

# Atmospheric Sounding Visualization

Sancho McCann

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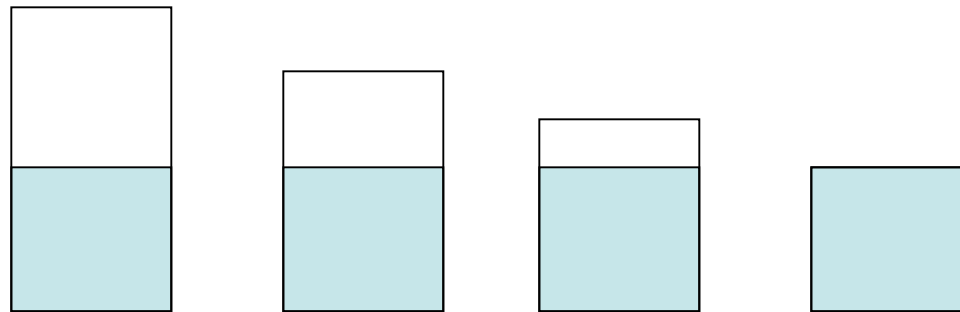
# Soundings

- Pressure
- Altitude
- Temperature
- Moisture
- Wind Speed
- Wind Direction



# Meteorology 101

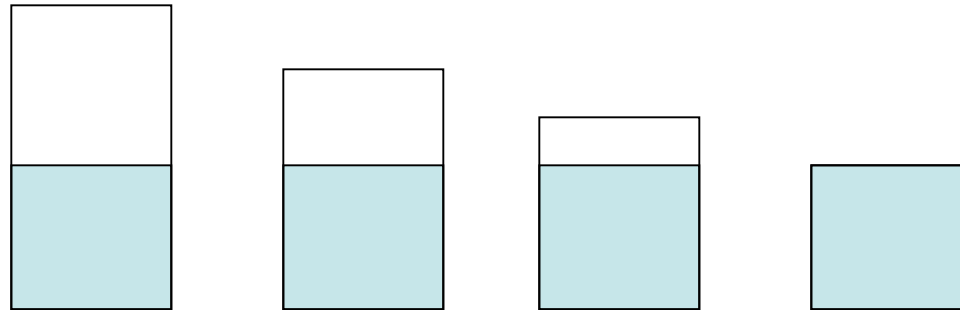
$$\text{Relative Humidity} = \frac{\text{Actual Vapour Pressure}}{\text{Saturation Vapour Pressure}}$$



Temp.	20°	15°	10°	5°
R.H.	40%	60%	80%	100%

# Meteorology 101

- At 100% humidity, the temperature has reached the **dewpoint**



Temp.	20°	15°	10°	5°
R.H.	40%	60%	80%	100%

# Meteorology 101

- Lifting causes cooling at  $9.8^{\circ}\text{C}$  per 1000m



# Meteorology 101

- Inside a cloud, the temperature decreases much more slowly  $\sim 6^\circ$  per 1000m



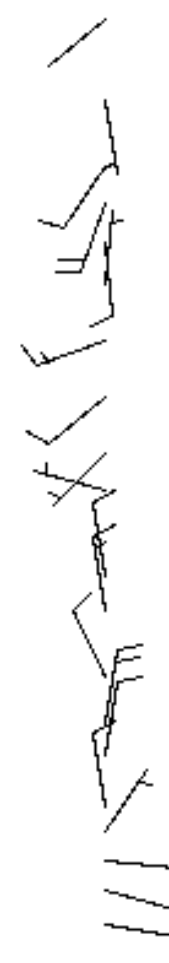
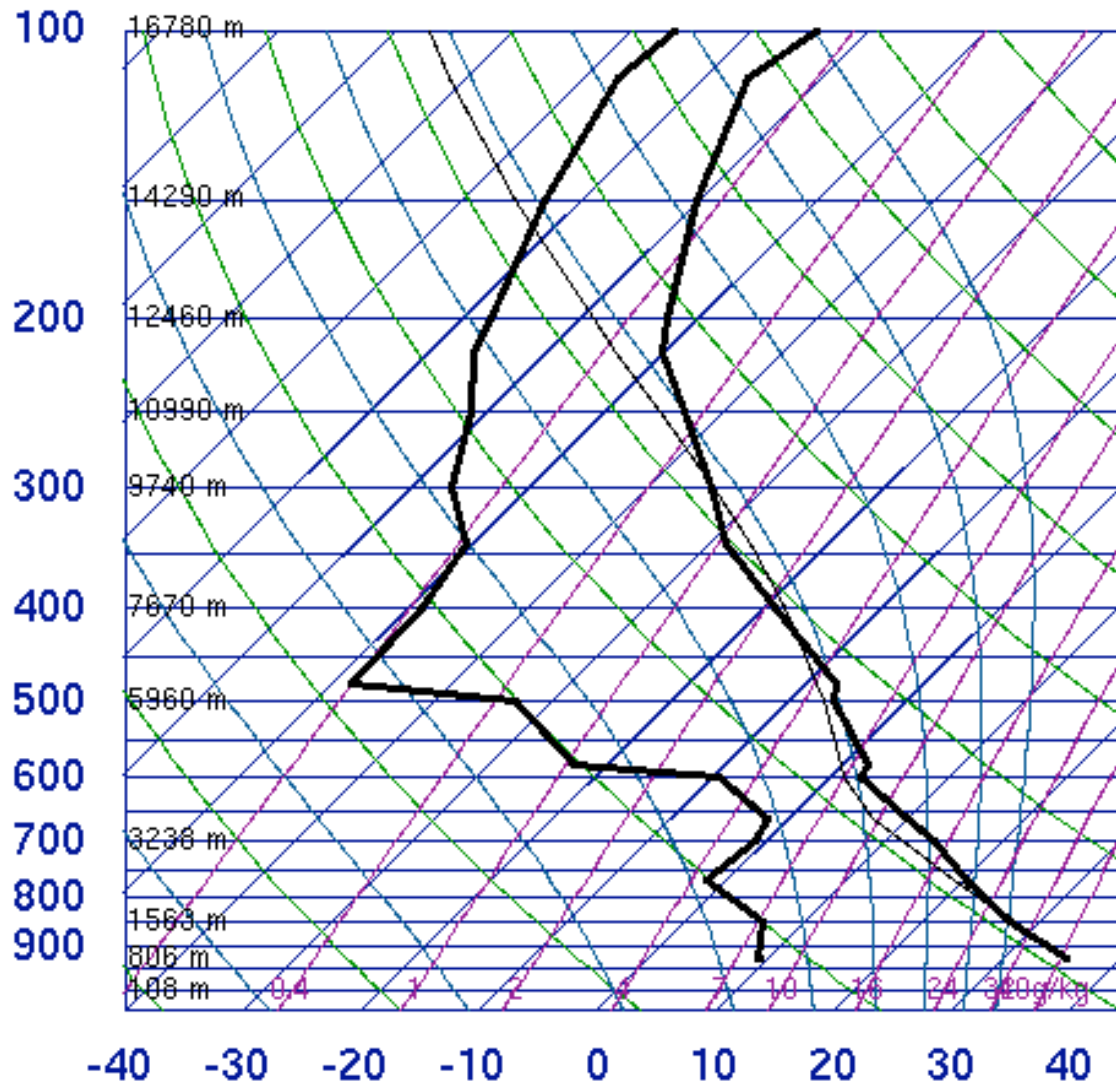
# Sample Sounding Data

