San Francisco State University Name_____
Department of Earth & Climate Sciences Fall 2017

Inclass Exercise 9: Pressure Tendency Equation (100 pts)
Due Thursday November 2, 2017

1. **On November 11, 2012 at 12 UTC, the 300 mb divergence over extreme south-central Iowa was 3.30 X 10 $^{-5}$ s^{-1}. At the same spot, the 850 mb divergence was -2.36 X 10^{-5} s^{-1}. Compute the one hour surface pressure tendency for this point using the pressure tendency equation. (50 pts)**

   You may make the following assumptions which will simplify the procedure:

(a) the 850 mb divergence is representative of the net divergence BELOW the level of nondivergence;
(b) the 300 mb divergence is representative of the net divergence ABOVE the level of nondivergence;
(c) the tropopause is at the 200 mb level and the surface pressure at station A is 900 mb (this station is not at sea level);

$$\left.\partial p / \partial t\right|_{900} = \int_{900}^{200} \nabla \bullet V_h dp$$

2. **The 300 mb height analysis with companion 300 mb convergence chart are provided below.**
   a. **Discuss how your answer in 1 and the patterns shown on the two charts are generally consistent with the principle embodied in Dines Compensation but that in the real atmosphere there is not quite the balance (upper divergence and lower convergence). (25 pts)**
   b. **Qualitatively discuss the contributions of the two terms that make up divergence in the natural coordinate system. Limit your discussion to Iowa. (25 pts)**

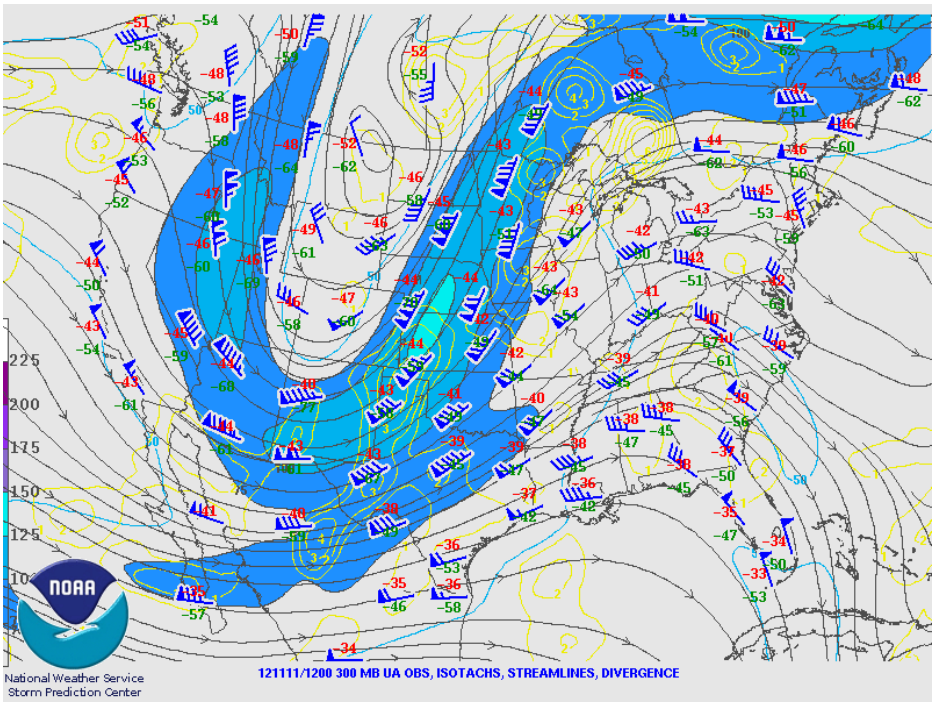

Figure 1: 300 mb heights and isotachs, 12 UTC 11 November 2012

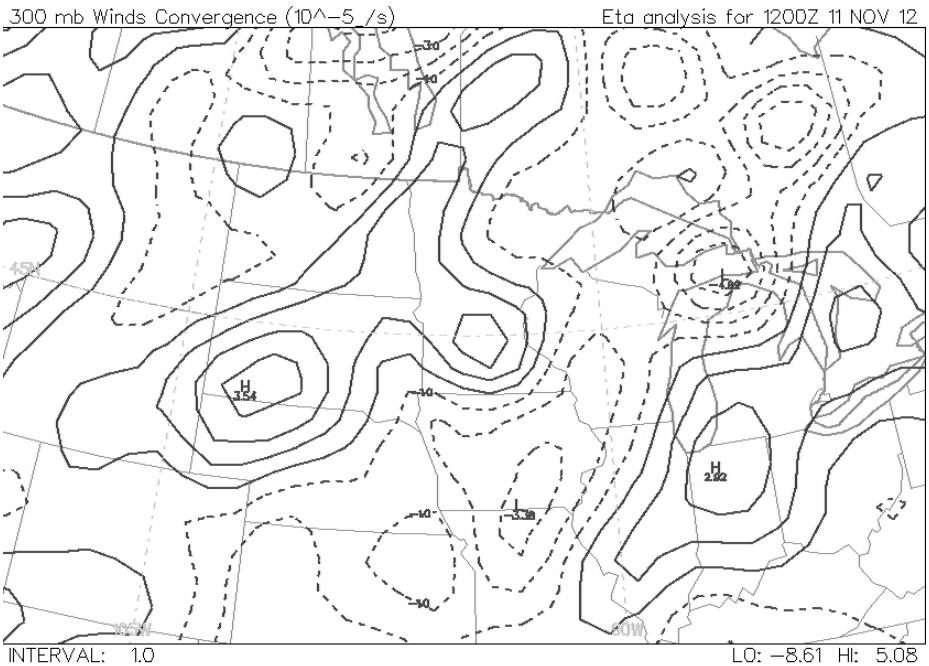

Figure 1: NAM analysis of 300 mb convergence, 12 UTC 11 November 201