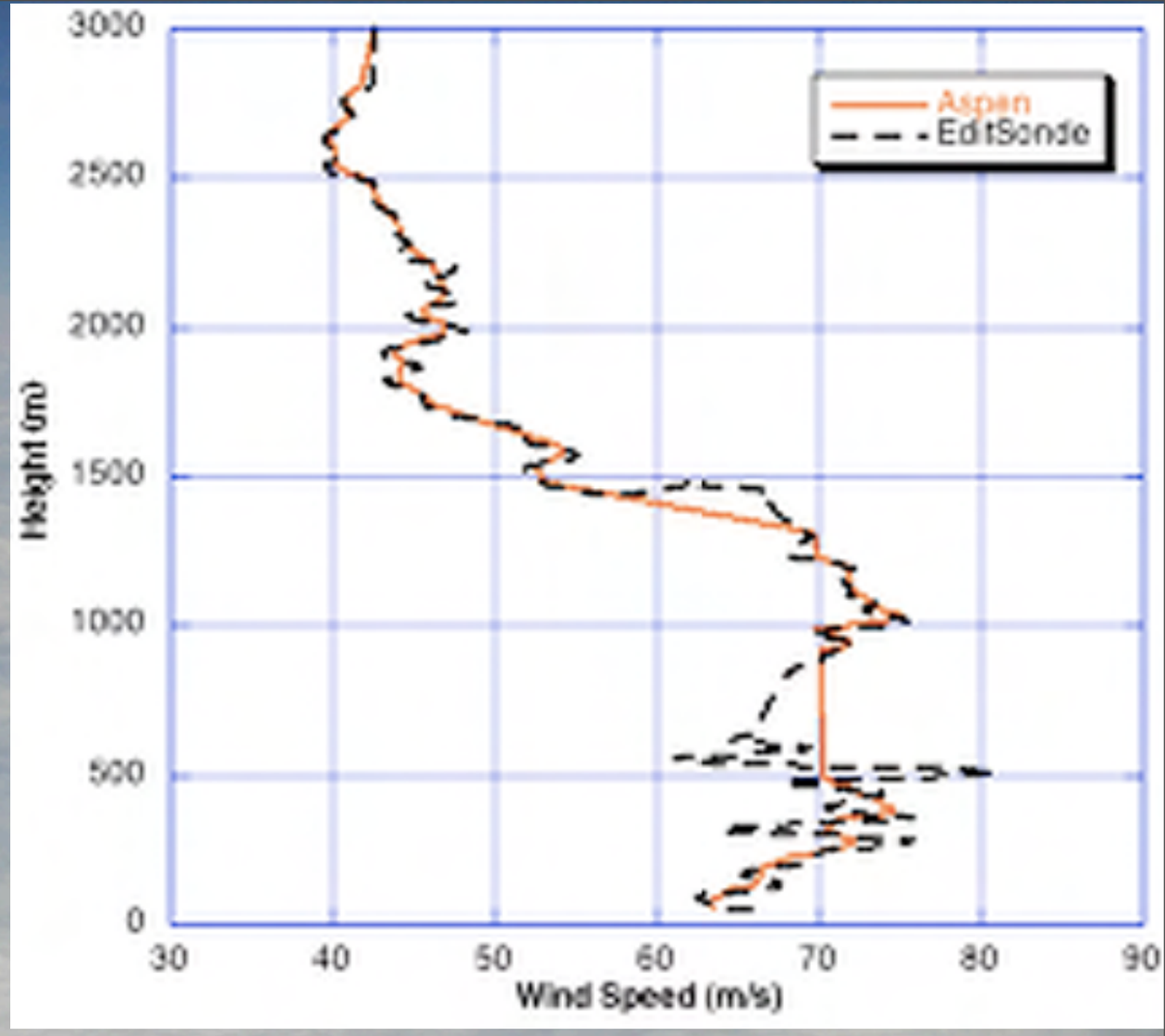


The RH profiles are offset because a bias correction was applied in the EDITSONDE, a capability not currently available in ASPEN. The dry bias is a result of molecular contamination of the RH sensor by airborne particulates, is somewhat random and unpredictable, and can have a magnitude of 5-20% in RH.

