Synoptic Meteorology I: Jets and Jet Streaks Application

Due to the thermal wind relationship, jets and jet streaks are typically collocated with large quasi-horizontal lower-tropospheric temperature gradients and large vertical wind shear. Consequently, lower-tropospheric warm air is typically found to the right of a jet and lower-tropospheric cold air is typically found to the left of a jet.

The surface frontal analysis for 1 December 2014 considered in the Frontal Analysis example can be used as a baseline for illustrating these concepts. To complement this analysis, 300 hPa wind speed, streamlines, and divergence valid at 1200 UTC 1 December 2014 is depicted in Fig. 1. Note the correspondence between the polar jet over the Great Lakes in Fig. 1 and the surface cold front over the Midwestern United States in the Frontal Analysis example:

- **Jet Axis**: Aligned from southwest to northeast, the same as the surface cold front.
- **Jet Location**: Slightly poleward of the surface cold front, consistent with cold front vertical structure (sloping rearward – for this example, northwestward – with increasing altitude).
- **Temperatures**: Warmer at 300 hPa and the surface to the right of the jet, colder at 300 hPa and the surface to the left of the jet.

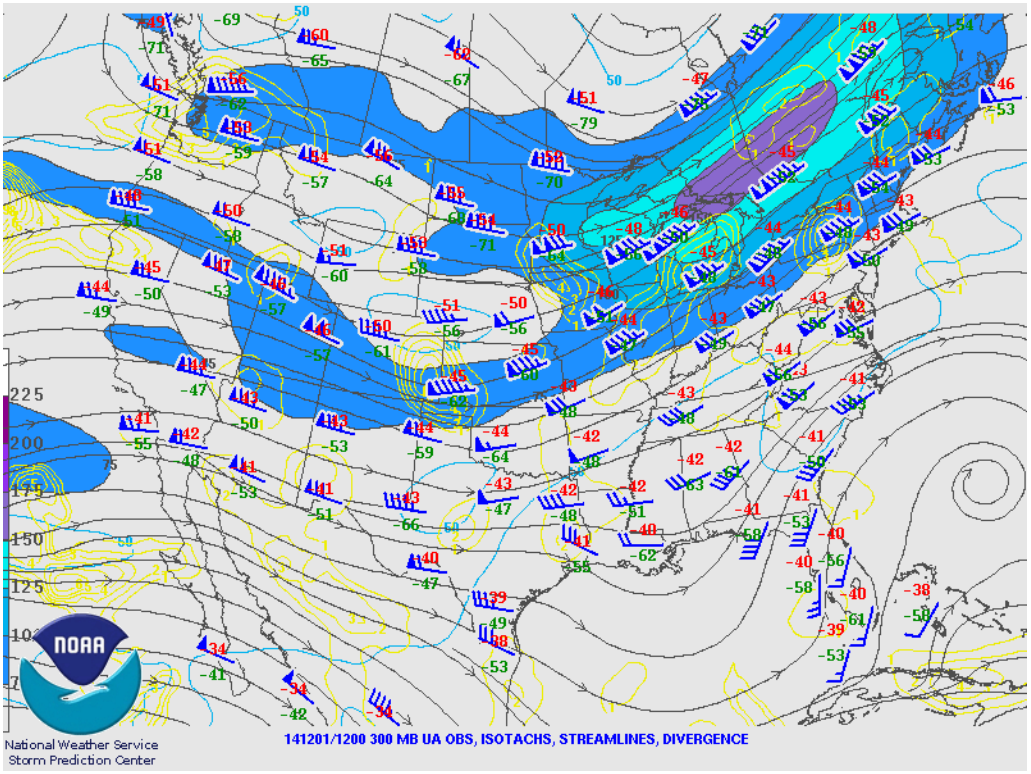

Figure 1. Model-derived, objectively analyzed 300 hPa wind speed (kt, shaded per the colorbar at lower left), streamlines (grey lines), and divergence (yellow contours) at 1200 UTC 1 December 2014. Figure obtained from https://www.spc.noaa.gov/obswx/maps/.