

Final Inclass Exercise (Inclass Exercise 11)
Diagnosing Fronts and Upper Tropospheric Divergence Patterns
(200 pts; Due Last Day of Class 12 December 2017)

Part 1: Fronts

You are provided with

- (a) 0000 UTC 29 February 2012 plot of surface isobars and 1000-500 mb thickness;
- (b) a plot of surface observations at 1449 UTC 29 February 2012;
- (c) 0000 UTC 29 February 2012 Skew-T Plot for Davenport IA (KDVN);
- (d) 1200 UTC 29 February 2012 Skew-T Plot for Oklahoma City (KOUN);
- (e) Analysis of 850 mb temperature advection ($K^{\circ} s^{-1}$)

Exercises

1. You will obtain from the Plymouth State University Weather Center Archive at <http://amser.org/index.php?P=AMSER--ResourceFrame&resourceId=278> Meteograms for Oklahoma City (KOKC) and Davenport IA (KDVN); (0000 UTC Start Time 29 February 2012). (12 pts)
2. Each person will analyze the provided charts (a) (midsection of country only) and (b), using standard techniques (40 pts)
3. Each person will compare/contrast his/her analysis of (a) with the actual 850 mb¹ temperature advection analysis given in (e) (8 pts)
4. Each person will examine the provided soundings in (c) and (d) to find evidence that backs the frontal analyses in (a) and (b). (10 pts)
5. Each person will write one paragraph describing how your findings in (2) and (3) just above are supported by the information in the Meteograms. (20 pts)

Presentations (~2 minutes each) (10 pts)

1. (2a) Juliana
2. (2b) Drew
3. (3) Jonathen
4. (4) Tianny
5. (5) Natalie

¹ 850 mb is roughly at the surface in this area.

