

- Continuity equation in the isobaric coordinate system. Meaning of Laplacian operator (demo – heat eqn in 2 space dimensions)

Exercise – please submit

- plot a hodograph for today's 12Z Stony Plain sounding.
- Identify (draw on your hodograph) the thermal wind $\mathbf{V}_{T,700-850}$, and comment on the relationship between your thermal wind vector and the isotherm pattern at the 850 hPa and 700 hPa levels

Note: $1 \text{ m s}^{-1} = 1.94 \approx 2 \text{ knots}$ (you may use either unit)

- Identify on the 12Z surface analysis the highest (largest) rate of change of surface pressure (Pa s^{-1}) occurring on the Canadian prairies (enumerated as the pressure change, in tenths of one hPa, in past 3 hrs). Using the omega-w relationship, compute the implied value of the vertical velocity

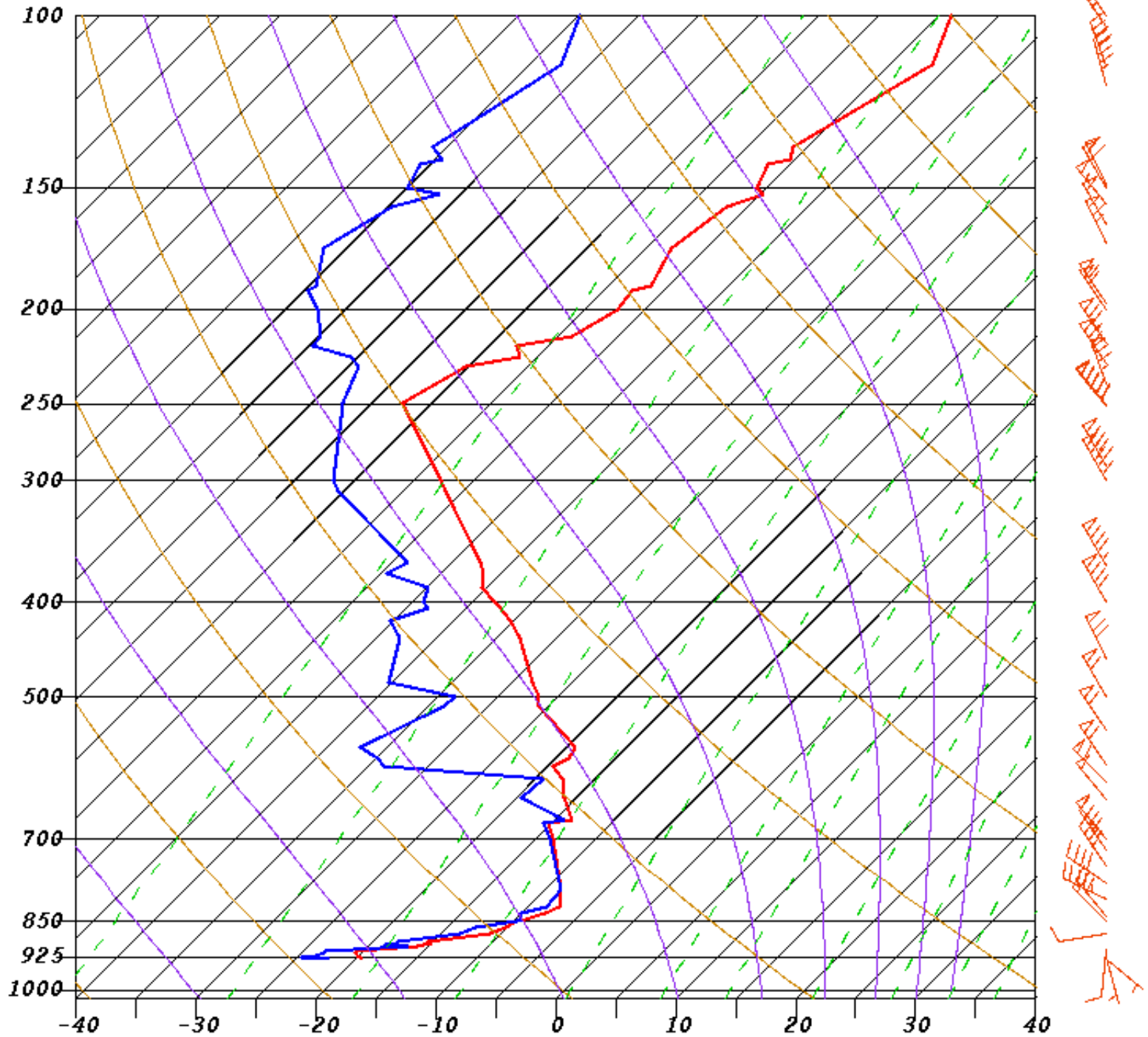
71119 WSE Edmonton Stony Plain Observations at 12Z 31 Jan 2013