72694 SLE Salem Observations at 12Z 08 Oct 2006

PRES	HGHT	TEMP	DWPT	RELH	MIXR	DRCT	SKNT	THTA	THTE	THTV
hPa	m	C	C	%	g/kg	deg	knot	K	K	K
1020.0	61	6.0	3.8	86	4.95	0	0	277.6	291.2	278.4
1000.0	224	10.0	6.9	81	6.28	15	4	283.1	300.7	284.2
997.0	249	10.2	7.1	81	6.38	17	5	283.6	301.5	284.7
990.3	305	10.0	6.8	80	6.30	20	6	284.0	301.6	285.0
954.6	610	9.0	5.2	77	5.83	25	9	286.0	302.6	287.0
925.0	871	8.2	3.8	74	5.46	5	12	287.7	303.4	288.6
920.2	914	8.1	4.0	75	5.56	5	12	288.0	304.0	289.0
909.0	1015	7.8	4.4	79	5.80	2	14	288.7	305.4	289.7
902.0	1079	8.8	-11.2	23	1.81	360	15	290.4	296.0	290.7

# Skew-T Diagram

72451 DDC Dodge City(Awos)



SLAT	37.77
SLON	-99.9
SELV	790.0
SHOW	1.58
LIFT	0.86
LFTV	0.20
SWET	114.2
KINX	25.30
CTOT	12.70
VTOT	33.70
TOTL	46.40
CAPE	120.4
CAPV	149.4
CINS	-307.
CINV	-198.
EQLV	293.9
EQTV	292.2
LFCT	429.4
LFCV	445.6
BRCH	5.31
BRCV	6.59
LCLT	276.3
LCLP	631.1
MLTH	315.2
MLMR	7.73
THCK	5852.
PWAT	19.97

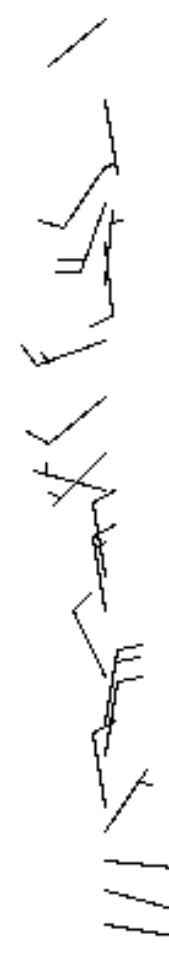
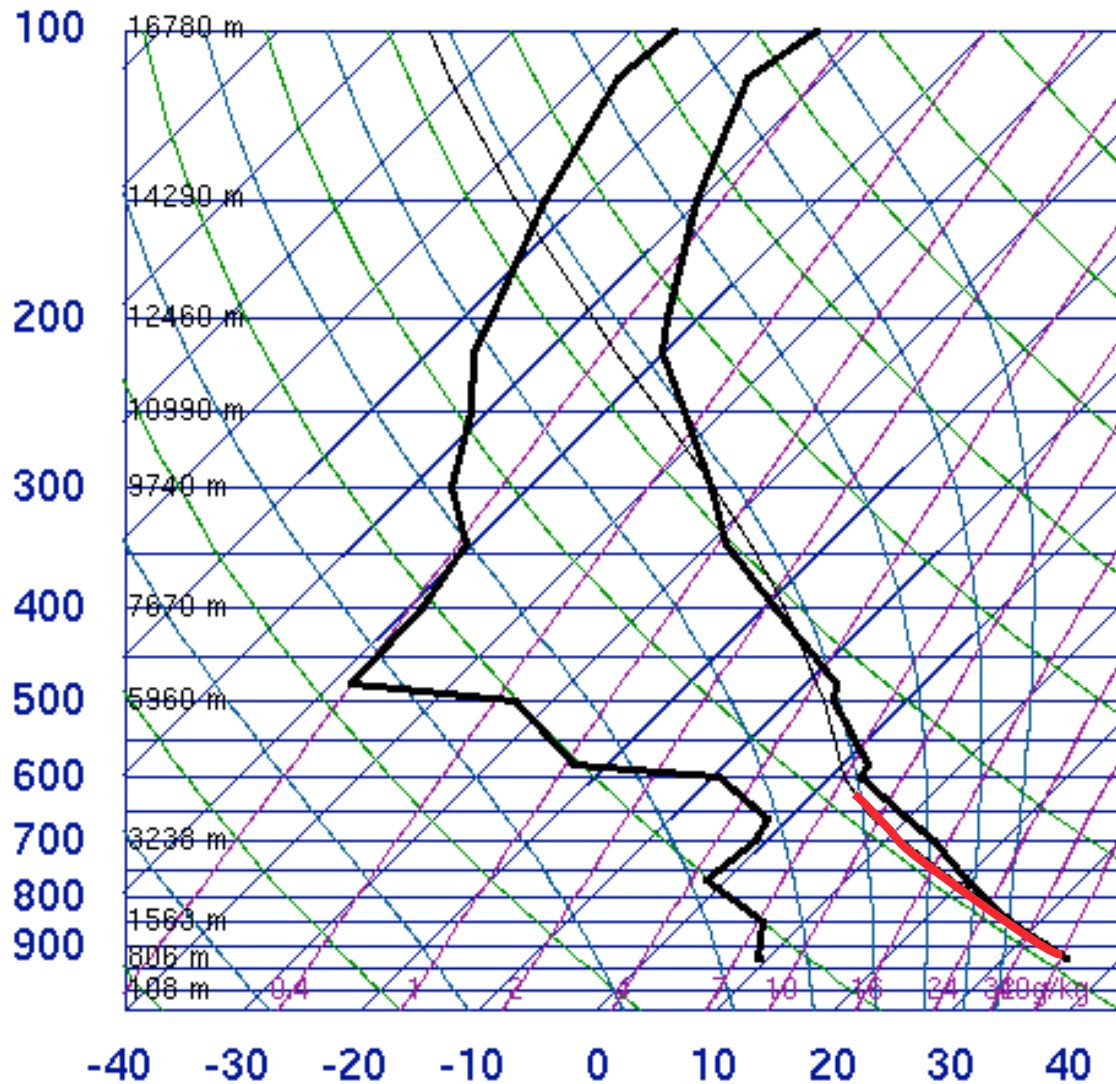
00Z 15 Jul 2006