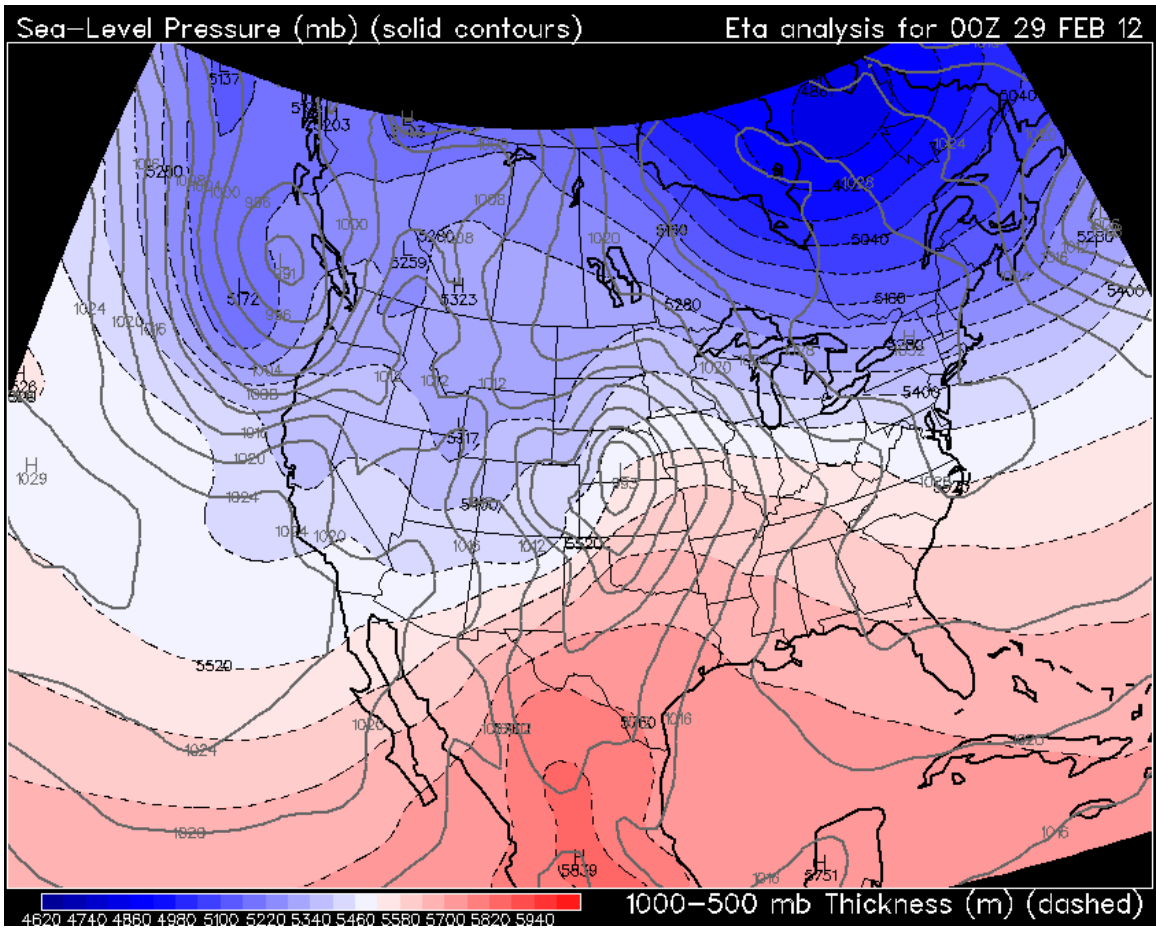


Figure (a): 0000 UTC 29 February 2012 plot of surface isobars and 1000-500 mb thickness;