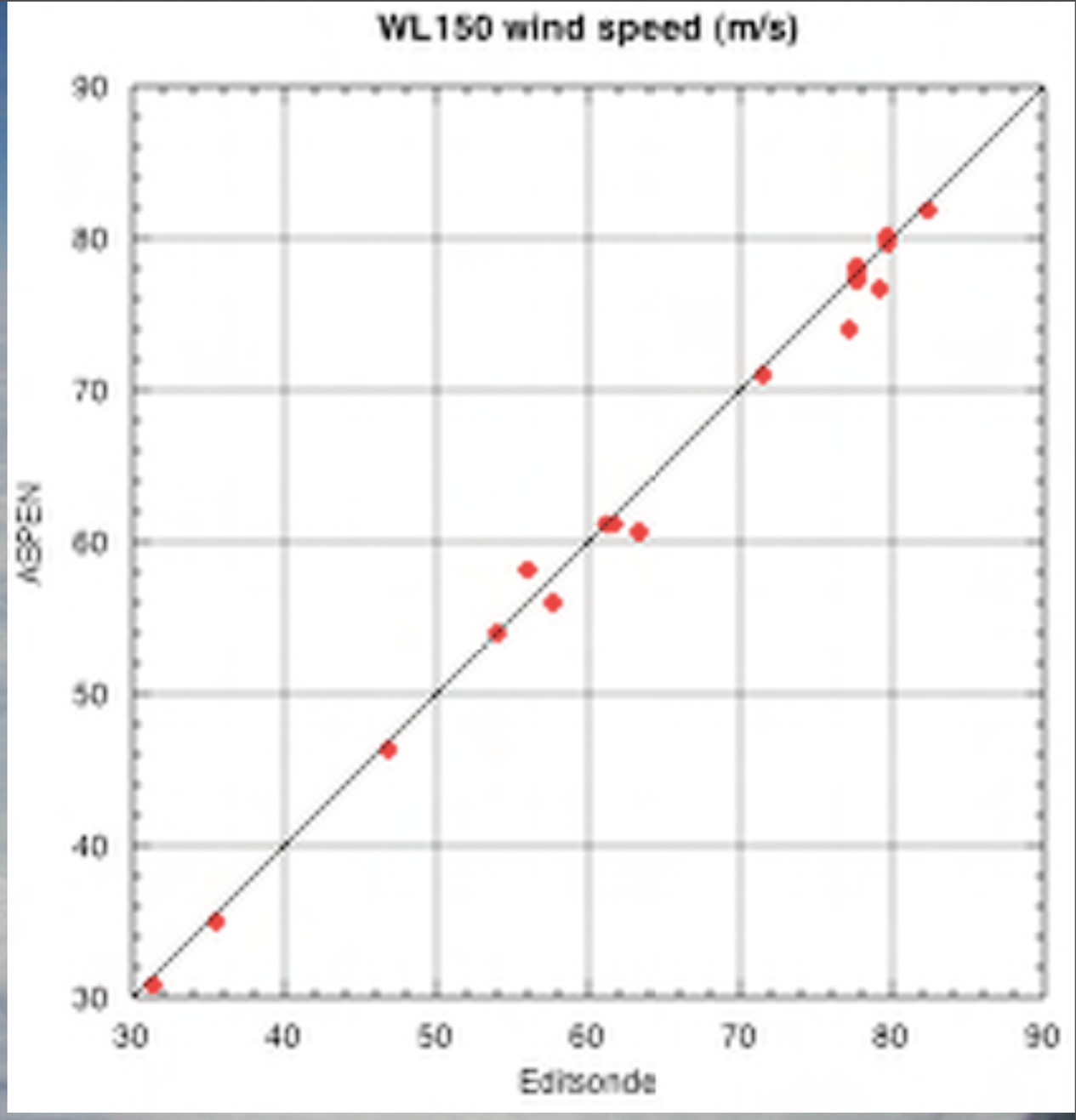


The wind profiles differ because of strong updrafts in the eyewall.

