Atmospheric Sounding Visualization

Sancho McCann

Outline

- Domain description
- Current presentation formats
- Proposed Solution
- Progress

Soundings

Pressure

Altitude

Temperature

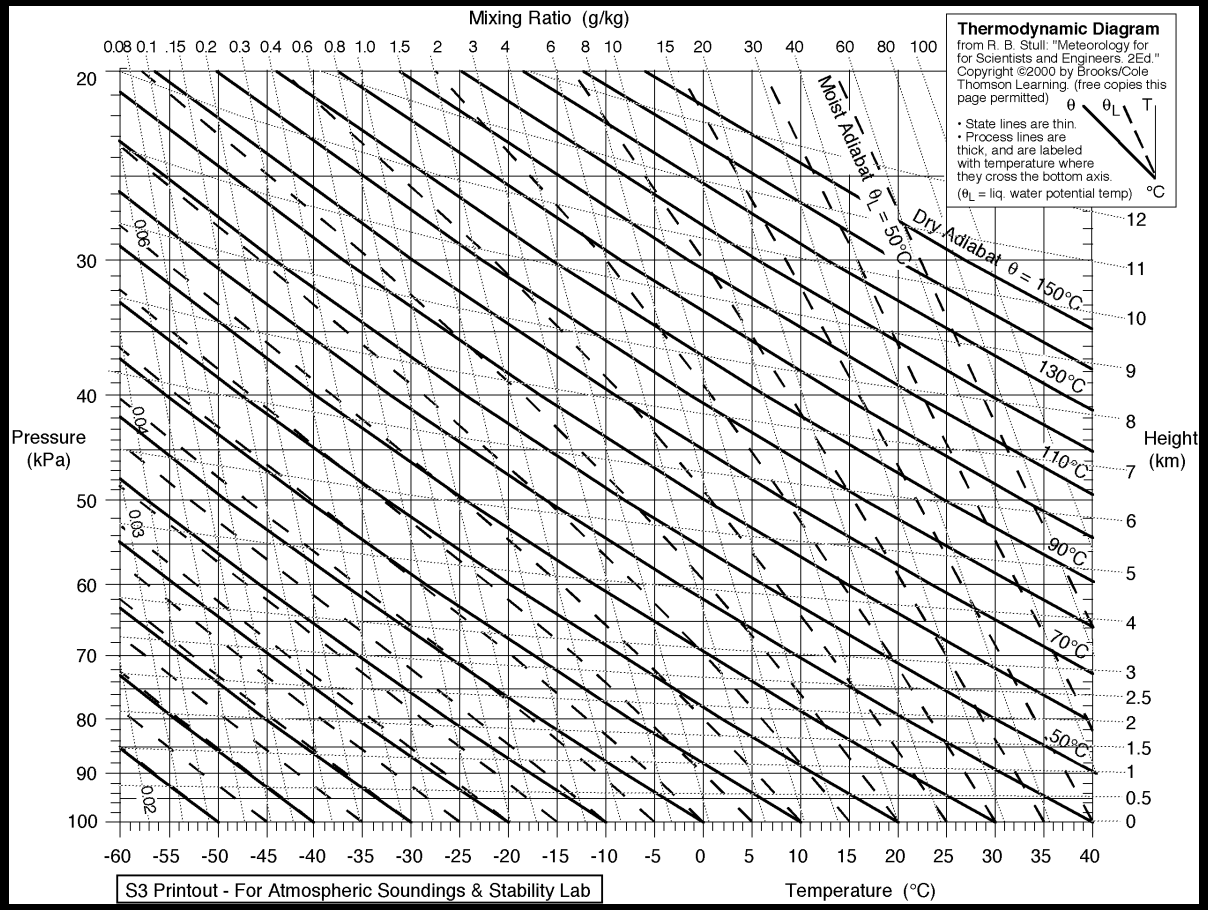
Dewpoint

Soundings

72694 SLE Salem Observations at 12Z 08 Oct 2006

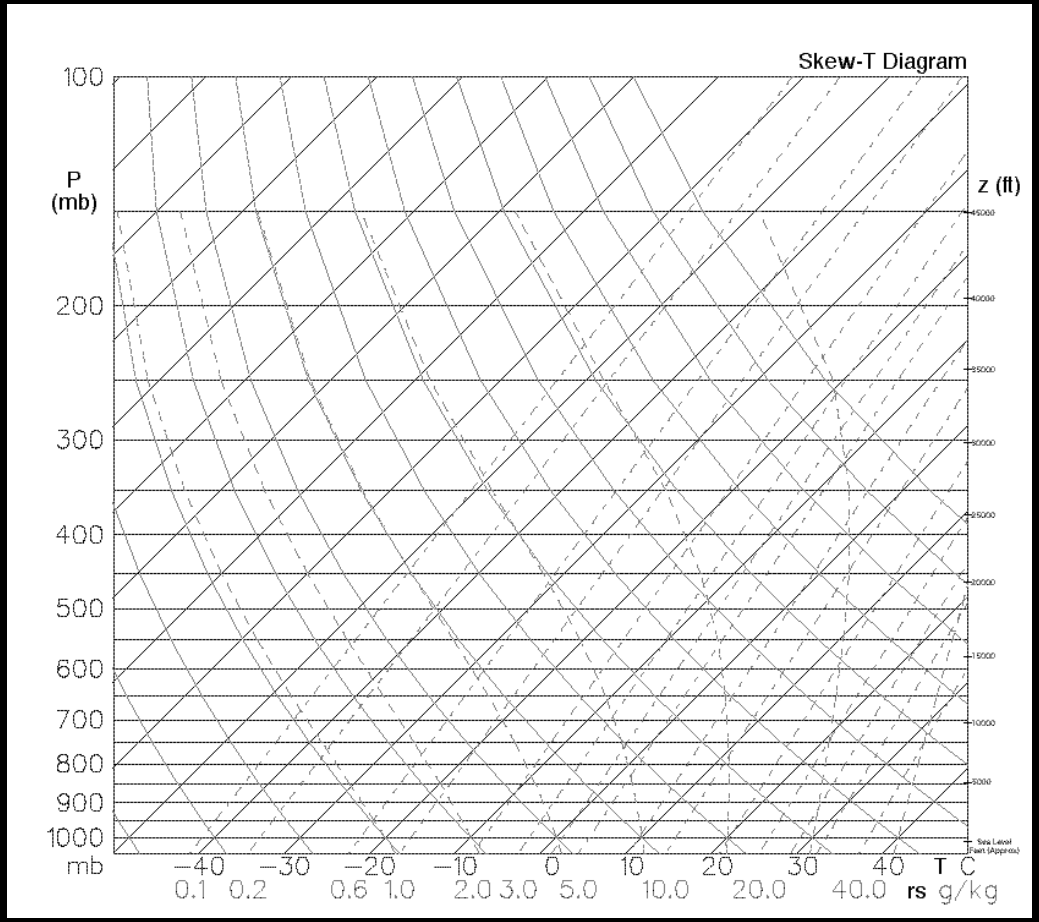
PRES hPa	HGHT m	TEMP C	DWPT C	RELH %	MIXR g/kg	DRCT deg	SKNT knot	THTA K	THTE K	THTV K
1020.0	61	6.0	3.8	86	4.95	0	0	277.6	291.2	278.4
1000.0	224	10.0	6.9	81	6.28	15	4	283.1	300.7	284.2
997.0	249	10.2	7.1	81	6.38	17	5	283.6	301.5	284.7
990.3	305	10.0	6.8	80	6.30	20	6	284.0	301.6	285.0
954.6	610	9.0	5.2	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