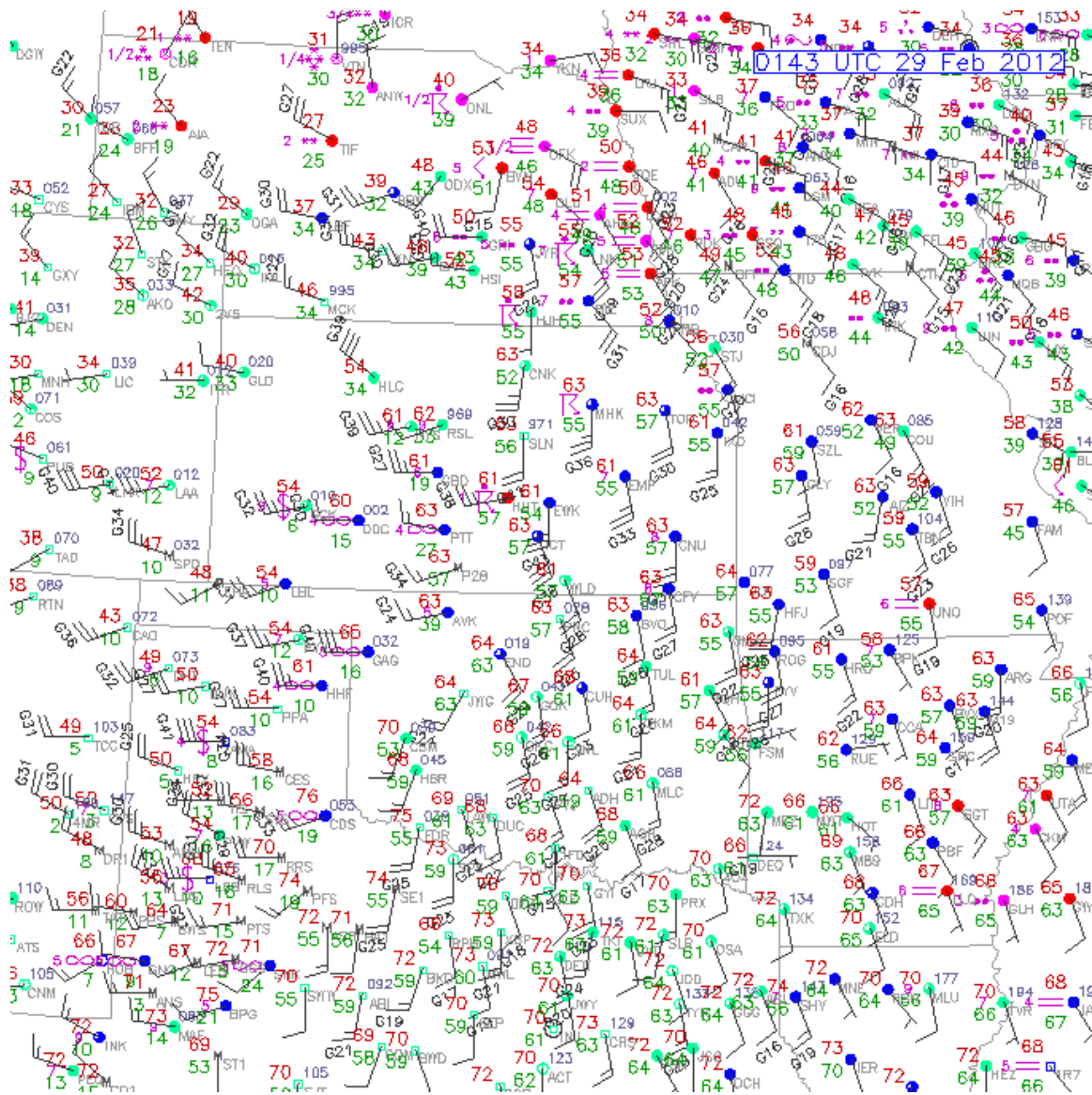


Figure (b) plot of surface observations at 1449 UTC 29 February 2012

▼ Plymouth State Weather Center ▼

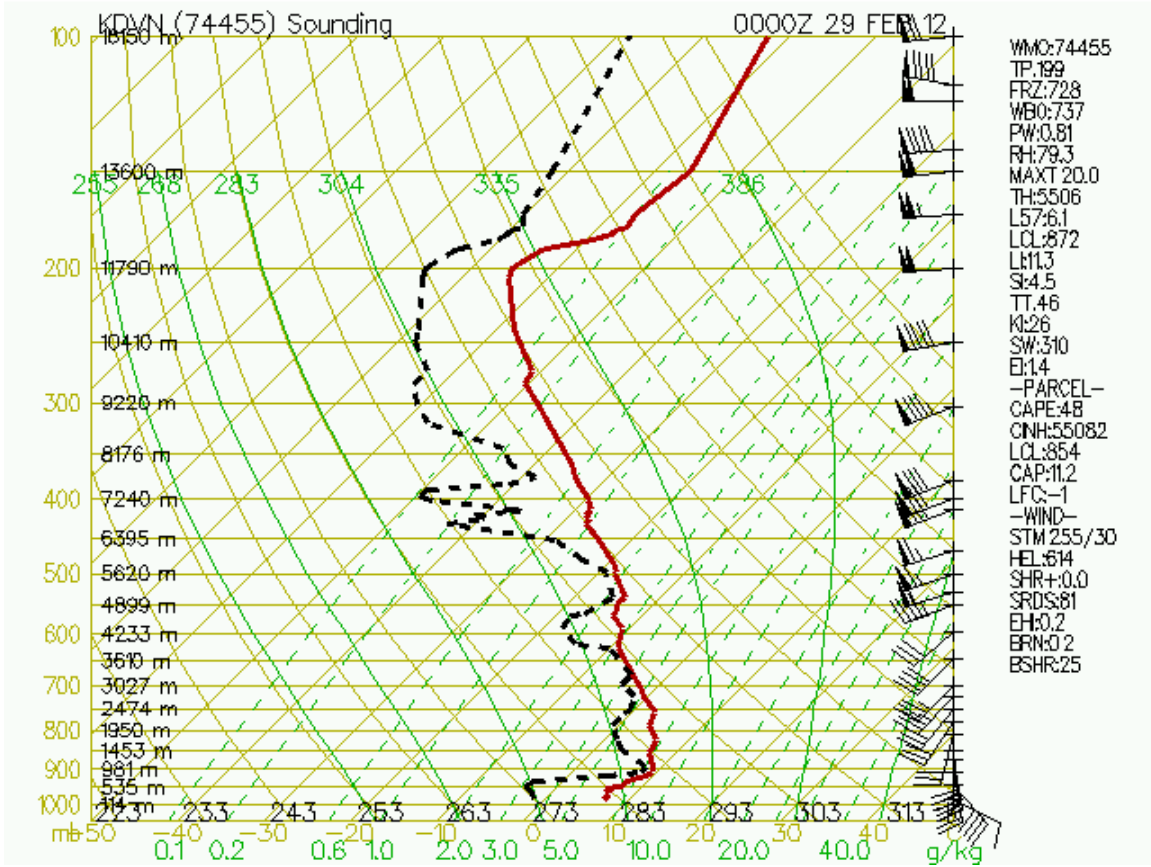