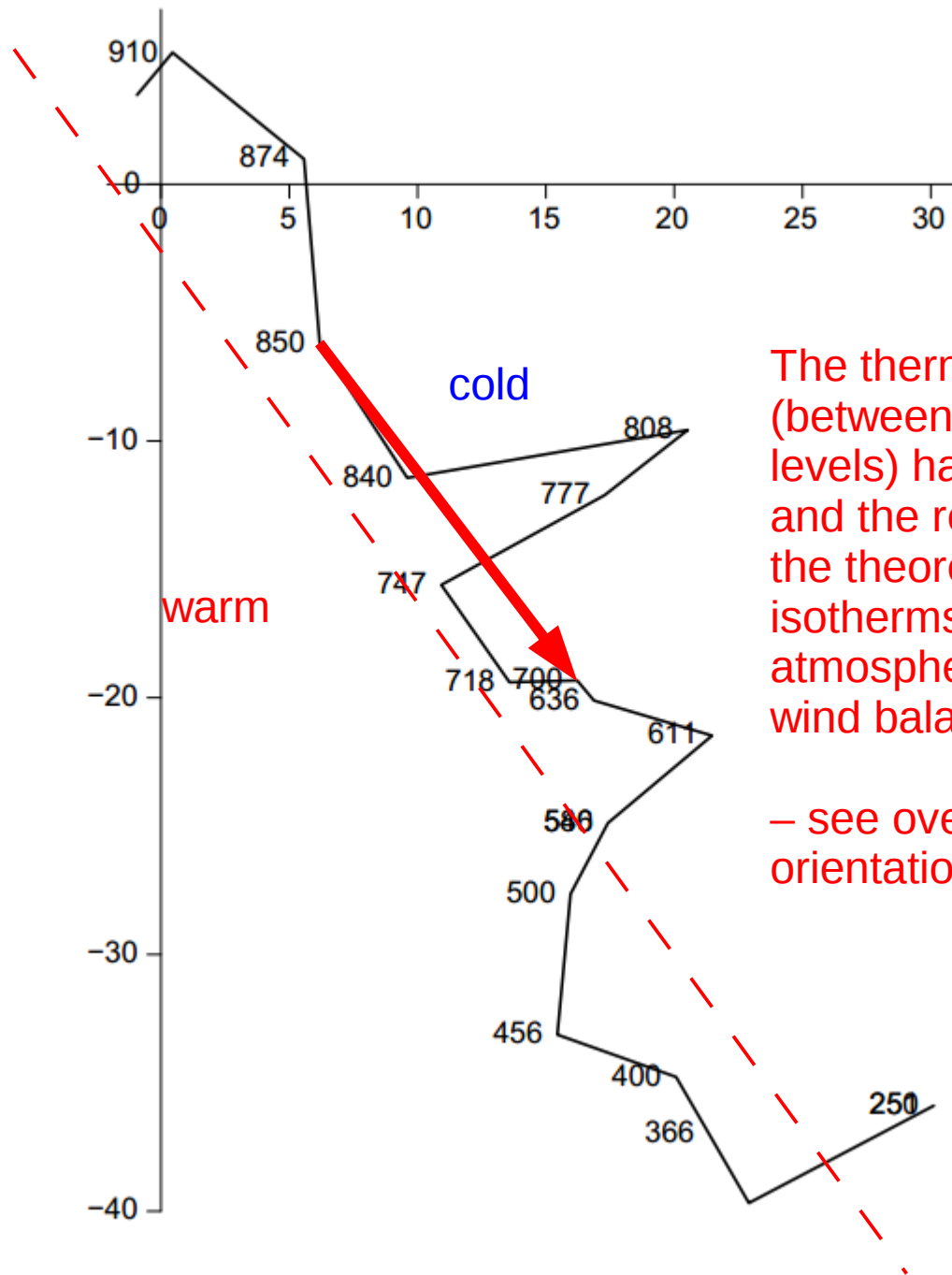
PRES hPa	HGHT m	TEMP C	DWPT C	RELH %	MIXR g/kg	DRCT deg	SKNT knot	THTA K	THTE K	THTV K
1000.0	189									
928.0	766	-19.5	-22.3	78	0.69	130	3	259.1	261.1	259.2
927.0	775	-19.7	-24.5	66	0.57	142	4	259.0	260.6	259.1
925.0	792	-19.9	-23.9	70	0.60	165	7	258.9	260.7	259.1
916.0	864	-20.5	-23.2	79	0.65	177	9	259.1	260.9	259.2
911.0	905	-20.5	-23.2	79	0.65	184	10	259.5	261.3	259.6
909.9	914	-19.9	-22.3	81	0.71	185	10	260.2	262.2	260.3
903.0	971	-15.9	-16.7	94	1.15	199	10	264.9	268.1	265.1
898.0	1013	-15.5	-18.7	76	0.98	209	10	265.7	268.5	265.9
894.0	1046	-15.1	-17.9	79	1.05	218	10	266.4	269.5	266.6
893.0	1055	-15.3	-17.8	81	1.06	220	10	266.3	269.4	266.5
876.0	1201	-10.9	-13.4	82	1.56	256	11	272.4	276.9	272.6
874.0	1219	-10.8	-13.3	82	1.58	260	11	272.7	277.2	272.9
863.0	1316	-10.1	-12.6	82	1.69	285	14	274.4	279.2	274.6
851.0	1424	-9.7	-9.7	100	2.16	313	17	275.9	282.1	276.2
850.0	1433	-9.5	-9.5	100	2.20	315	17	276.2	282.5	276.6
840.1	1524	-8.4	-9.8	90	2.18	320	29	278.2	284.5	278.6
835.0	1571	-7.9	-9.9	86	2.17	316	31	279.3	285.6	279.6