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# Skew-T Diagram

72451 DDC Dodge City(Awos)



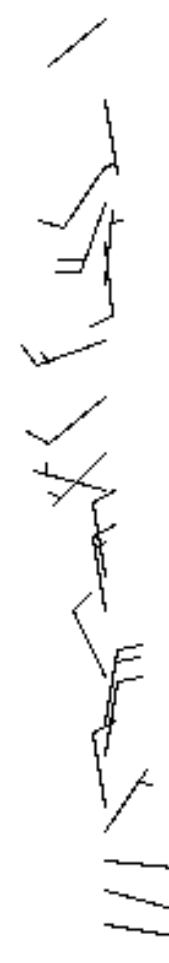
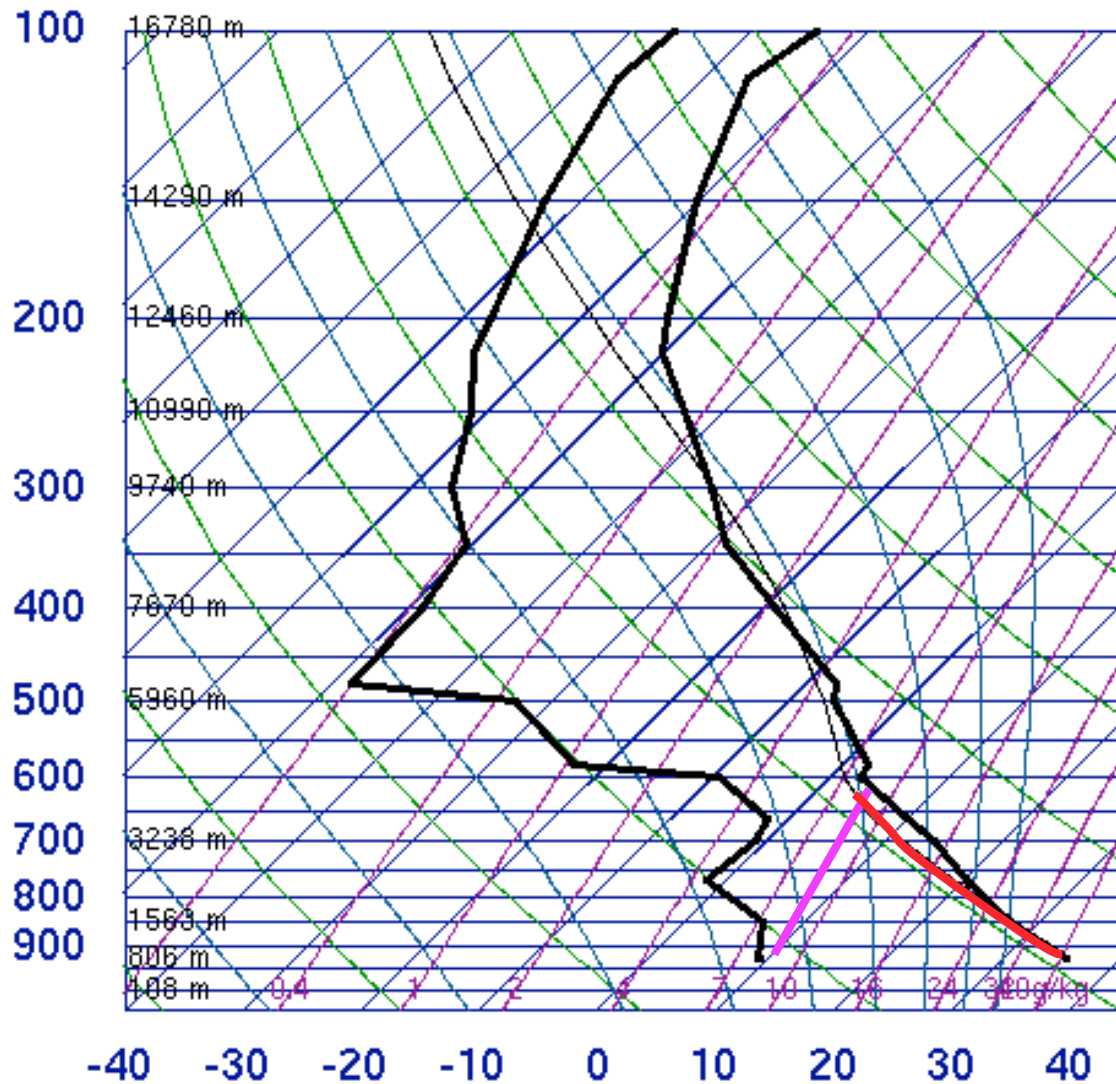
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00Z 15 Jul 2006