Figure (c): 0000 UTC 29 February 2012 Skew-T Plot for Davenport IA (KDVN);

▼ Plymouth State Weather Center ▼

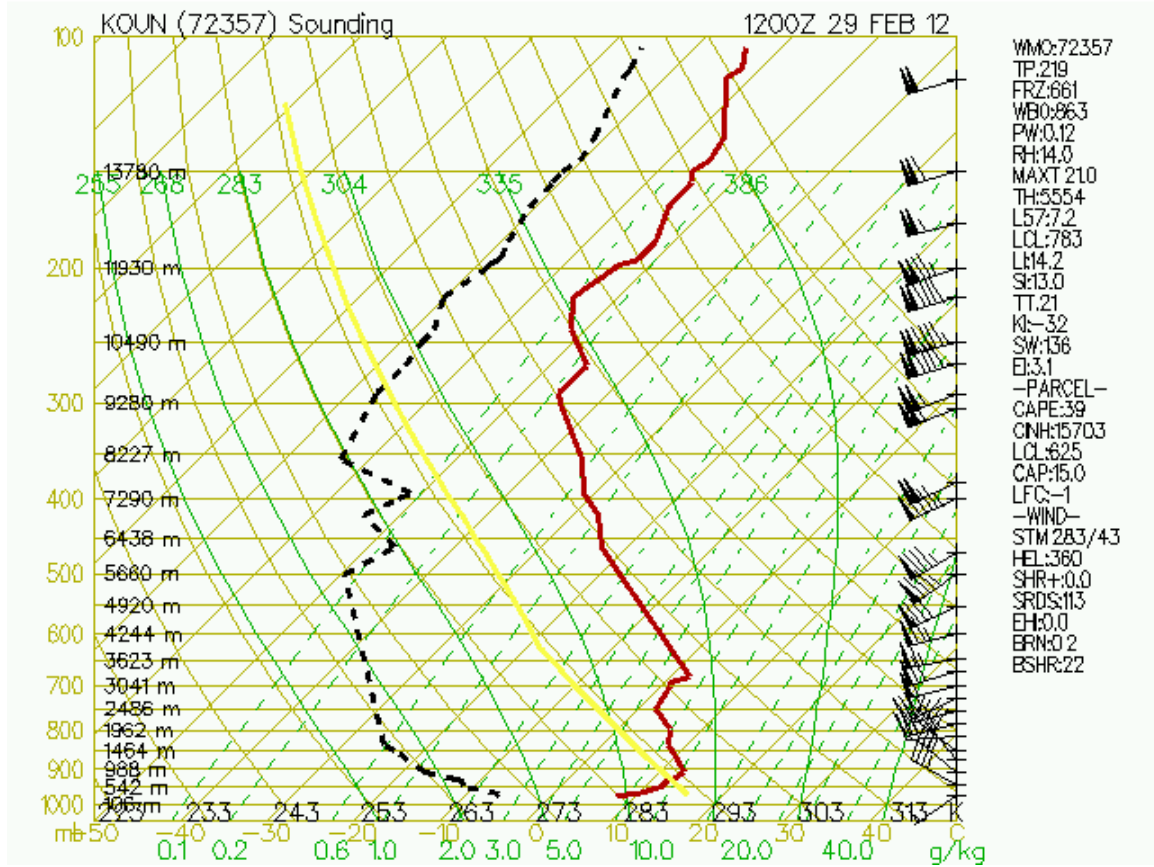


Figure (d): 1200 UTC 29 February 2012 Skew-T Plot for Oklahoma City (KOUN);