Current Presentation Methods



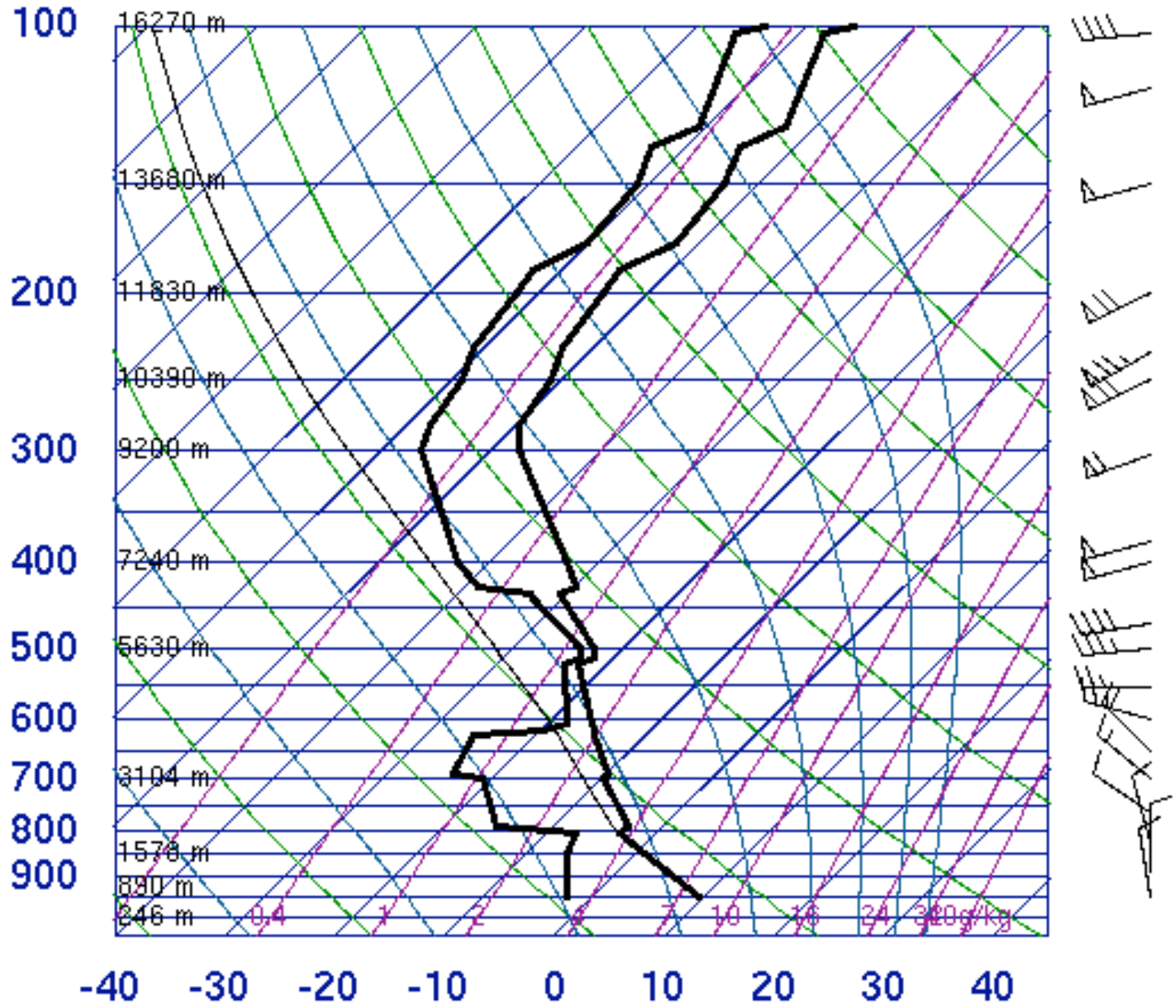
Emagram

Current Presentation Methods



Skew-T Log-P

72768 GGW Glasgow



SLAT	48.21
SLON	-106.
SELV	700.0
SHOW	9.74
LIFT	8.93
LFTV	9.02
SWET	55.98
KINX	6.10
CTOT	16.30
VTOT	23.30
TOTL	39.60
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	267.3
LCLP	779.7
MLTH	287.0
MLMR	3.21
THCK	5384.
PWAT	9.12

00Z 09 Oct 2006

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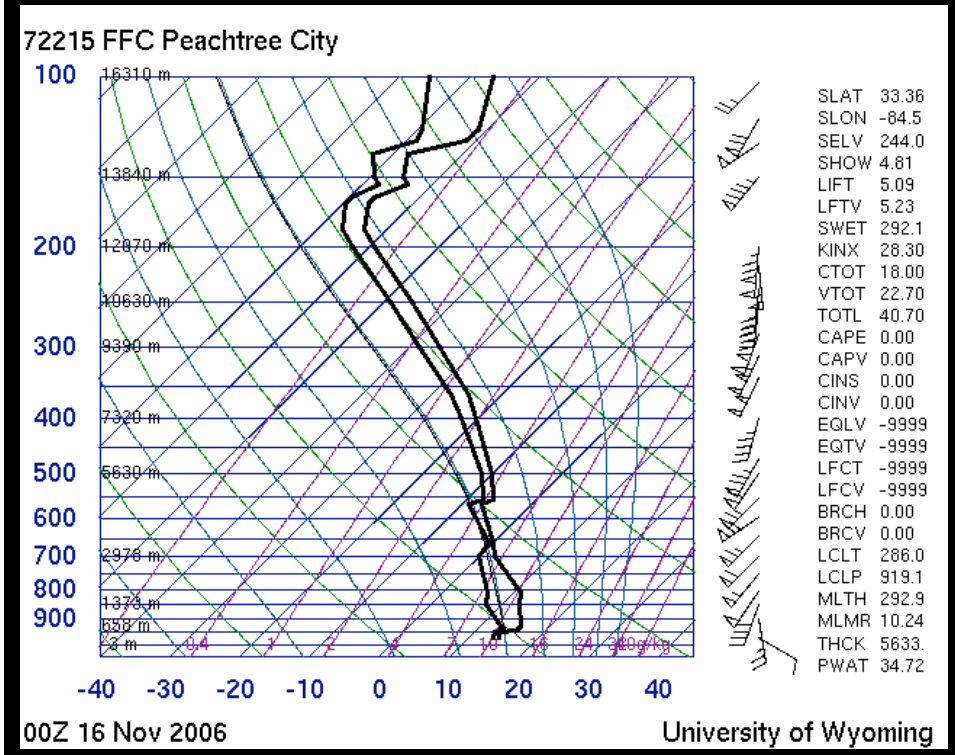
Critique

- Much training required
- Difficult to compare quickly
- Difficult to use for presentation to novice students
- Easy to distribute
- Complexity might aid understanding