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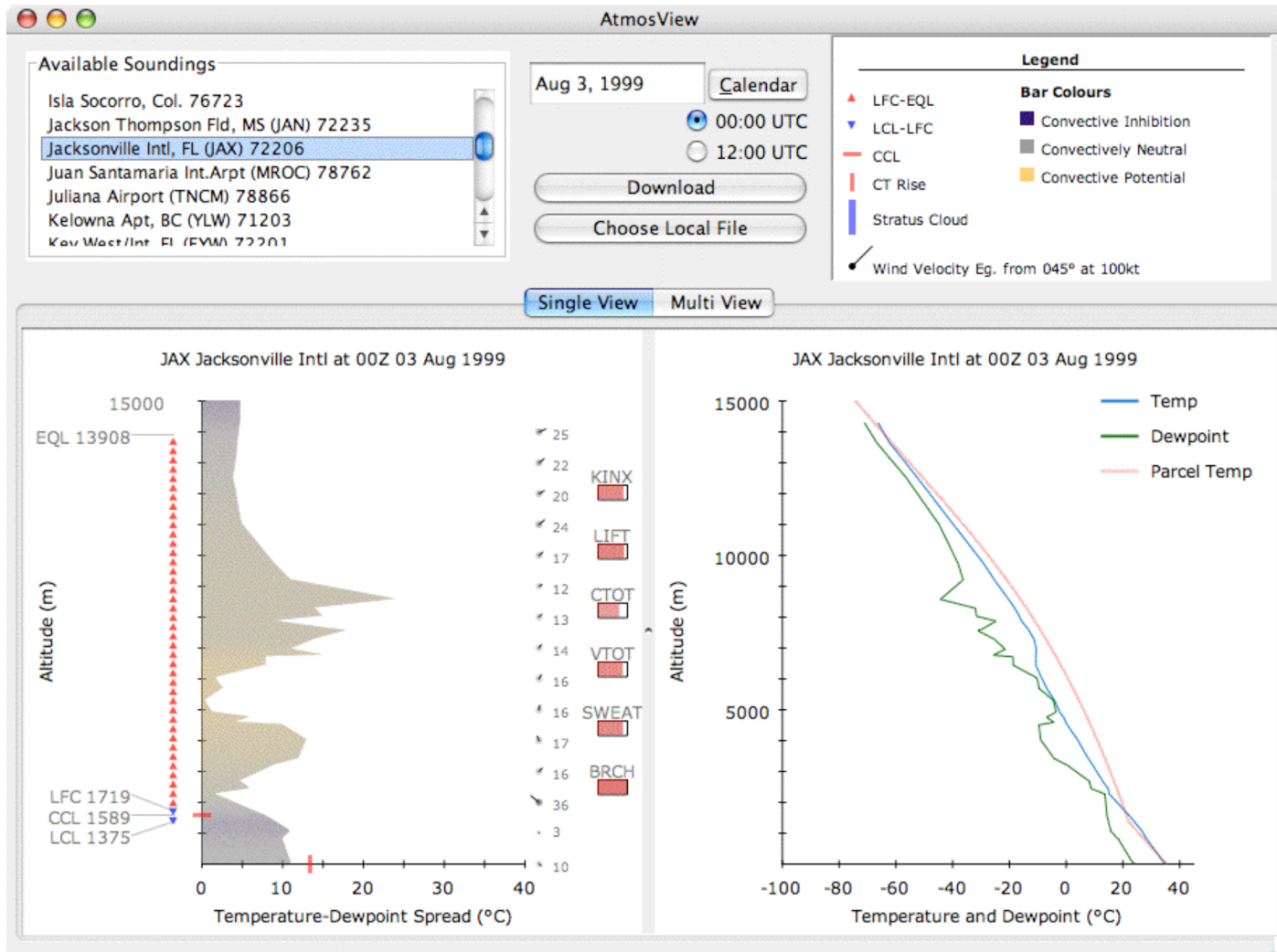
00Z 15 Jul 2006

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# Problems

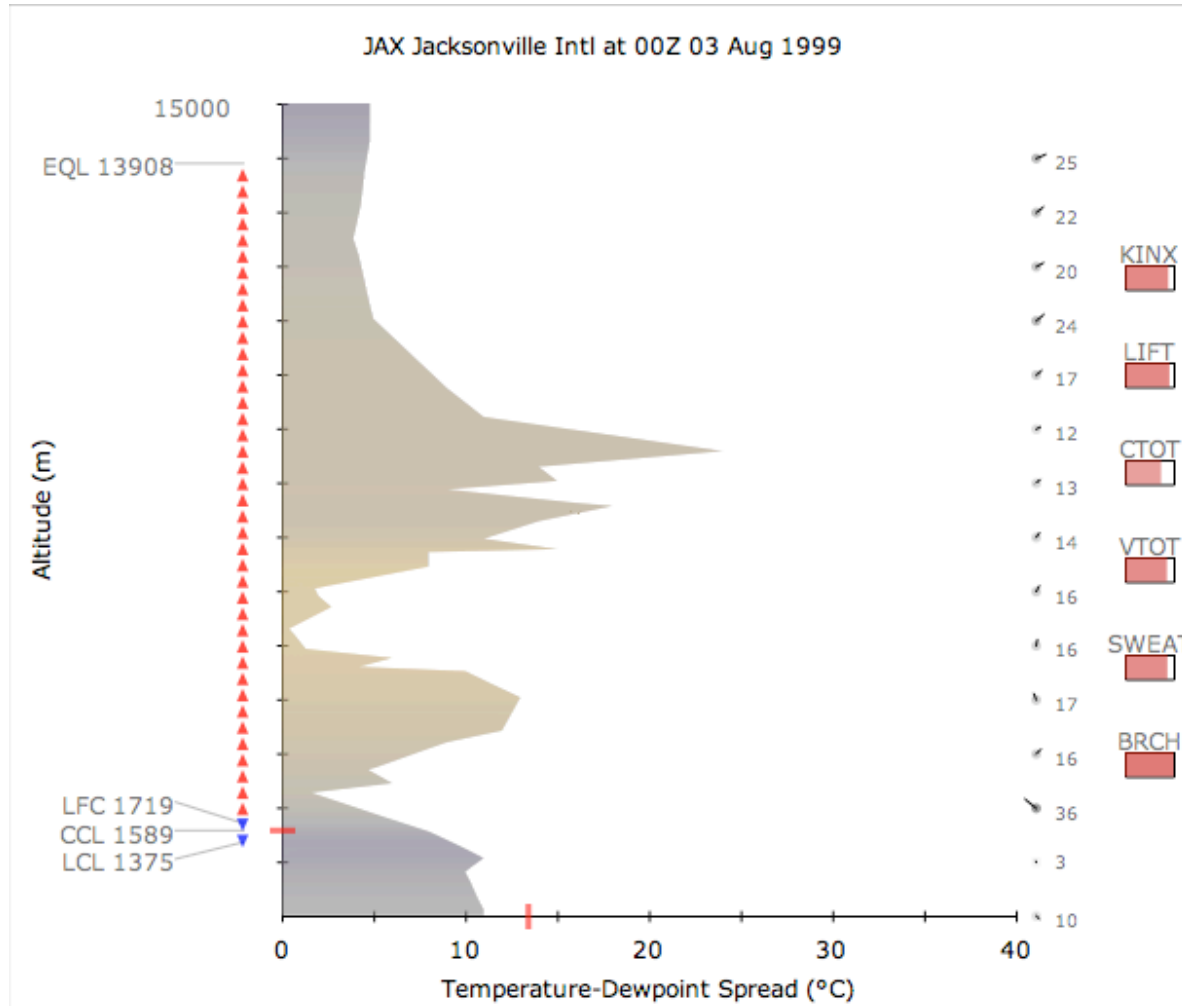
- Easy to forget
- Easy to make mistakes
- Difficult to compare
- Information doesn't pop out