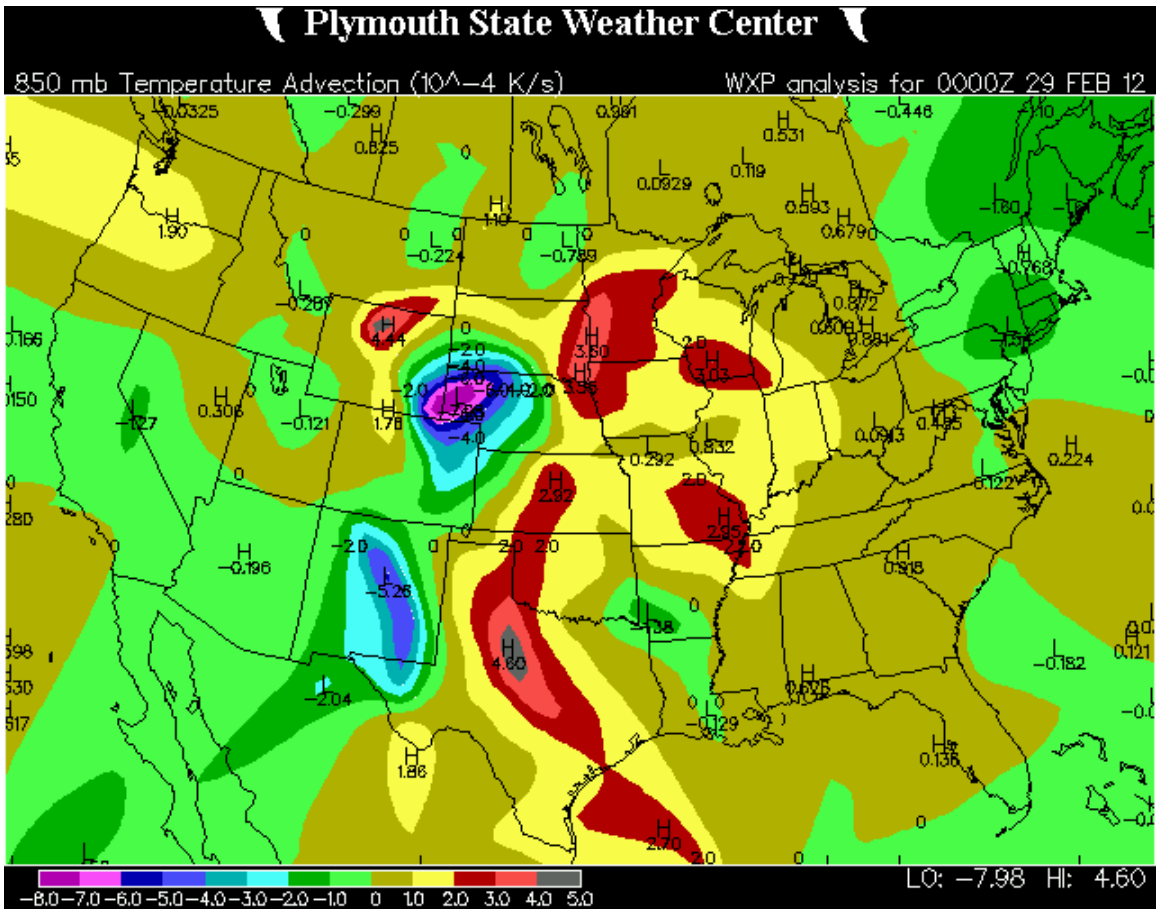


Figure (e): 0000 UTC Analysis of 850 mb Temperature Advection ($K^{\circ} s^{-1}$)