72215 FFC Peachtree City
100
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16310 m
13840 m
12070 m
10630 m
9390 m
7320 m
5630 m
2978 m
1373 m
656 m
3 m
-40 -30 -20 -10 0 10 20 30 40
SLAT 33.36
SLON -84.5
SELV 244.0
SHOW 4.81
LIFT 5.09
LFTV 5.23
SWET 292.1
KINX 28.30
CTOT 18.00
VTOT 22.70
TOTL 40.70
CAPE 0.00
CAPV 0.00
CINS 0.00
CINV 0.00
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00Z 16 Nov 2006
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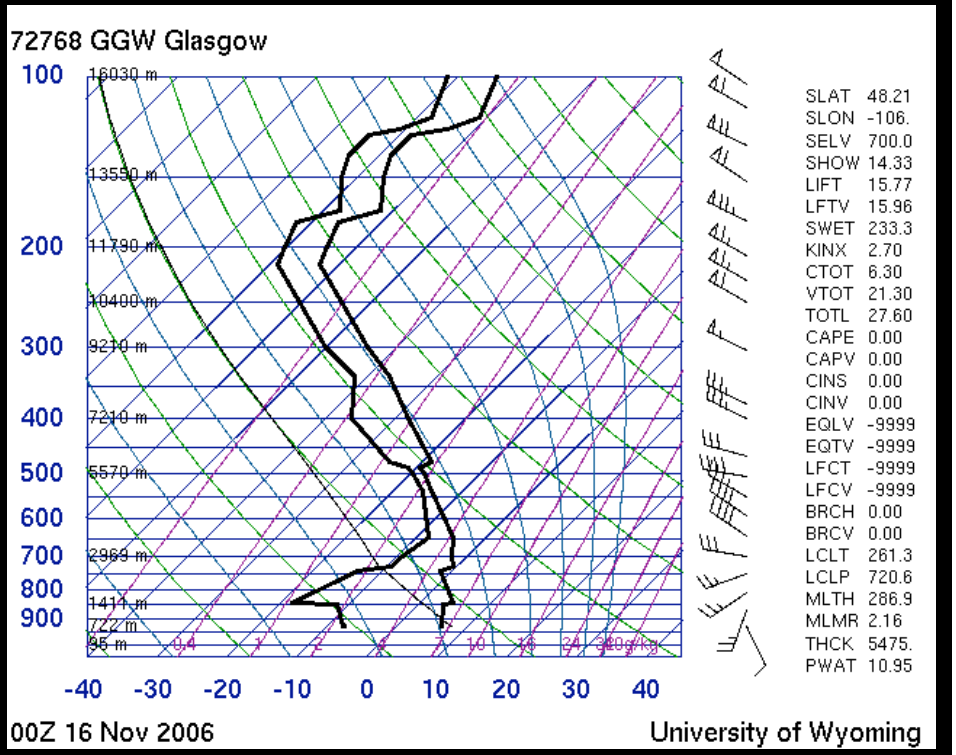
72768 GGW Glasgow
100
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700
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16030 m
13550 m
11790 m
10400 m
9210 m
7210 m
5570 m
2969 m
1414 m
722 m
95 m
-40 -30 -20 -10 0 10 20 30 40
SLAT 48.21
SLON -106.
SELV 700.0
SHOW 14.33
LIFT 15.77
LFTV 15.96
SWET 233.3
KINX 2.70
CTOT 6.30
VTOT 21.30
TOTL 27.60
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 261.3
LCLP 720.6
MLTH 286.9
MLMR 2.16
THCK 5475.
PWAT 10.95
00Z 16 Nov 2006
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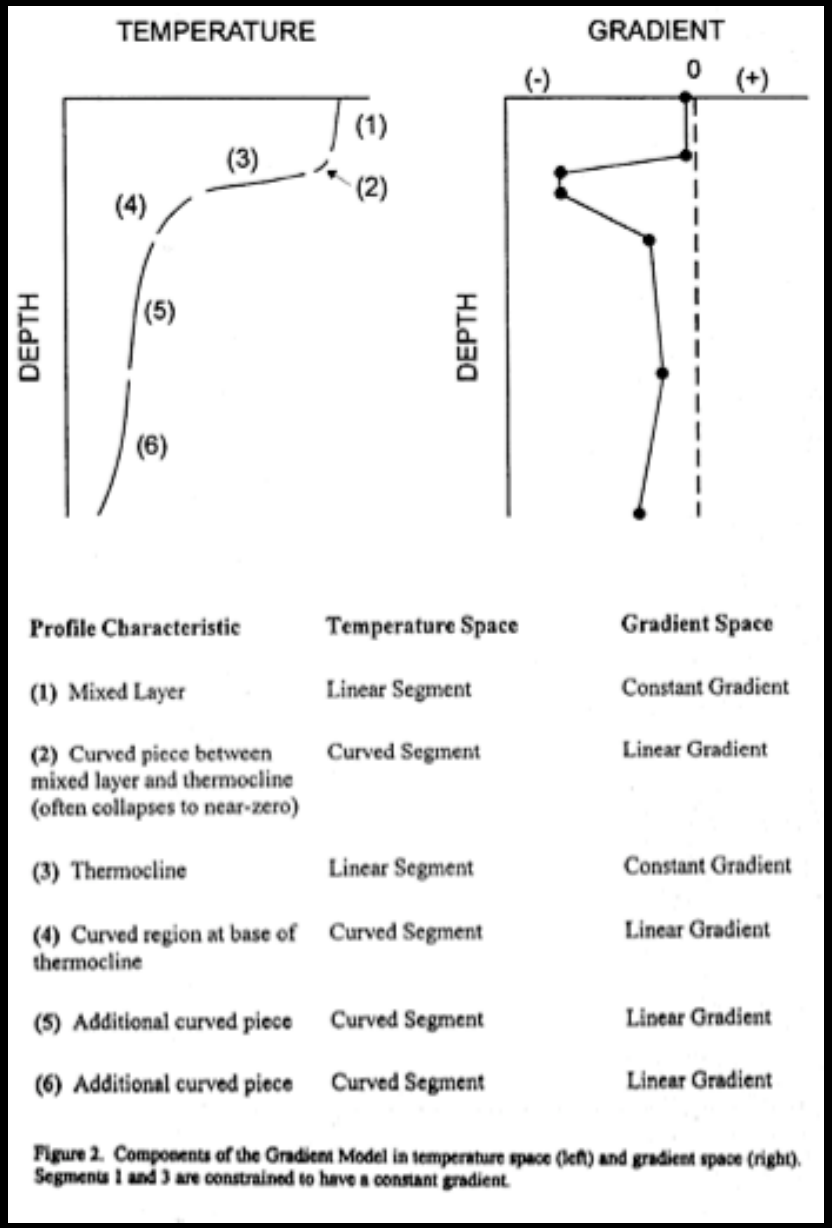
Previous Work

