EAS372 Assignment 1 (15%) Due: Fri. 14 Feb. 2014

Format: Please submit a tidy, organized report *in electronic format* (PDF), covering the exercise below[1]. Text should be double spaced with font size 12 pt. The page limit is **three**, not counting your figures and/or tables.

A) Plot hodographs for The Pas (YQD, Manitoba) and Mount Pearl (AYT, Newfoundland) for 12Z on 24 January 2014. Superpose on each a thermal wind vector $\vec{V}_{21} = \vec{V}_2 - \vec{V}_1$, where subscripts 1,2 designate respectively the 850 and 500 hPa levels. Explain whether or not your thermal wind vectors are qualitatively consistent with the thermal patterns at 850 hPa and 700 hPa (the CMC analyses are available on the class website). **[6%]**

B) Plot a cross section of temperature and potential temperature for 12Z on 24 January 2014, based on the soundings at Stony Plain (WSE), Fort Smith (YSM) and Cambridge Bay (YCB). Plot θ isolines for 310, 305, 300,... 255 K and T isolines for -35, -30, -25, ... +5 °C, deducing the height (or rather, pressure) of each isoline at each location by interpolation on the sounding. (Isolines may intersect ground between stations.) **[6%]**

C) From the EC record of daily mean, maximum and minimum temperatures for the first ten days of February 2014 at Toronto (Pearson) International Airport (YYZ), determine the number of days whose maximum and minimum temperature were below normal, normal and above normal. Table (1) gives the February threshold temperatures that define these classes, for Toronto Pearson and a sample of other Canadian locations. **[3%]**

Location	$T_{min}^{33\%}$	$T_{min}^{66\%}$	$T_{max}^{33\%}$	$T_{max}^{66\%}$	Xtrm lo T_{min}	Xtrm hi T_{max}	Period (inclusive)
Vancouver	0.0	3.3	7.2	9.4	-11.2	18.4	1960-2011
Whitehorse	−22.1	−12.5	−11.4	−2.2	-51.2	11.7	1960-2007
Yellowknife	−33.8	−24.1	−23.3	−14.8	-46.8	6.2	1960-2007
Edmonton City	−16.4	−8.6	−6.9	+1.8	-38.9	14.0	1960-2012
Calgary	−14.8	−7.2	−2.8	+5.0	-37.5	19.6	1960-2011
Regina	−21.8	−13.3	−10.5	−2.5	-41.0	11.3	1960-2007
Winnipeg	−24.4	−15.6	−12.8	−5.0	-45.0	9.0	1960-2007
Toronto Pearson	−12.8	−6.5	−3.3	+1.5	-27.7	14.9	1960-2011
Montreal Trudeau	−16.1	−9.9	−6.4	−0.6	-31.7	15.0	1960-2012
Halifax Stanfield	−13.3	−7.7	−2.8	+0.8	-27.3	11.8	1961-2011

Table 1: Climatological upper and lower temperature limits (°C) defining three equiprobable classes (below normal, normal, above normal) for February daily temperature maximum and minimum. For example, the below normal class for February minimum temperatures at Edmonton is $T_{min} < -16.4$°C, and over the period of record 33% of the observed minimum temperatures on February days have fallen in this class; the normal band is $-16.4 \leq T_{min} < -8.6$°C, and again, 33% of observed February minimum temperatures belong in this class.

[1]Blank hodographs and cross sections are available from the class URLs.