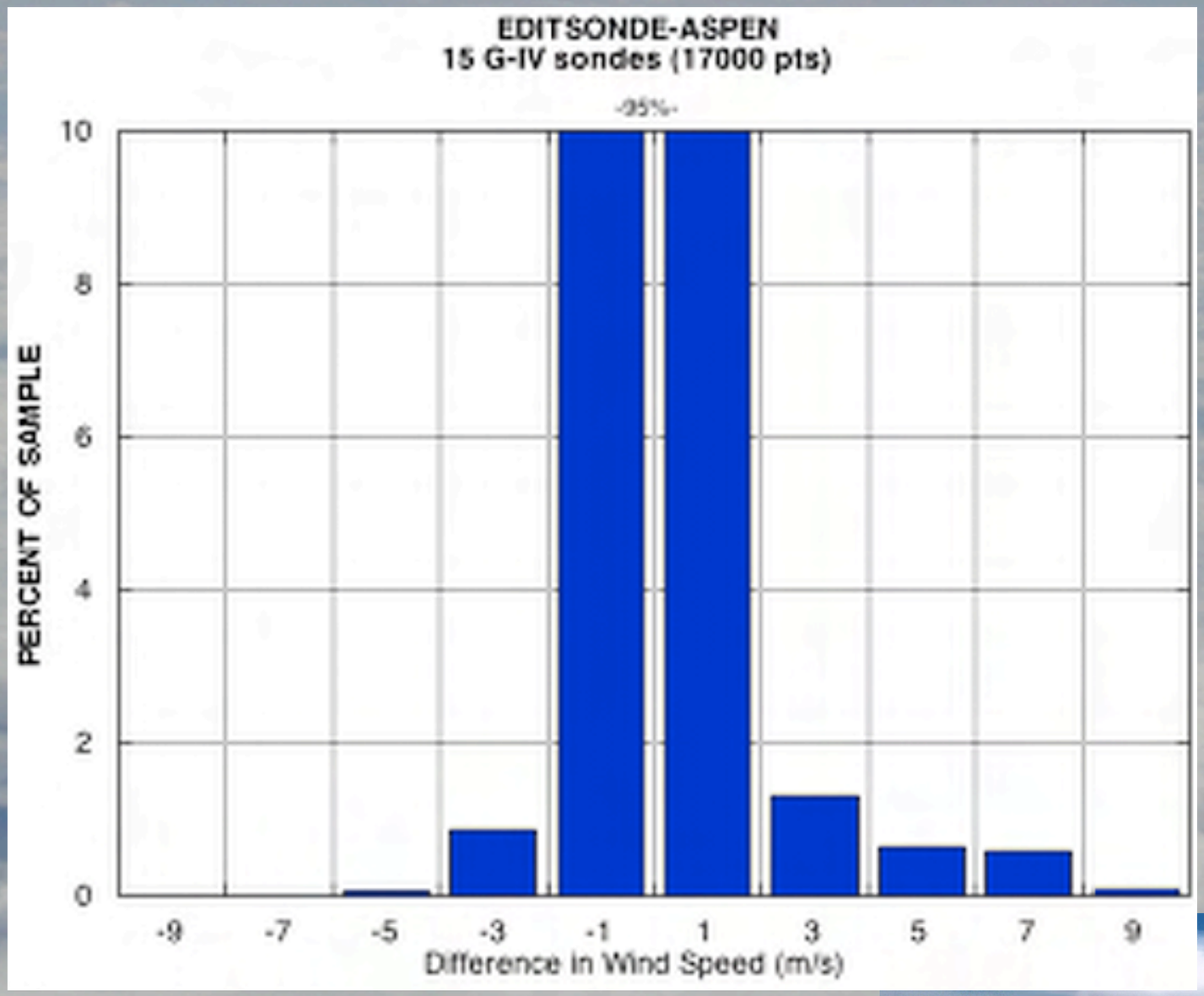
ASPEN was unable to correctly process data in updrafts exceeding the instrument terminal fall speed. ASPEN removed data within these updrafts. These events are rare. The current version of ASPEN has been corrected.



Near-surface wind speed differences >2 m/s in soundings with these extreme events, significantly larger than the measurement uncertainty, in about half of the sample. Height differences of tens of meters were also seen.



Of the 100 random soundings from the G-IV, 48 required manual intervention. Two had faulty or a non-exiting launch detects. EDITSONDE was able to process the thermodynamic data in these 2, whereas ASPEN produced no output.