- Only modifications to Skew-T
- Haeger: Vertical ocean profiles



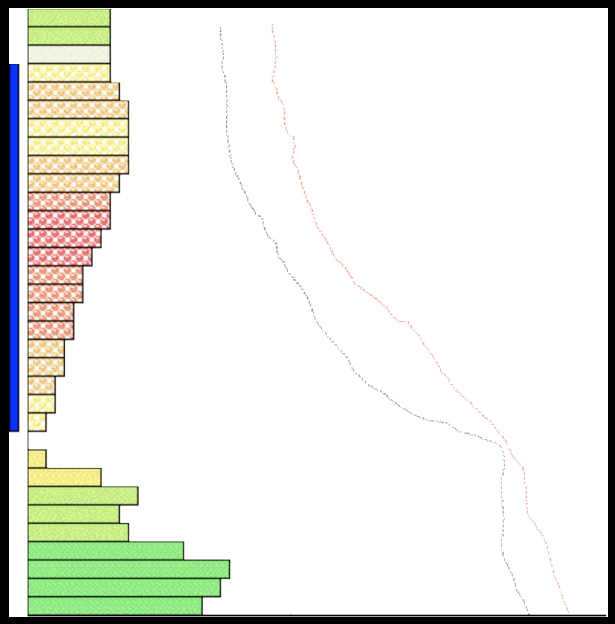
Profile Characteristic	Temperature Space	Gradient Space
(1) Mixed Layer	Linear Segment	Constant Gradient
(2) Curved piece between mixed layer and thermocline (often collapses to near-zero)	Curved Segment	Linear Gradient
(3) Thermocline	Linear Segment	Constant Gradient
(4) Curved region at base of thermocline	Curved Segment	Linear Gradient
(5) Additional curved piece	Curved Segment	Linear Gradient
(6) Additional curved piece	Curved Segment	Linear Gradient

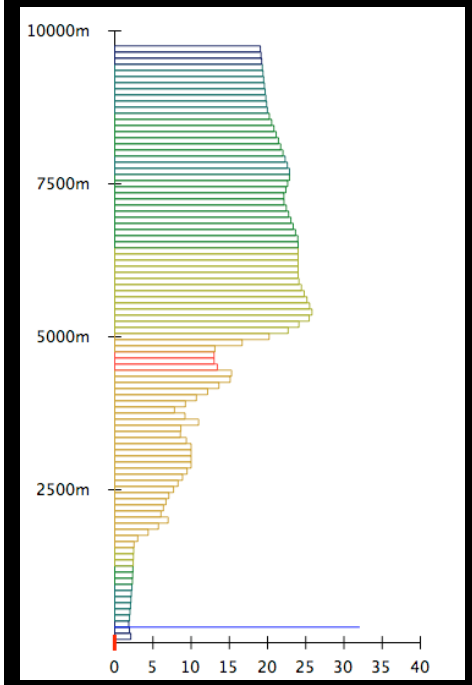
Figure 2. Components of the Gradient Model in temperature space (left) and gradient space (right). Segments 1 and 3 are constrained to have a constant gradient.

S.D. Haeger. Vertical representation of ocean temperature profiles with a gradient feature model. In Proceedings of OCEANS '95. MTS/IEEE 'Challenges of Our Changing Global Environment'. San Diego, CA, 1995