823.0	1684	-7.3	-8.3	93	2.50	307	37	281.1	288.3	281.5
807.8	1829	-7.9	-8.5	96	2.51	295	44	281.9	289.2	282.4
788.0	2022	-8.7	-8.7	100	2.53	301	42	283.1	290.5	283.5
776.6	2134	-9.3	-9.3	100	2.44	305	41	283.6	290.8	284.0
746.5	2438	-10.9	-11.0	99	2.22	325	37	285.1	291.7	285.5
717.5	2743	-12.5	-12.7	98	2.01	325	46	286.6	292.6	286.9
700.0	2933	-13.5	-13.8	98	1.89	320	49	287.5	293.2	287.8
674.0	3220	-15.3	-15.6	98	1.69	320	50	288.6	293.8	288.9
670.0	3265	-13.5	-14.1	95	1.93	320	50	291.1	297.1	291.5
636.1	3658	-15.9	-19.4	75	1.31	320	51	292.7	296.8	292.9
634.0	3684	-16.1	-19.7	74	1.27	320	52	292.8	296.8	293.0
610.9	3962	-17.5	-19.4	85	1.36	315	59	294.3	298.7	294.6
607.0	4011	-17.7	-19.3	87	1.38	317	59	294.6	299.0	294.9
588.0	4248	-19.7	-33.7	28	0.38	324	59	295.0	296.3	295.0
586.5	4267	-19.6	-33.9	27	0.37	325	59	295.3	296.6	295.4
578.0	4375	-18.9	-34.9	23	0.34	325	59	297.4	298.6	297.4
563.0	4571	-19.3	-37.3	19	0.28	325	59	299.1	300.1	299.2
540.0	4877	-22.1	-35.7	28	0.34	325	59	299.4	300.6	299.4
512.0	5268	-25.7	-33.7	47	0.44	328	61	299.6	301.1	299.7
500.0	5440	-26.5	-33.5	52	0.46	330	62	300.7	302.3	300.8

