

# Progress and plans for the development of a unified dropsonde quality assurance and visualization capability

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# Background:

Two software packages have been used on operational aircraft missions to date:

- 1)HRD's Editsonde package on all P3 missions and G-IV flights prior to 2005
- 2)NCAR's ASPEN software on AFRC C-130 missions

HRD, NCAR, and NHC determined that substantial differences in the products (TEMP DROP messages, ASCII files) between the two packages could occur due to differences in the algorithms and capabilities of the two software suites



Both software packages are for single computer platforms- ASPEN: Windows, Editsonde: HP Unix

The JHT decided to fund an effort to reconcile the differences in the software, improve on the capabilities, and convert the code and graphics packages to work on multiple computer operating systems

# Progress:

A formal meeting was held in 2009 among the primary users of dropsonde quality assurance software users to identify the major requirements of the project which include:

1) Retain the basic structure and graphical capabilities of ASPEN while adding additional capabilities that are available in Editsonde

2) The highest priority of these capabilities are the use of synoptic maps to more easily analyze and correct observations from individual flights and more control of the data editing features



3) The new software package should have multi-platform capability

1) Reconciliation of quality control algorithms between the Aspen and Editsonde software

# Progress (cont'd)

- 1) Significant progress has been made in the reconciliation of the algorithms, especially for the critical near-surface region of the sounding. Differences between Aspen and Editsonde were carefully studied and the causes of discrepancies were documented. Aspen was modified so that the near-surface processing produces results very close to the output from Editsonde
- 2) A prototype software package has been built that is multi-platform capable. The package uses the Nokia-Trolltech Qt graphical user interface system, along with utilization of the “scons” software build environment that makes this possible. An initial scons configuration has been completed, and the AspenV3 prototype is now operating on three platforms: Windows, Linux, and Mac OSX operating systems. The initial prototypes have been tested for basic functionality and will be soon be available to JHT point of contacts and collaborators for further testing.
- 3) NCAR-EOL has recently hired an additional software engineer to work on this project. The software engineer holds Master's degrees in both computer science and meteorology and thus is ideal suited for this project. He will devote about half of his time to the unified dropsonde software package

# Near-term Goals

- 1) A synoptic analyses and visualization feature will be added to ASPENV3. This functionality is currently found in Editsonde, and is the most often requested new feature for ASPEN.
- 2) An “auto-save” feature, which automatically saves the quality control output products, will be added to ASPENV3.



- 3) Additional editing capability of ASPEN V3 will be developed based upon recommendations from the collaborators and JHT point of contacts.
- 4) Work will begin on the development of an automated validation system, which will provide an objective method for comparing processing results between Editsonde and ASPENV3. It will also provide a method for validating software modifications to the unified software package as development continues in future years.

# 2010 Hurricane season plans for ASPENV3:

The prototype software will NOT be used operationally this summer except for:

1) Ground processing of the raw dropsonde files from the NASA Global Hawk dropsonde system (research flights)

2) Possibly for the NASA DC-8 dropsondes as well\*

3) Possibly for NOAA P3 operational and research missions\*

\* To date plans have not been finalized for dropsonde processing for aircraft involved in field campaigns this summer (PREDICT, GRIP, IFEX). Other factors besides the availability and functionality of ASPENV3 are involved