# AtmosView

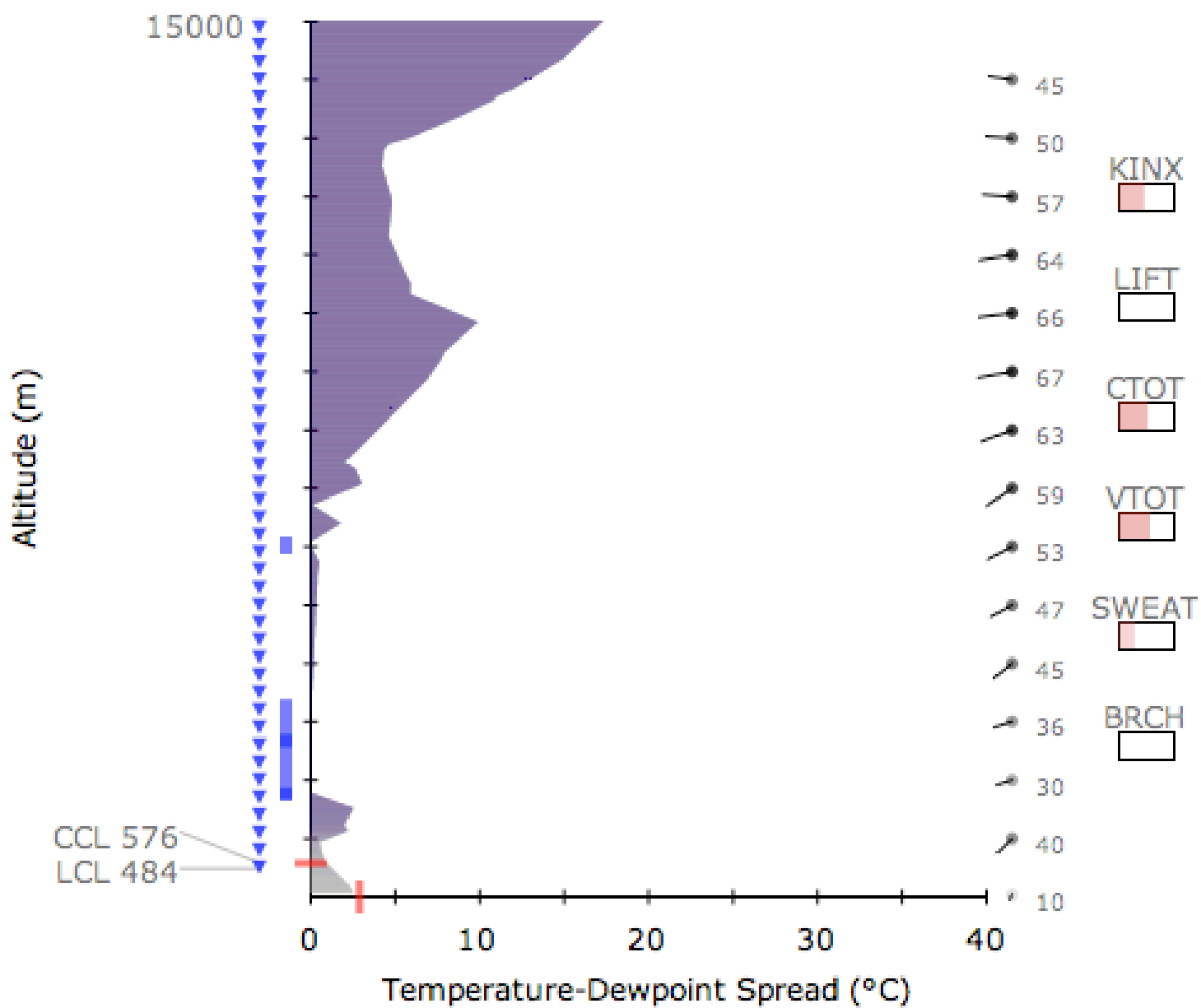


**Legend**

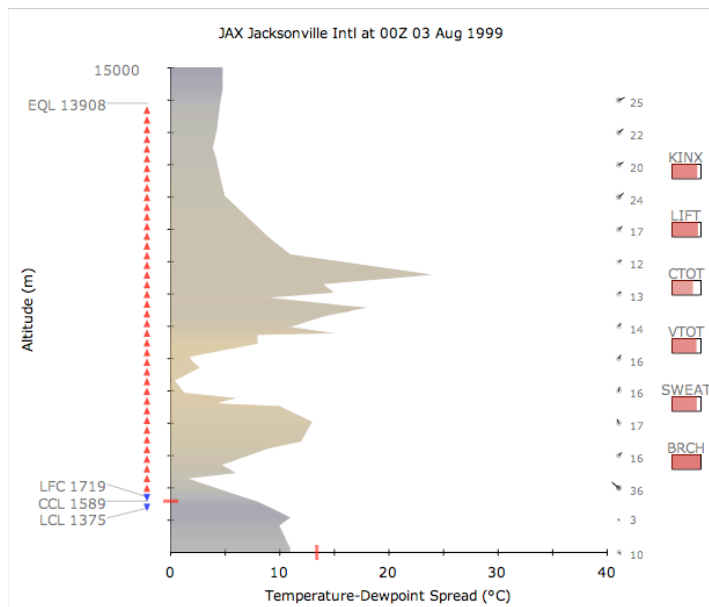
- ▲ LFC-EQL
  - ▼ LCL-LFC
  - CCL
  - | CT Rise
  - | Stratus Cloud
  - Wind Velocity Eg. from 045° at 100kt
- Bar Colours**
- Convective Inhibition
  - Convectively Neutral
  - Convective Potential