130131/1200 71119

WSE

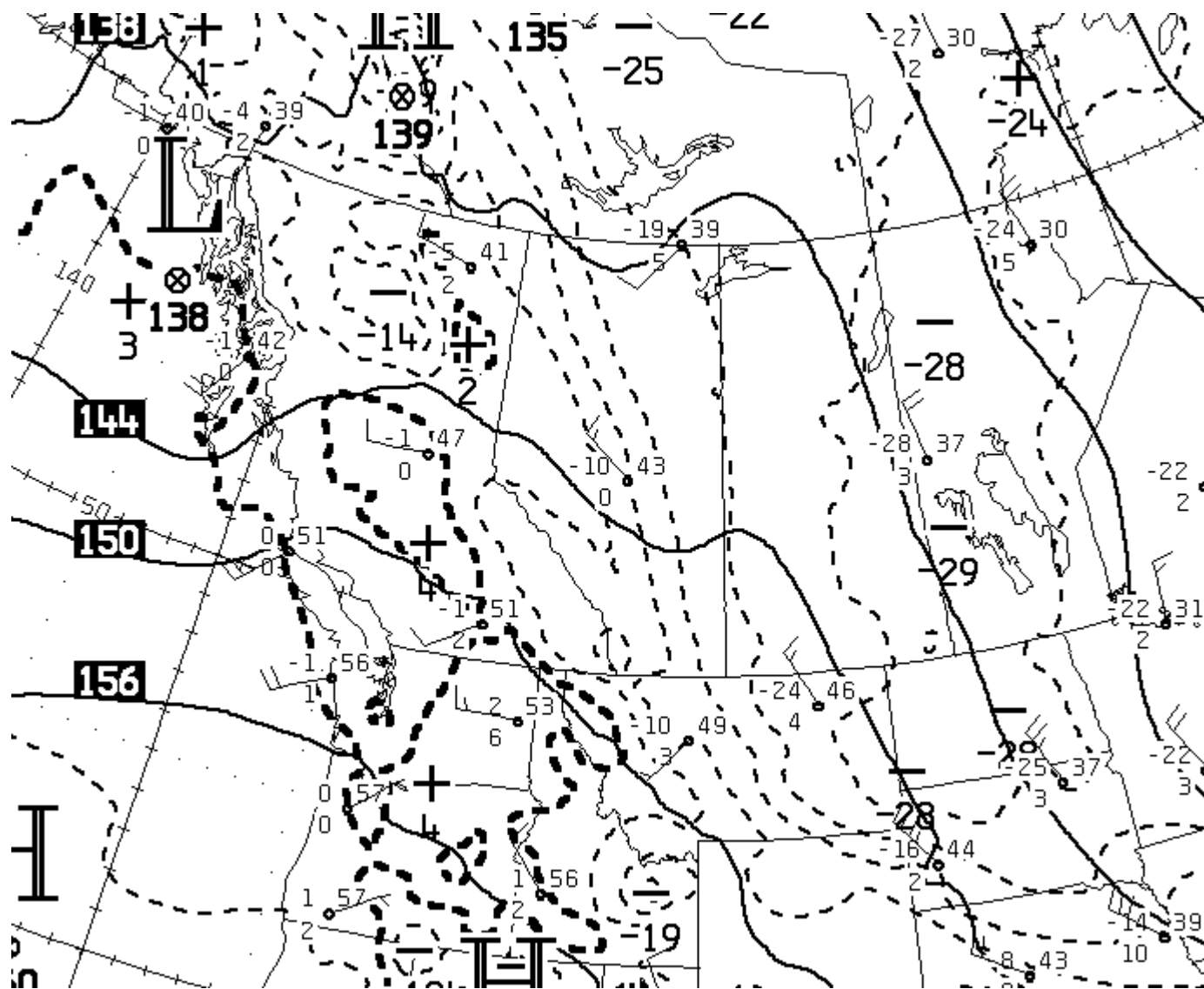
SHOW: 15 LIFT: 22 SHET: 96 VTOT: 17 Tt
CAPE: 0 EQLV: -9999 SELV: 766 CINS: 0 Li
LCLT: 250 LCLP: 886





The thermal wind vector (between 850 hPa and 700 hPa levels) has been added in red, and the red dashed line shows the theoretical orientation of isotherms (assuming the atmosphere to be in thermal wind balance)

– see over for observed orientation of isotherms



CMC 850 hPa analysis 12Z Thurs 31 Jan. 2013