# ASPENV3 screen shots: Linux

Aspen - [D20080911\_083327.TF11d22\_04E1E71B.1] View Virtual Machine Window

File Tools View Window Help

Main Raw QC XY Graph Skew-T Levels WMO Comm Summary

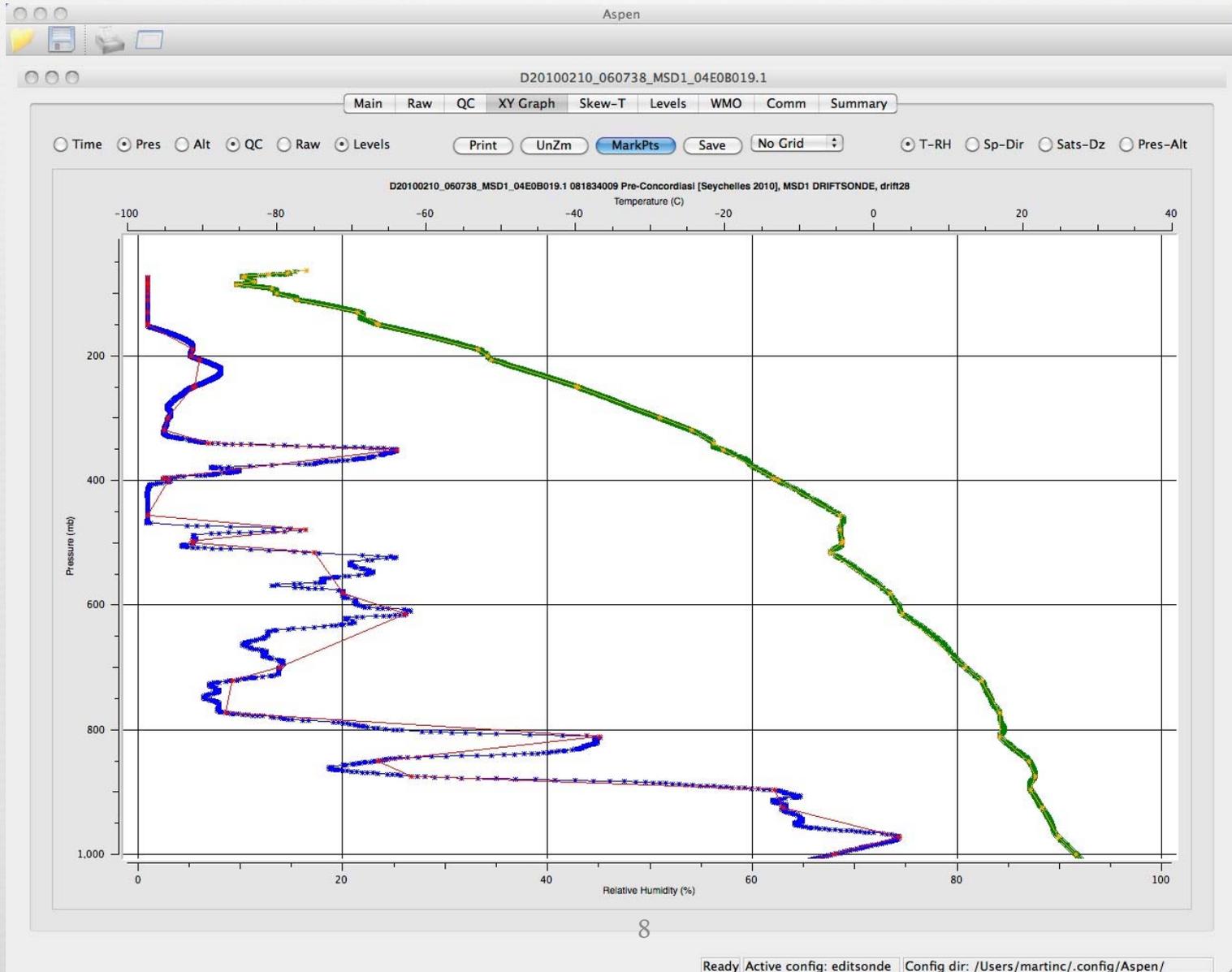
D20080911\_083327.TF11d22\_04E1E71B.1 081913627 T-PARC Driftsonde, TF11d22 DRIFTSONDE, drift22

Modify Restore Insert Before Insert After Delete Original groups: 216 Modified groups: 0 Print Save Email