EDITSONDE-ASPEN
15 G-IV sondes (17000 pts)
-95%-
PERCENT OF SAMPLE
10
8
6
4
2
0
-9
-7
-5
-3
-1
1
3
5
7
9
Difference in Wind Speed (m/s)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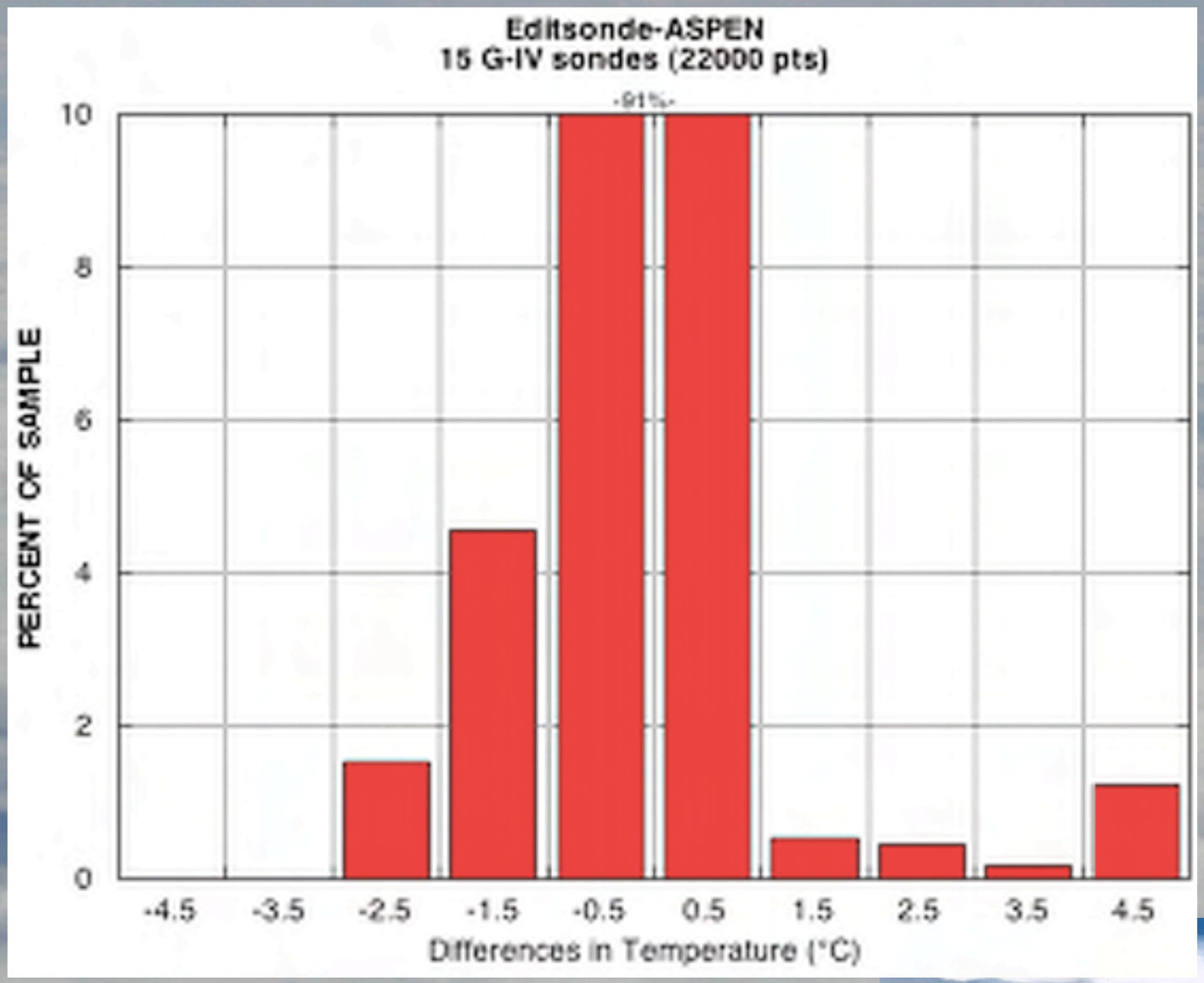
Editsonde-ASPEN
15 G-IV sondes (22000 pts)
-91%-
PERCENT OF SAMPLE
10
8
6
4
2
0
-4.5