Proposed Solution

- Derive variables
- Display on an annotated bar plot

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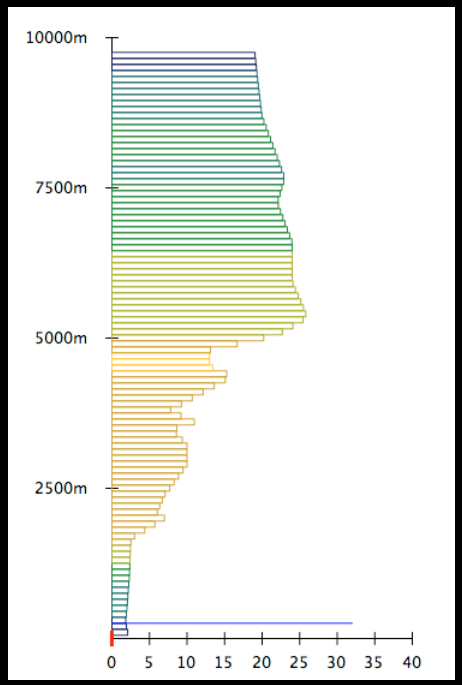
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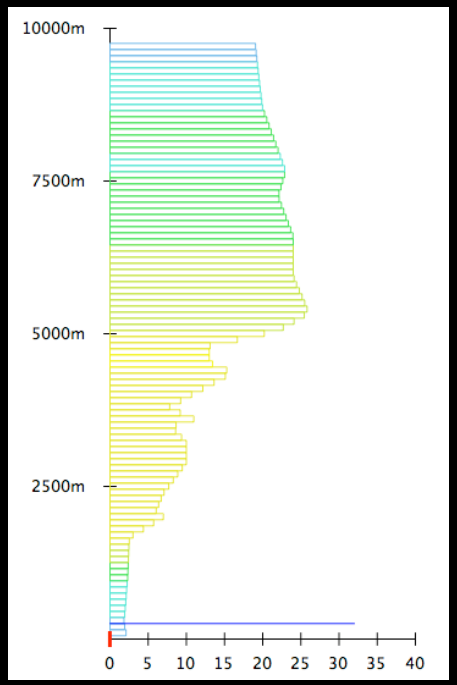
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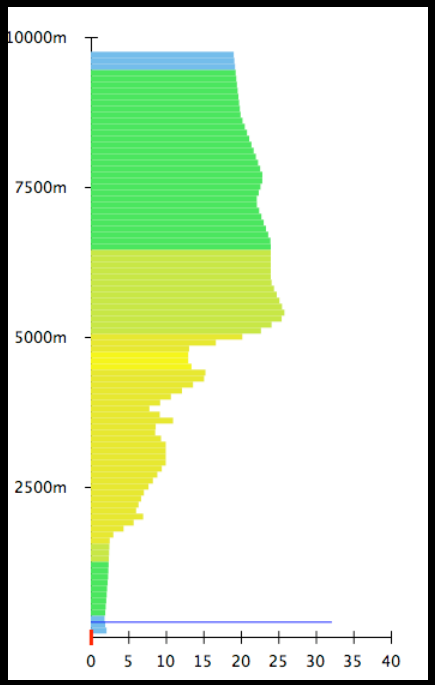
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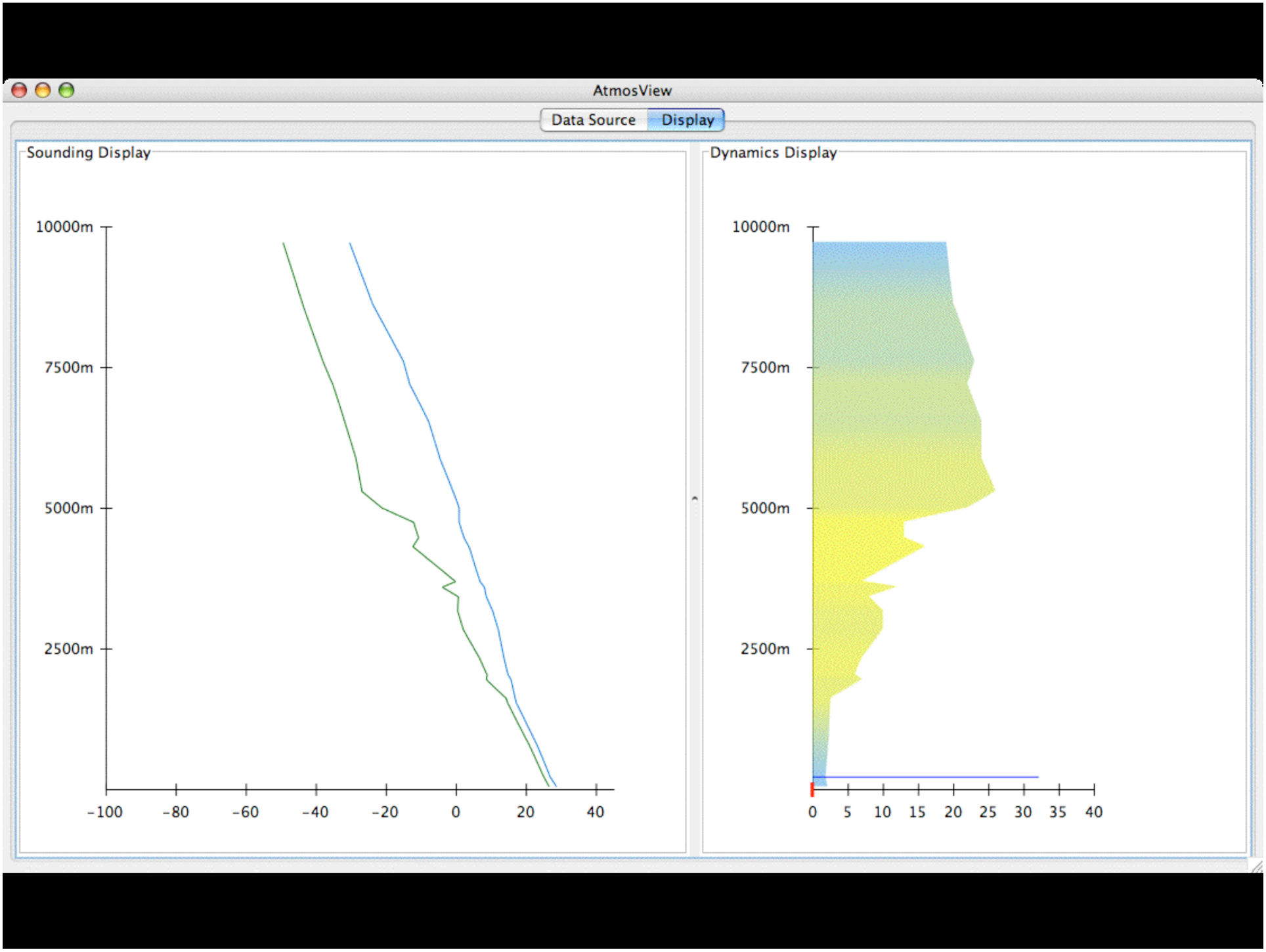
AtmosView
Data Source
Display
Sounding Display
10000m
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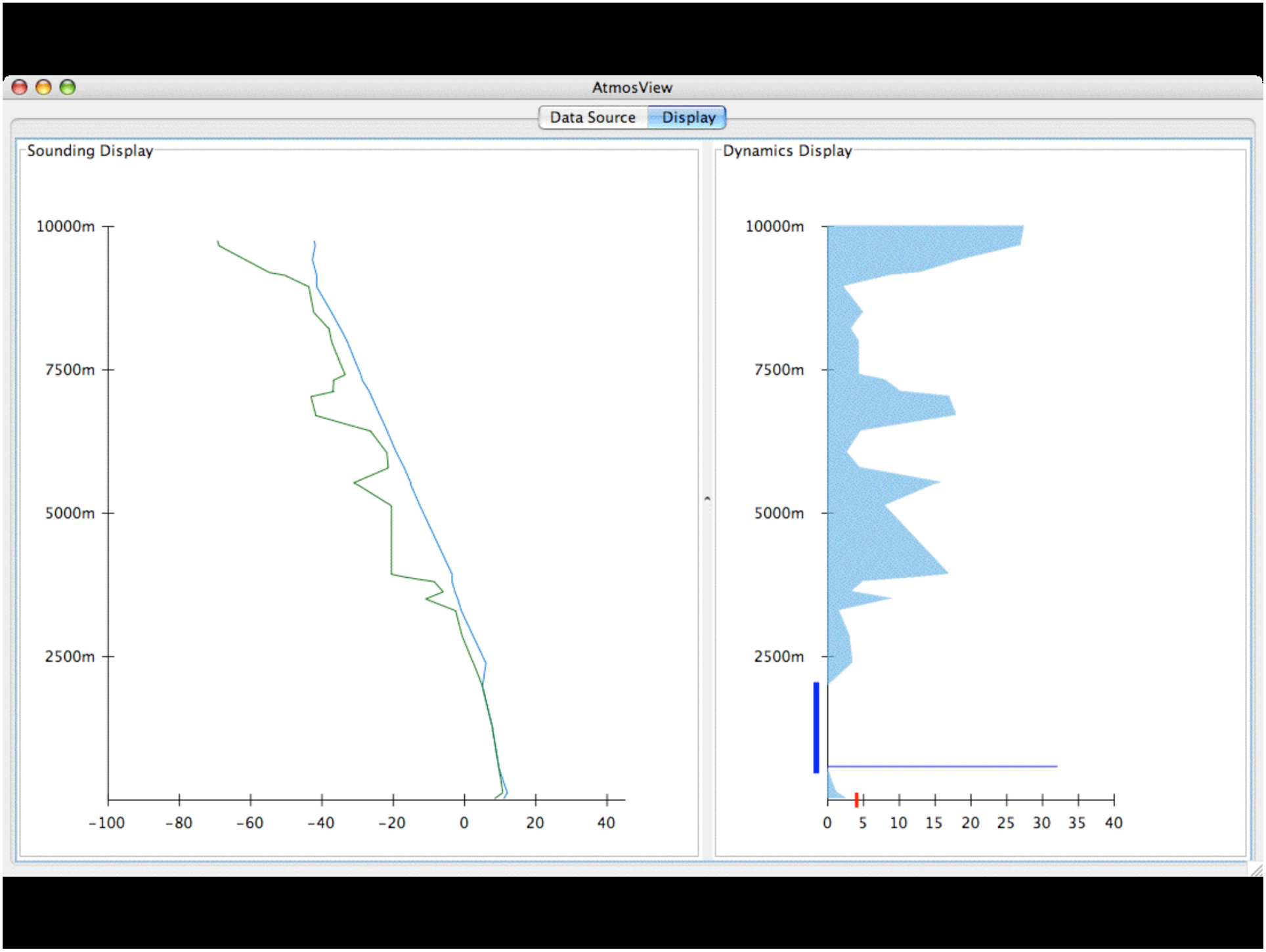
AtmosView