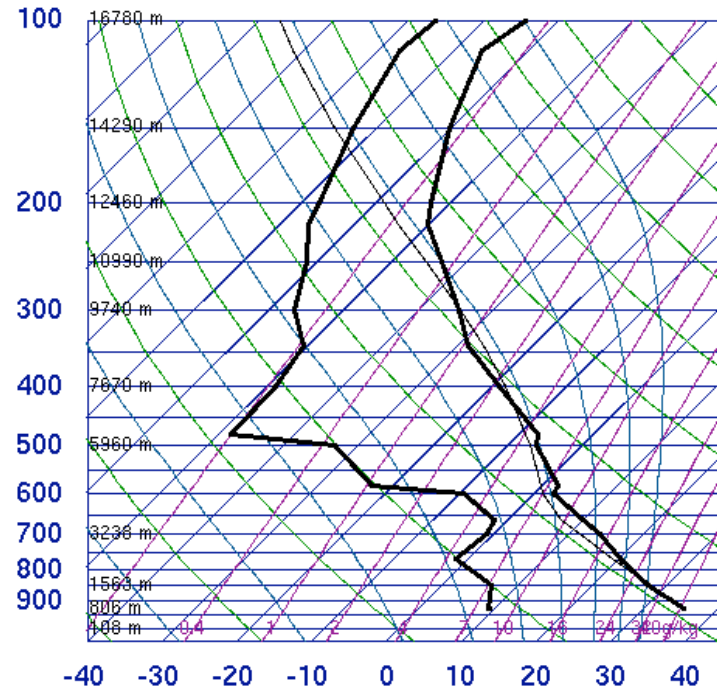
# YYR Goose Bay at 00Z 15 Nov 2006



# Use Scenarios



72451 DDC Dodge City(Awos)



SLAT	37.77
SLOE	-99.9
SELV	790.0
SHOW	1.58
LIFT	0.86
LFTV	0.20
SWET	114.2
KINX	25.30
CTOT	12.70
VTOT	33.70
TOTL	46.40
CAPE	120.4
CAPV	149.4
CINS	-307.
CINV	-198.
EQLV	293.9
EQTV	292.2
LFCV	429.4
LFCV	445.6
BRCH	5.31
BRCV	6.59
LCLT	276.3
LCLP	631.1
MLTH	315.2
MLMR	7.73
THCK	585.2
PWAT	19.97

00Z 15 Jul 2006

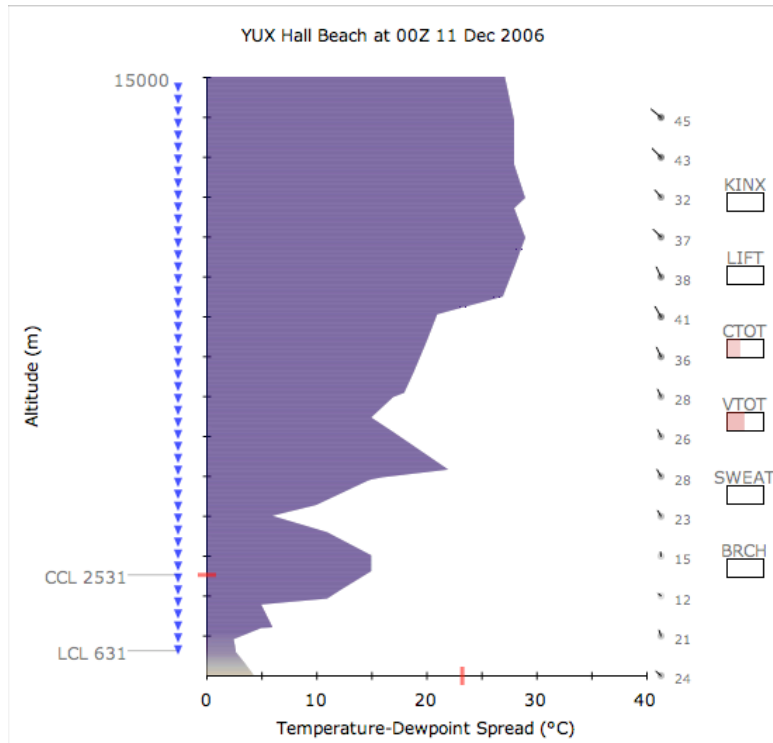
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DEMO

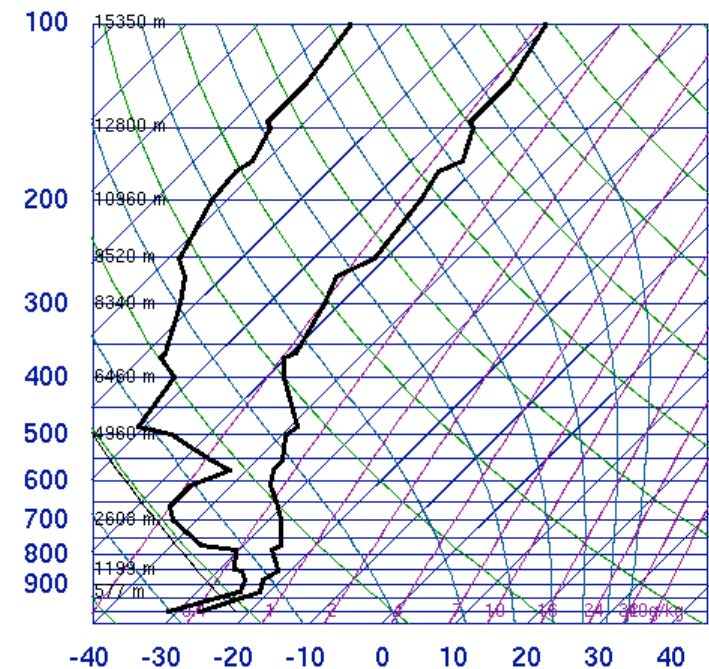


# Informal Evaluation

- 2 Students
- Given instruction on the AtmosView
- Given a set of questions to answer
- Given instruction on the Skew-T
- Given a set of questions to answer