-3.5
-2.5
-1.5
-0.5
0.5
1.5
2.5
3.5
4.5
Differences in Temperature (°C)


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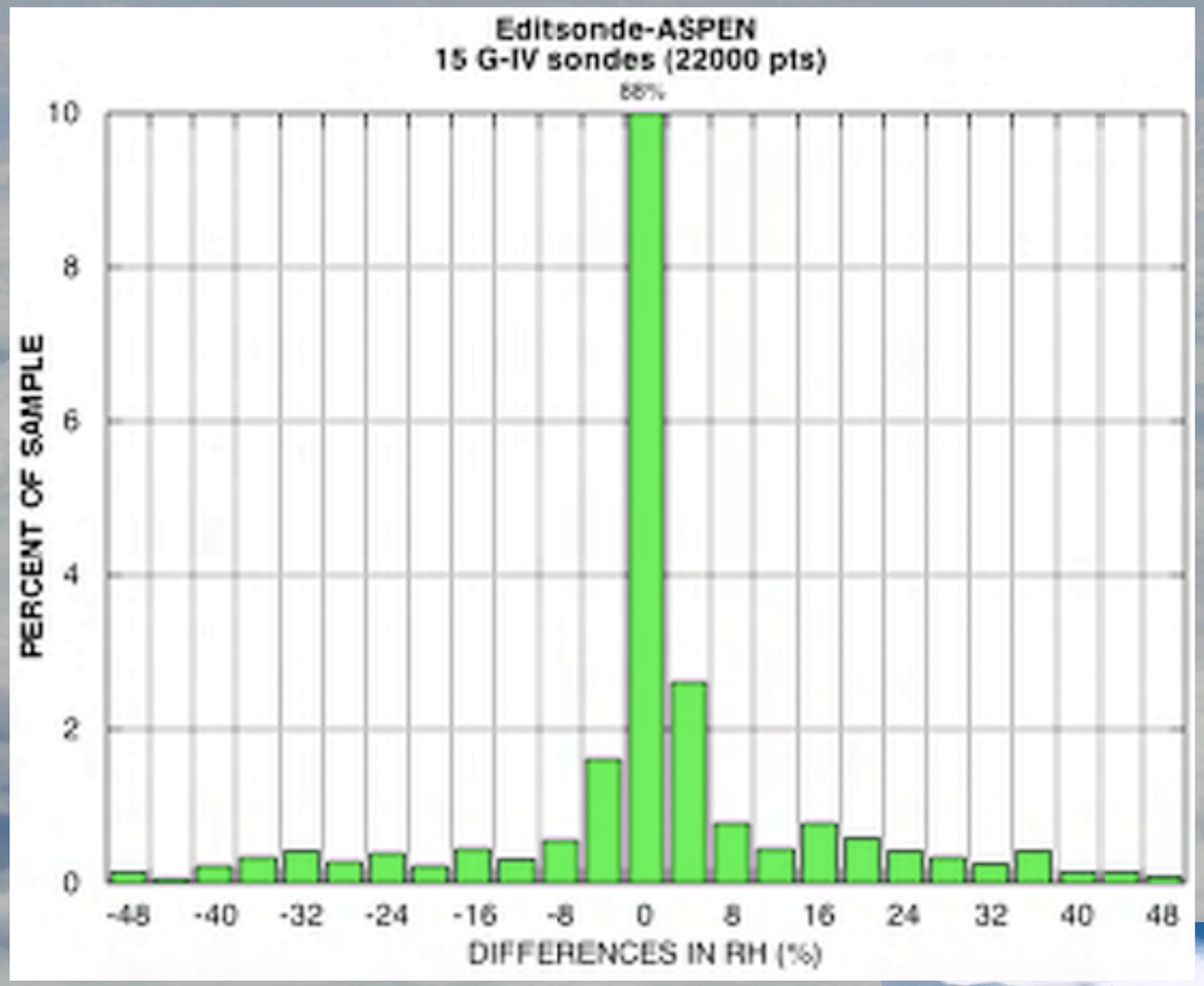
Editsonde-ASPEN
15 G-IV sondes (22000 pts)
88%
10
8
6
4
2
0
PERCENT OF SAMPLE
-48
-40
-32
-24
-16
-8
0
8
16
24
32
40
48
DIFFERENCES IN RH (%)


