$$\left(\frac{\delta\zeta}{\delta t}\right)_{1000} = -(V-c)_{500} \bullet \nabla\zeta_{a\,500} - \frac{g}{f}\nabla^2\left(\frac{\partial z_T}{\partial t}\right)_{1000-500} \qquad (12)$$

where

$\left(\frac{\delta\zeta}{\delta t}\right)_{1000}$ is the vorticity tendency observed at the center of the moving system..

| Development | Vorticity Advection | Thickness | LPT Term |
|---|---|---|---|
| 18 UTC 11/6/13 | | | XXXXXXXX |
| 00 UTC 11/7/13 | | | |
| ??????? | | | |
| 06 UTC 11/7/13 | | | |
| ??????? | | | |

Note: (a) Coriolis Parameter, f, at 7 degrees latitude is 1.777 X $10^{-5}$ $s^{-1}$. Hence the factor g/f=5.515 X $10^5$ m $s^{-1}$

(b) Finite difference cross $\Delta x$ and $\Delta y$ = 1.25 deg latitude = 138.75 km (for finite difference cross shown, which spans 2.5 deg latitude). Assume thickness at points 1, 2, 3 and 4 are 582 dm.

$$-\frac{g}{f}\nabla^2\left(\frac{\partial z_T}{\partial t}\right)=-\frac{g}{f}\frac{\partial}{\partial t}\nabla^2 z_T$$

$$-\frac{g}{f}\frac{\partial}{\partial t}\text{Laplacian of Thickness Field}$$

For first six hour time step

$$\frac{\partial}{\partial t}\text{Laplacian of Thickness Field}=\frac{\text{LTF}_{Time2}-\text{LTF}_{Time1}}{\Delta t}$$

For second six hour time step

$$\frac{\partial}{\partial t}\text{Laplacian of Thickness Field}=\frac{\text{LTF}_{Time3}-\text{LTF}_{Time2}}{\Delta t}$$

To estimate this term, get center the Laplacian grid on the cyclone and determine the value of the Laplacian of the thickness field at time 1, time 2 and time 3. Then perform the arithmetic operations shown.