Part 2: Divergence Patterns Diagnosed from Vorticity Patterns

You are provided with

- (f) 0000 UTC 29 February 2012 plot of 300 mb heights (m).
- (g) 0000 UTC 29 February 2012 plot of 300 mb heights (m) and absolute vorticity ($\times 10^{-5} \text{ s}^{-1}$).
- (h) 0000 UTC 29 February 2012 plot of 300 mb convergence ($\times 10^{-5} \text{ s}^{-1}$).

Exercises

6. Each person will analyze troughs and ridges on (f) and, using EARTH 260 reasoning, make a first guess on divergence/convergence patterns at 300 mb for the middle third of the country; (20 pts)
7. Each person will shade in the absolute vorticity advection areas you deduce on (g) using the following convention: (i) light green shading for areas of positive (cyclonic) absolute vorticity advection; (ii) light brown shading for areas of negative absolute vorticity advection. Now, deduce where divergence and convergence areas are on this chart. (One paragraph) (40 pts)
8. Each person will examine the plot of 300 mb convergence patterns given in (h) and compare and contrast the results you got in (6) with the actual patterns given in (h) (30 pts)

Presentations (~2 minutes each) (10 pts)

9. (6) Juliana
10. (7) Drew and Tianny
11. (8) Jonathen and Natalie

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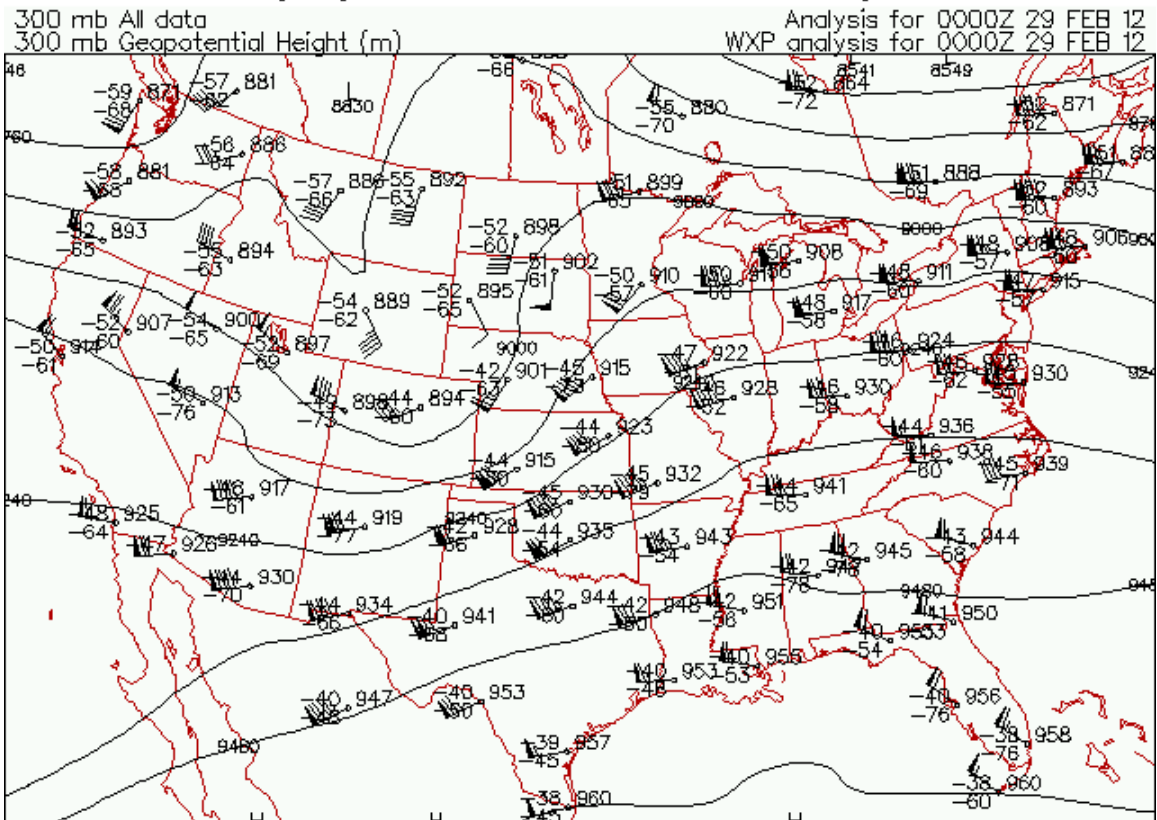