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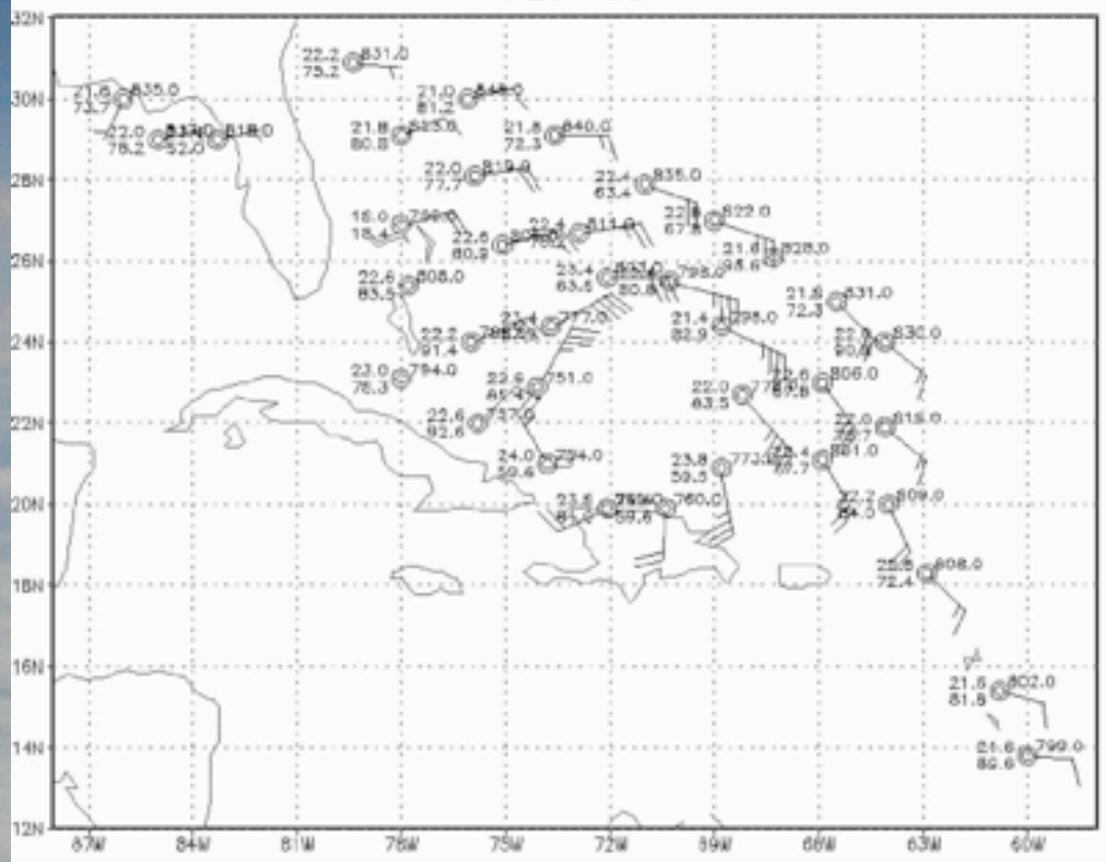
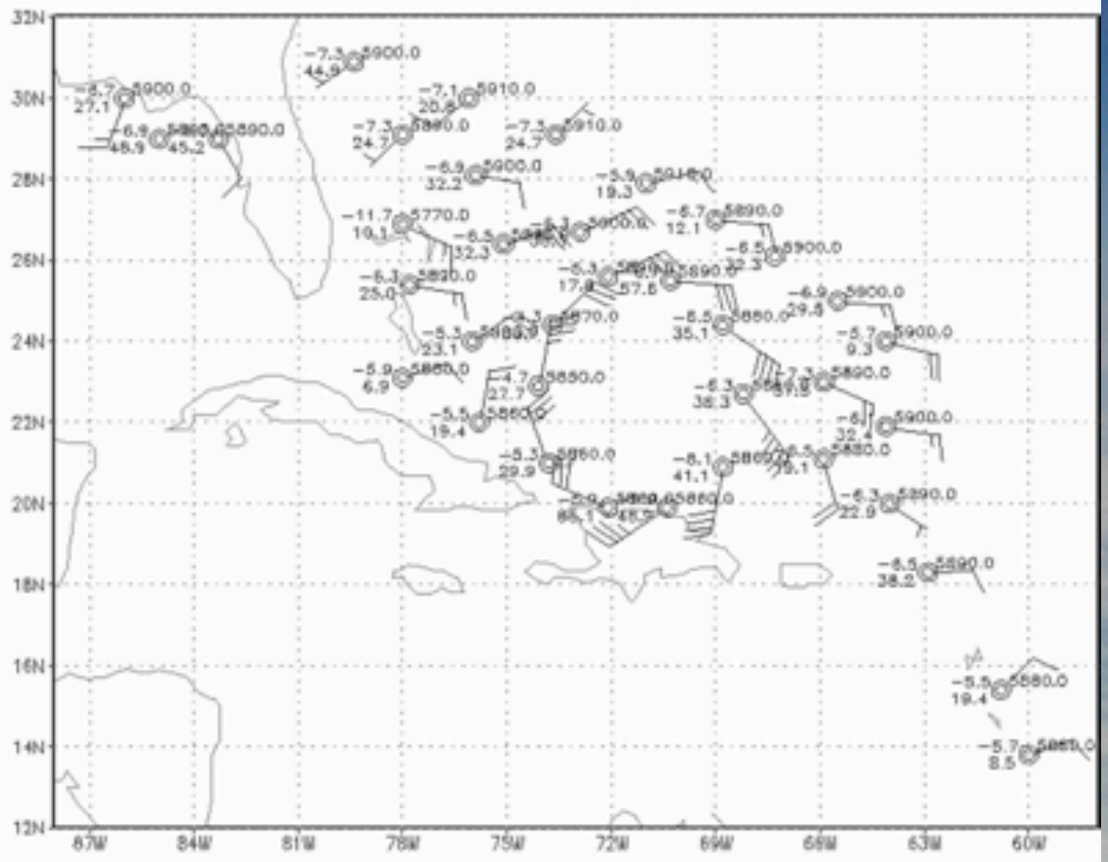
(a)