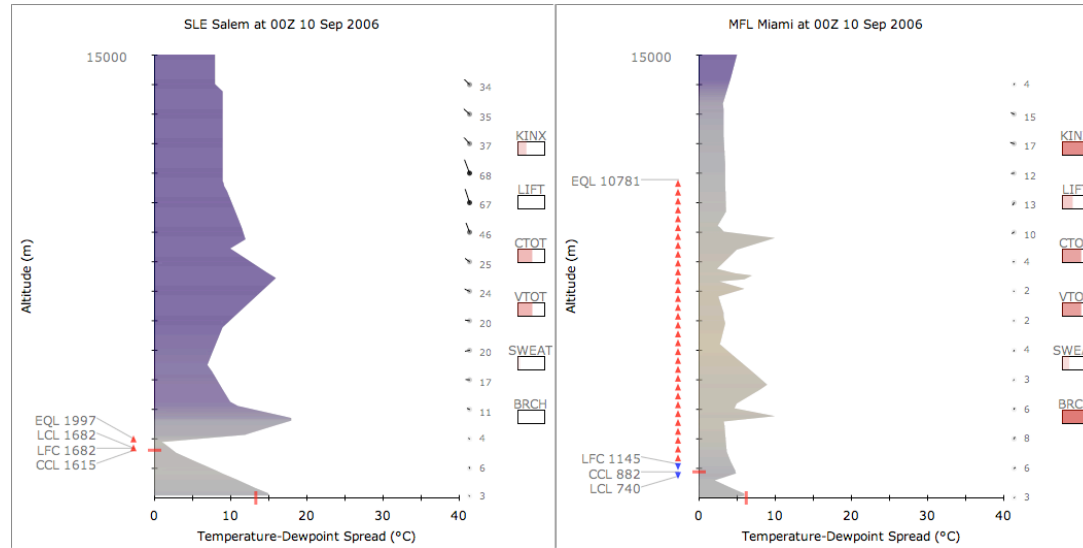
### 71081 YUX Hall Beach



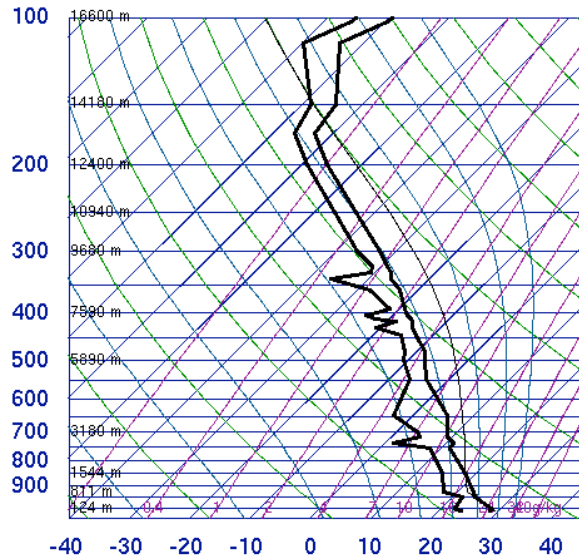
SLAT	68.76
SLON	-81.2
SELV	6.00
SHOW	16.94
LIFT	26.86
LFTV	26.87
SWET	72.01
KINX	-25.5
CTOT	11.40
VTOT	17.40
TOTL	28.80
CAPE	0.00
CAPV	0.00
CINS	0.00
CINV	0.00
EQLV	-9999
EQTV	-9999
LFCT	-9999
LFCV	-9999
BRCH	0.00
BRCV	0.00
LCLT	244.5
LCLP	910.2
MLTH	251.2
MLMR	0.41
THCK	4954.
PWAT	1.47

00Z 11 Dec 2006

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72202 MFL Miami

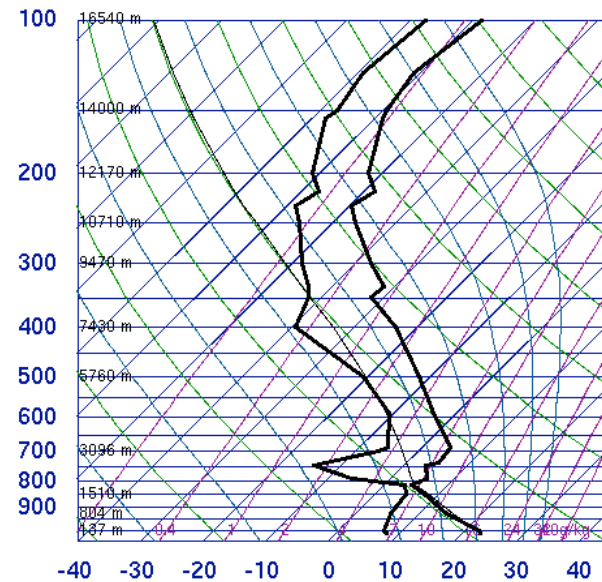


SLAT	25.75
SLON	-80.3
SELV	5.00
SHOW	-1.19
LIFT	-5.01
LFTV	-5.54
SWET	194.9
KINX	34.80
CTOT	21.60
VTOT	25.30
TOTL	46.90
CAPE	2128.
CAPV	2303.
CINS	-19.8
CINV	-6.64
EQLV	161.8
EQTV	161.7
LFCT	853.4
LFCV	885.6
BRCH	1104.
BRCV	1195.
LCLT	294.2
LCLP	920.0
MLTH	301.3
MLMR	17.42
THCK	5766.
PWAT	53.22