Figure (f): 0000 UTC 29 February 2012 plot of 300 mb heights (m).

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300 mb Abs vorticity ($1e-05$ m/s/m)
300 mb Geopotential Height (m)

WXP analysis for 1200Z 29 FEB 12
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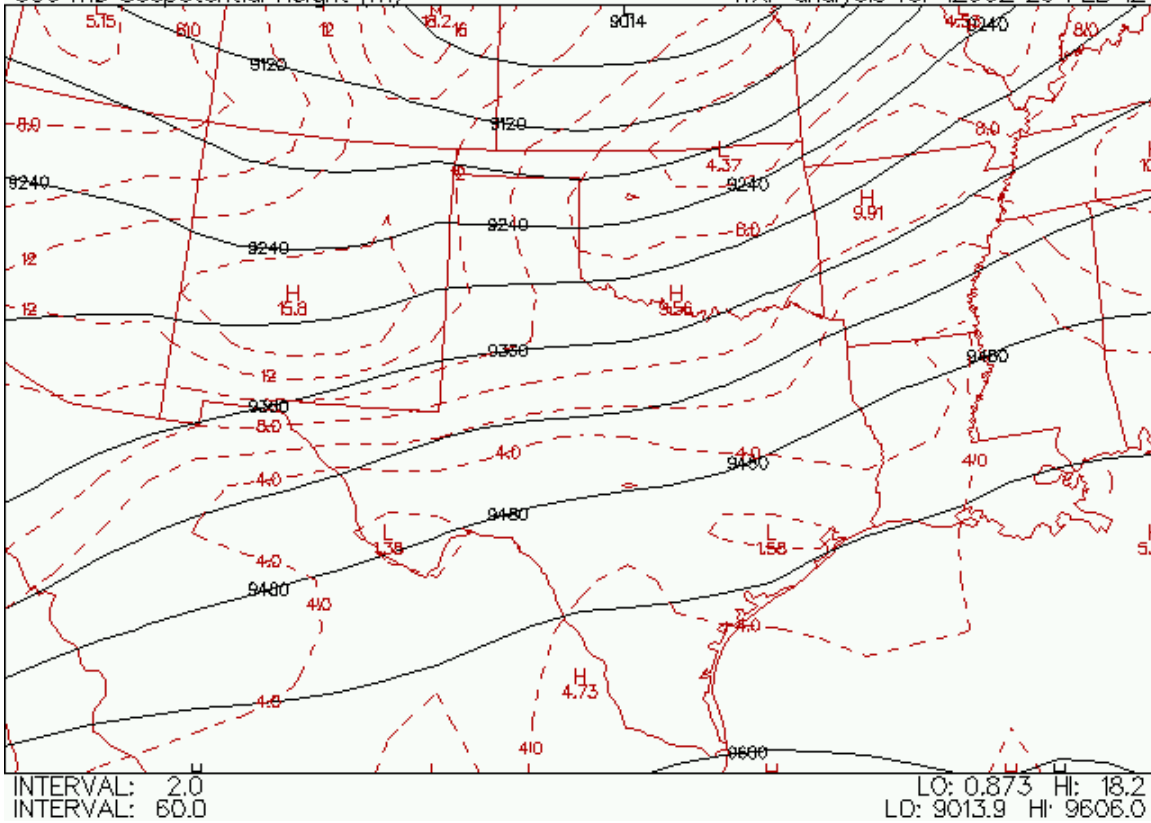


Figure (g): 0000 UTC 29 February 2012 plot of 300 mb heights (mm) and absolute vorticity ($\times 10^{-5} \text{ s}^{-1}$).