925 mb



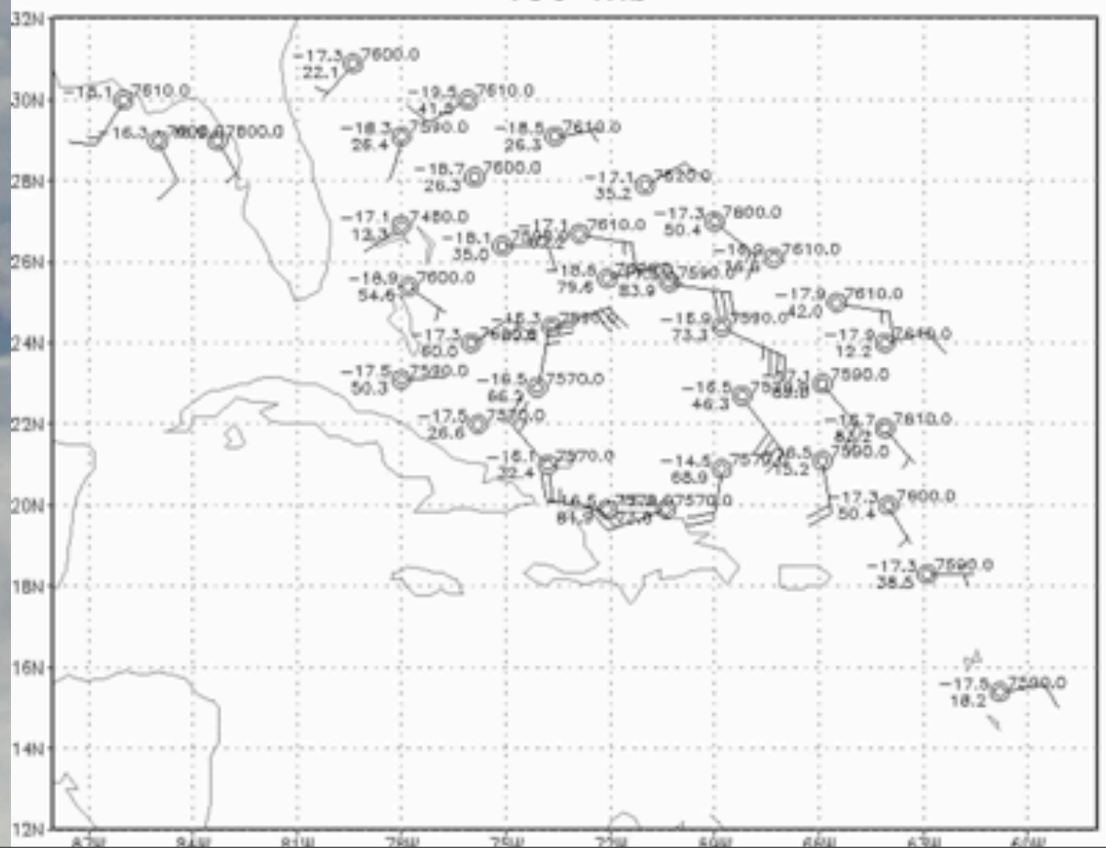
(b)

500 mb



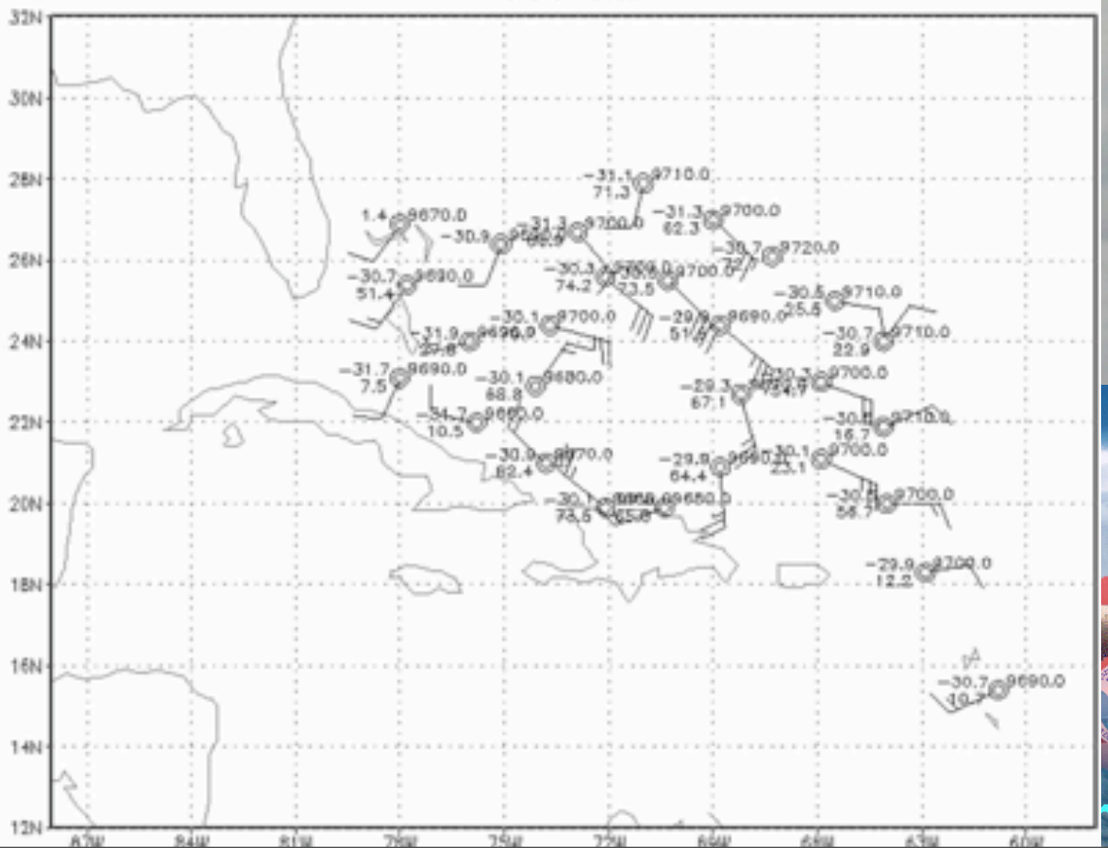
(c)

400 mb



(d)

300 mb



HRD's offers

HRD is willing to help process any difficult dropwindsondes brought to our attention. Just send me e-mail at sim.aberson@noaa.gov.

