

SIO 217B Atmospheric and Climate Sciences II

Exercise #27

1. Download the files containing Z_{1000} and Z_{500} for 00Z and 12Z of March 13, 00Z and 12Z of March 14, and 00Z and 12Z of March 15 in 1993. Plot Z_{1000} and Z_{500} in the domain 20-65°N, 250-330°E for each date using a contour interval of 6 dkm.
2. According to quasi-geostrophic theory applied to Earth's atmosphere, an upper-level trough can interact with a surface low to produce mutual amplification when the upper-level trough is west of the surface low. We will now qualitatively examine this process.
 - a) What is the minimum closed Z_{1000} contour of the surface low center for each date? On what date is the surface low center deepest? How many closed contours does the surface low center have for each date? On what date is the number of closed contours maximum?
 - b) Since it is difficult to quantify upper-level trough amplitude by eye, qualitatively describe for each date whether the upper-level trough looks deeper or less deep than the previous date (alternatively, you may develop your own quantitative criteria and apply the method to the data). On what date is the trough deepest? Be careful not to confuse the short-wavelength trough that is interacting with the surface low with the planetary-scale trough spanning the eastern North America-western Atlantic sector.
 - c) On what date does the axis of the upper-level trough appear to be the farthest west from the location of the surface low center? On what date does the axis of the upper-level trough appear to coincide with the location of the surface low center? How are these dates related to dates when the surface low center and upper-level trough are amplifying or decaying?