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300 mb v-999 Convergence ($1e-05$ m/s/m)
300 mb Geopotential Height (m)

WXP analysis for 0000Z 29 FEB 12
WXP analysis for 0000Z 29 FEB 12

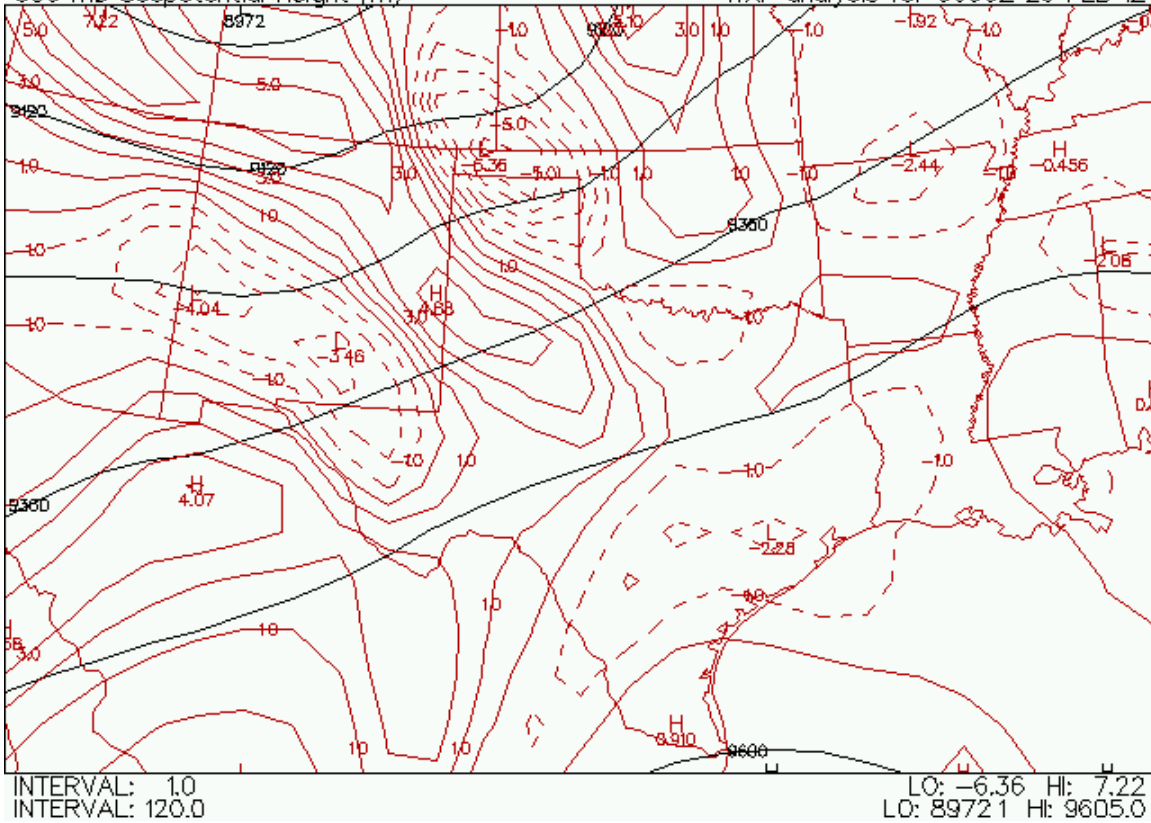


Figure (h): 0000 UTC 29 February 2012 plot of 300 mb convergence ($\times 10^{-5} \text{ s}^{-1}$).