We have (GrADS) software that will plot synoptic maps at mandatory levels from TEMPDROP messages. I can provide that to anyone interested.

Anyone with ideas for the new software should also contact me.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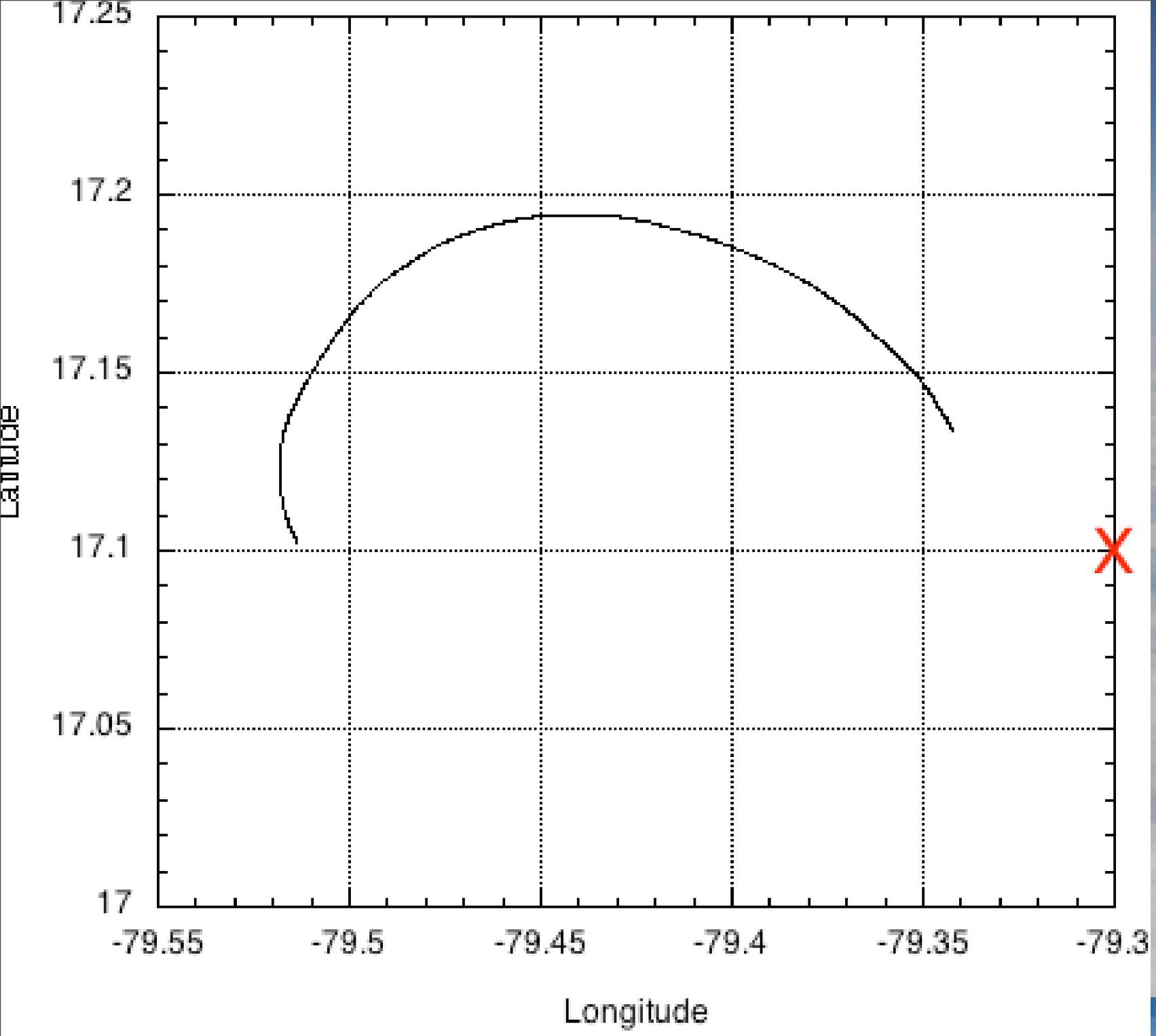

Figure 5. Trajectory of a dropwindsonde released in the eyewall of Hurricane Emily 16 July 2005. The 'X' marks the location provided on the TEMPDROP message and represents the only location available for assimilation of the dropwindsonde data.


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2008 environmental dropwindsonde missions (27 August to 01 October)

A parallel run of the GFS model (identical to the operational run except for the removal of dropwindsonde data globally) has been completed for this entire period. 132 h forecasts are initialized every 6 h.

This is the longest such period ever run. (Previous run was 3 weeks in 2004.)

Model grib files are available through me, T-PARC, or DOTSTAR.