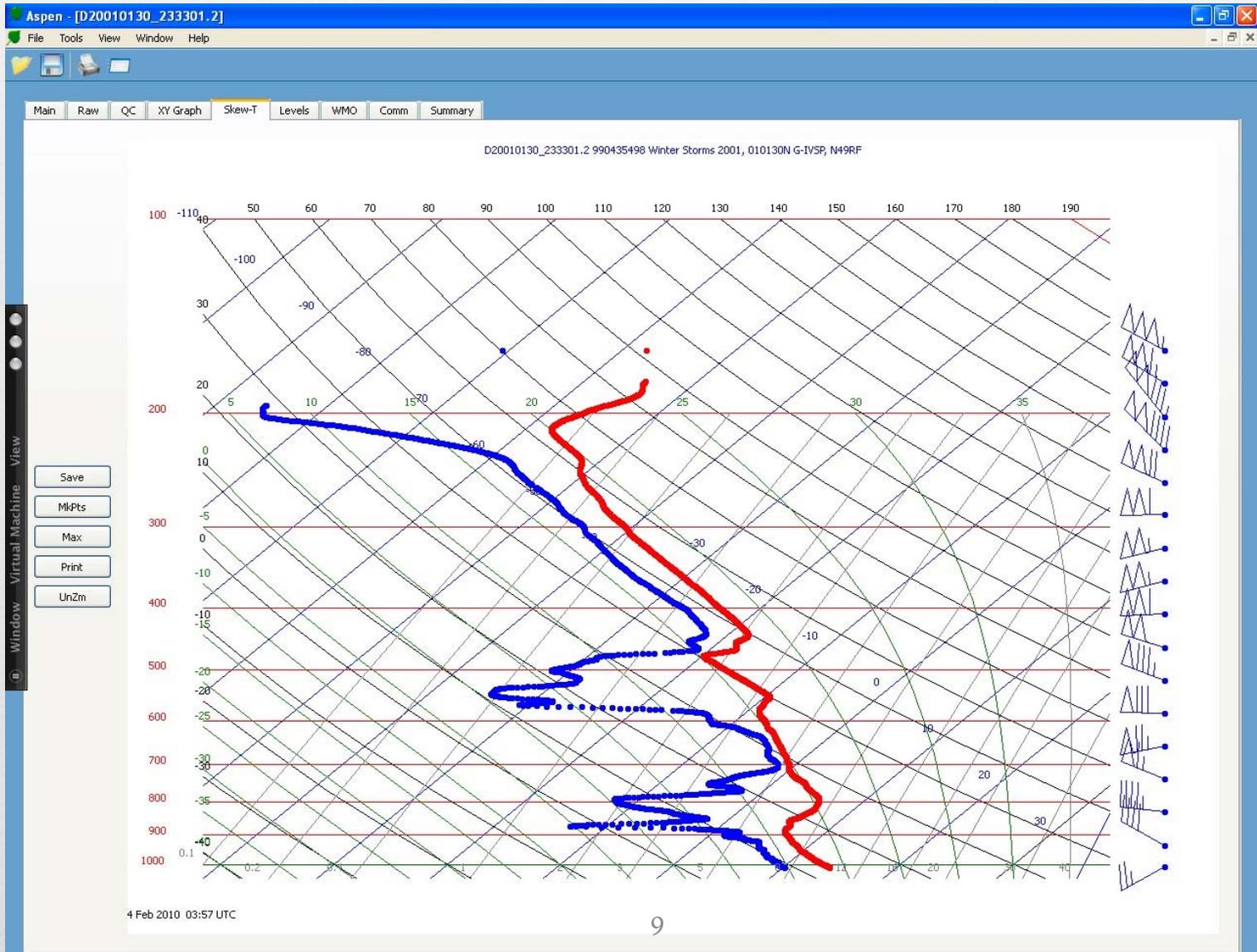
	1	2	3	4	5	6	7	8	9	10	11
4	07530	40744	17937	09519	30953	33156	11512	25079	43359	16513	20225
5	56168	20518	15403	65181	34522	10649	67781	09021	88151	65181	34522
6	77999										
7	31313	09608	81535	61616							=
8	XXBB	61238	99202	11678	09207	00///	////	11945	22858	22938	24457
9	33920	02057	44900	01758	55898	01558	66883	17660	77874	20060	88809
10	15458	99761	14060	11639	01820	22508	07121	33410	16735	44346	25148
11	55300	33156	66247	43759	77192	59170	88173	62575	99145	66381	11137
12	63382	22113	66781	33110	65581						
13	21212	00///	////	11952	10023	22850	12026	33784	12514	44563	07037
14	55380	09018	66300	11512	77282	11016	88264	11515	99252	16513	11234
15	17504	22219	20510	33204	20016	44190	22521	55182	27015	66169	33019
16	77161	34025	88142	00518	99130	06511	11121	03011	22116	05521	33112
17	03510	44110	06010	55105	09513	66101	08519				
18	31313	09608	81535	61616							=
19	XXCC	61237	99202	11678	09207	70863	71579	07018	88918	70380	11026
20	77999										
21	31313	09608	81535								
22	51515	10190	50087	61616							=
23	XXDD	6123/	99202	11678	09207	11958	67781	22904	70780	33844	67981
24	44740	68980	55704	70980	66677	76778	77653	37789	88650	37989	
25	21212	11962	11526	22899	10521	33877	08015	44699	07018	55650	08028
26	31313	09608	81535								
27	51515	10190	50087	61616		7					=

Ready | Active config: tom | Config dir: /home/martinc/.config/Aspen/

# ASPENV3 screen shots: Mac OSX



# ASPENV3 screen shots: Windows XP



# ASPENV3 screen shots: Windows XP

Microsoft Windows XP - Parallels Desktop

Aspen - [D20050827\_162131.1]

### Advanced Configuration Management

Quality Control Parameters    Other Options

Configuration set name: dropsonde

**Processing**

- QC Processing
- Levels
- WMO Message

**Levels Threshold**

- 1 Temperature (degC)
- 10 RH (%)
- 10 Wind Speed (m/s)
- 2.5 Wspd below 850mb (m/s)
- 10 Wind direction (deg)

**WMO identification**

These parameters apply to upsonde messages:

Message Type

- TEMP
- SHIP
- MOBIL

99999 Block station number (TEMP)

CALL Call sign (SHIP/MOBIL)

LJUNA19 Upsonde abbreviated header

KWBC Upsonde ICAO code

**Tropopause Levels Detection**

60 Lapse smoothing wavelength (s)

**Fixed Data Source and Destination Directory**

Enabled    Change

C:/Documents and Settings/Owner/

**Dropsonde Parameters**

- Dropsonde mass: 395 grams     Dropsonde hit surface
- Parachute area: 676 squared cm     Surface altitude unknown
- Blend length: 4 seconds     Discard frames with CRC errors
- Cabin temperature: 25 degC    Coefficient of Drag: 0.61