00Z 10 Sep 2006

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72694 SLE Salem

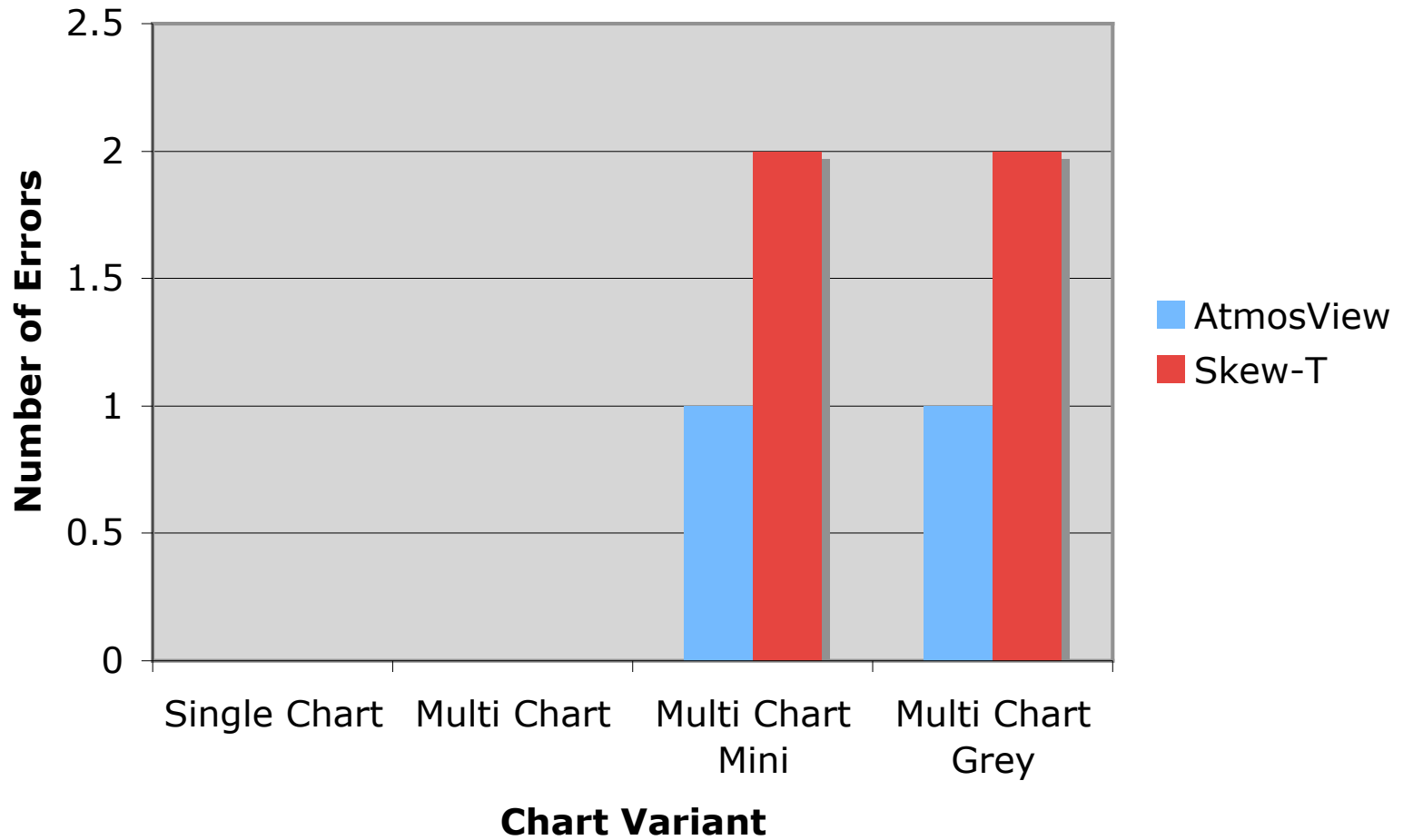


SLAT	44.91
SLON	-123.
SELV	61.00
SHOW	8.71
LIFT	8.39
LFTV	8.39
SWET	88.79
KINX	13.40
CTOT	16.60
VTOT	19.50
TOTL	36.10
CAPE	0.00
CAPV	0.00
CINS	0.00
CINV	0.00
EQLV	-9999
EQTV	-9999
LFCT	-9999
LFCV	-9999
BRCH	0.00
BRCV	0.00
LCLT	277.0
LCLP	802.5
MLTH	295.0
MLMR	6.35
THCK	5623.
PWAT	22.96

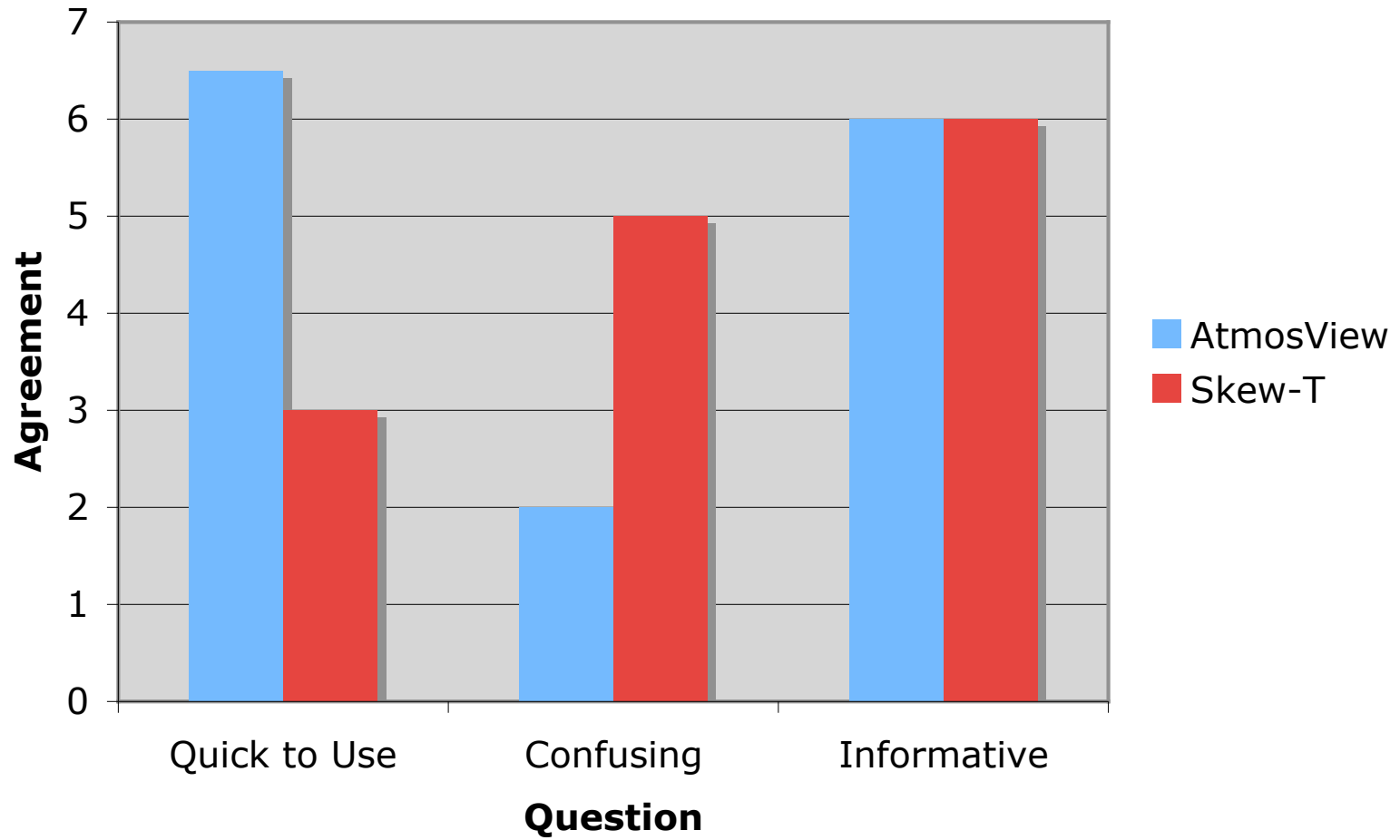
00Z 10 Sep 2006

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## Skew-T vs Atmosview Error Rate



## Questionnaire Results



# Strengths

- Successful improvement to Skew-T
- Data pops out
- Quick comparisons
- Useable in miniature
- Not reliant on colour

# Areas for Improvement

- Temperature not displayed

# Future Work

- Improve usability of system
- Target audience: amateur meteorologists (glider pilots, students, storm-chasers)