

A typical value of the buoyancy frequency N in the Gulf Stream region is $N = 10^{-3} \text{ s}^{-1}$.

a. Determine the wavelength of the perturbation with the largest growth factor in the Eady model for the Gulf Stream.

From (10.36) it follows that

$$\lambda_* = 4L_D = 4\frac{ND}{f_0}$$

For the Gulf Stream, $L_D \approx 20 \text{ km}$ and hence $\lambda_* = 80 \text{ km}$.

b. Why do we see (in general) eddies with a larger diameter?

There may be several reasons: (i) the eddies are formed due to a mixed baroclinic-barotropic instability, (ii) the flow is non-zonal, (iii) N^2 is not constant, ...