**RH Channel**

- AVAPS Selected
- 1
- 2

**Miscellaneous**

- Set heights missing
- Open file chooser on startup
- Report observed position instead of integrated winds position
- Generate Q/C diagnostics file

Position interpolation (winds) interval: 60 seconds

Plot dimensions (pixels) X: 1000 Y: 700

Default plot file:  PNG  JPG

Number of Skew-T wind barbs: 20

Skew-T minimum temperature (degC): -40

Skew-T maximum temperature (degC): 40

Skew-T minimum pressure (mb): 100

Skew-T maximum pressure (mb): 1050

OK    Cancel    Apply

19	18	GDL Wind Speed	289.5	903.4	25.0	167.0
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Ready    Ready/ Active config: dropsonde    Config dir: C:/Documents and Settings/Owner/Application Data/Aspen/

# ASPENV3 screen shots: Windows XP

Microsoft Windows XP - Parallels Desktop

Aspen - [D20050827\_162131.1]

File Tools View Window Help

Main Raw QC XY Graph Skew-T Levels WMO Comm Summary

D20050827\_162131.1 051926250 RAINEX, RF01 Lockheed P-3D, 154587

Launch Parameters

	Reported	Ignore	Override	
End of Sounding Time	388.95			Clear
Pressure (mb)	593.16	<input type="checkbox"/>		Clear
Temperature (deg C)	3.45	<input type="checkbox"/>		Clear
RH (%)	87.25	<input type="checkbox"/>		Clear
Wind Speed (m/s)	15.67	<input type="checkbox"/>		Clear
Wind Direction (deg)	141.72	<input type="checkbox"/>		Clear
Latitude (deg)	24.6611	<input type="checkbox"/>		Clear
Longitude (deg)	-82.0482	<input type="checkbox"/>		Clear
Altitude (m)	4488.56	<input type="checkbox"/>		Clear

RECOMPUTE

Launch Time

[time hh:mm:ss] [date dd-mmm-yyyy]

Height Overrides

Hit Surface?  Set Heights Missing?

Surface Altitude Unknown (Dropsonde over land)

Dropsonde Height Integration Results

Upward	4472.7	Launch Altitude (m)
Downward	21.243	Low Altitude (m)

Dropsonde Surface Parameters

Pressure (mb)	1005.61		Clear
Altitude (m)	0		Clear

Ready Ready Active config: dropsonde Config dir: C:/Documents and Settings/Owner/Application Data/Aspen/

Parallels Tools are not installed. From the Virtual Machine menu, choose Install Parallels Tools.

# ASPENV3 screen shots: Windows XP

Microsoft Windows XP - Parallels Desktop

Aspen - [D20050827\_162131.1]

File Tools View Window Help

Main Raw QC XY Graph Skew-T Levels WMO Comm Summary

D20050827\_162131.1 051926250 RAINEX, RF01 Lockheed P-3D, 154587

Click on a level to disable /enable it. Disabled Levels are highlighted in red.

	n	Type	Time (s)	Pres (mb)	Tdry (C)	RH (%)	Spd (m/s)	Dir (deg)	Alt (m)
1	0	Uppermost Winds	-1.0	593.2			15.7	141.7	
2	1	Uppermost Thermodynamic	-1.0	593.2	3.5	87.2			
3	2	62626 REL Location	-1.0	593.2					
4	3	GDL Wind Direction	10.0	603.8			18.0	132.6	
5	4	GDL Wind Direction	13.0	606.8			15.5	149.1	
6	5	GDL Wind Direction	22.0	615.7			16.0	158.3	
7	6	GDL RH	43.5	637.4	6.6	67.8			
8	7	GDL Wind Direction	54.0	648.1			18.0	149.5	
9	8	Standard	104.5	700.0	10.3	74.8	19.6	167.3	3110
10	9	GDL Wind Direction	107.0	702.5			19.5	168.0	
11	10	GDL Wind Direction	127.5	724.2			19.4	157.2	
12	11	GDL Wind Direction	170.5	770.5			23.9	173.6	
13	12	GDL RH	197.5	800.5	14.3	89.8			
14	13	GDL RH	207.0	811.2	15.2	73.3			
15	14	Station Base Pressure	240.9	850.0	18.1	65.9			
16	15	GDL Wind Speed	240.9	850.0			25.6	168.2	
17	16	Standard	240.9	850.0	18.1	65.9	25.6	168.2	1471
18	17	GDL RH	275.0	887.4	21.1	59.4			
19	18	GDL Wind Speed	289.5	903.4			25.0	167.0	

12

Ready Active config: dropsonde Config dir: C:/Documents and Settings/Owner/Application Data/Aspen/