Data Source
Display
Sounding Display
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Dynamics Display
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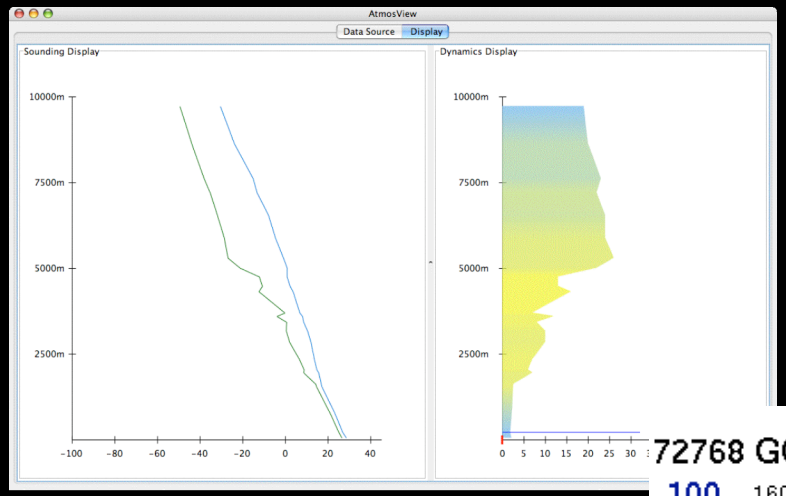
AtmosView
Data Source
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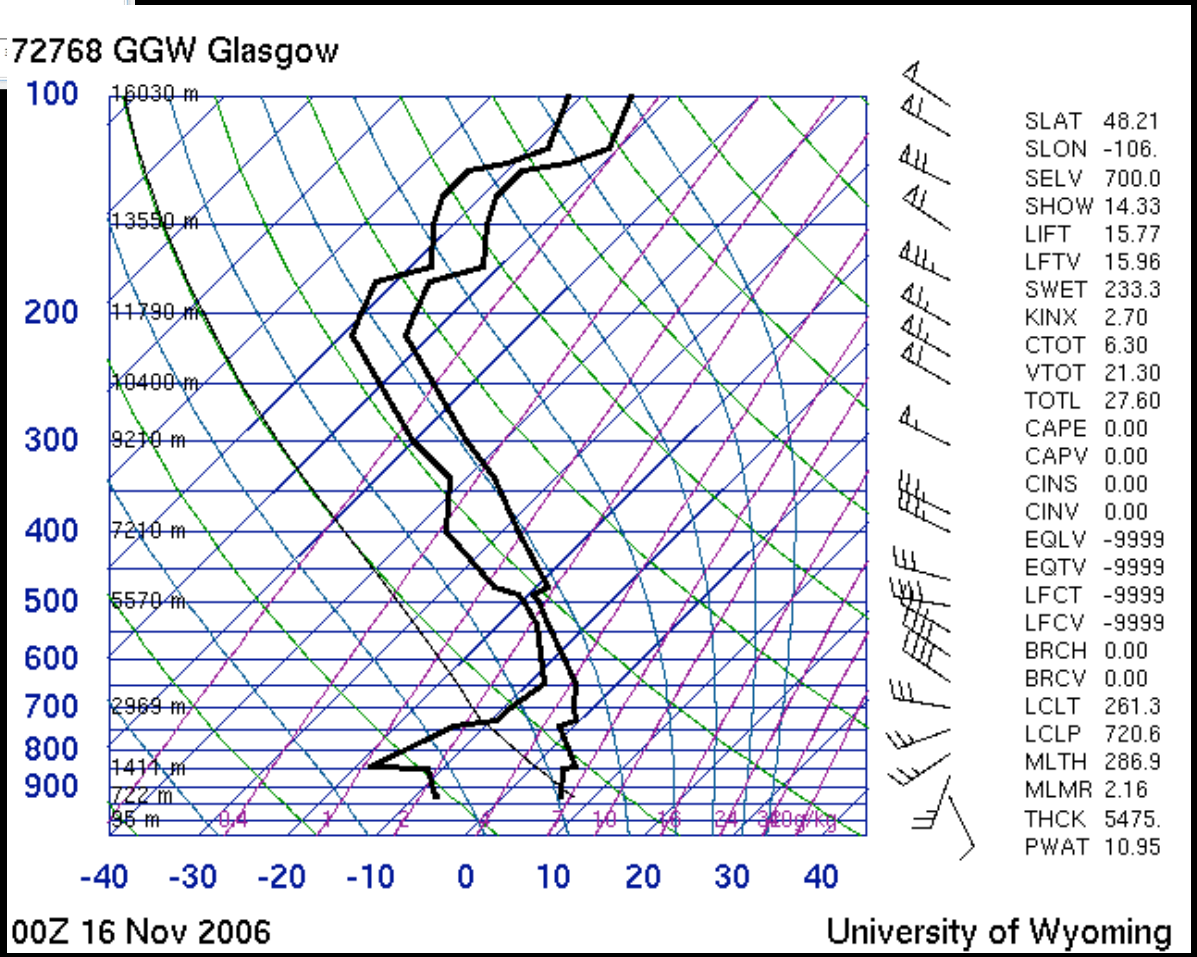
72768 GGW Glasgow
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5570 m
2969 m
1411 m
722 m
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SLAT 48.21
SLON -106.
SELV 700.0
SHOW 14.33
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VTOT 21.30
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CAPV 0.00
CINS 0.00
CINV 0.00
EQLV -9999
EQTV -9999
LFCT -9999
LFCV -9999
BRCH 0.00
BRCV 0.00
LCLT 261.3
LCLP 720.6
MLTH 286.9
MLMR 2.16
THCK 5475.
PWAT 10.95
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Use

- 14-17 year olds that have just completed an introduction to meteorology class

Implementation Details

- Data source:
  http://weather.uwyo.edu/upperair/sounding.html
- Java/swing in Eclipse

Outstanding Issues

- Interaction with sounding plot
- Small multiple layout for comparisons by location or time
- How to force a visual link

Slope of temperature ⟷ Stability