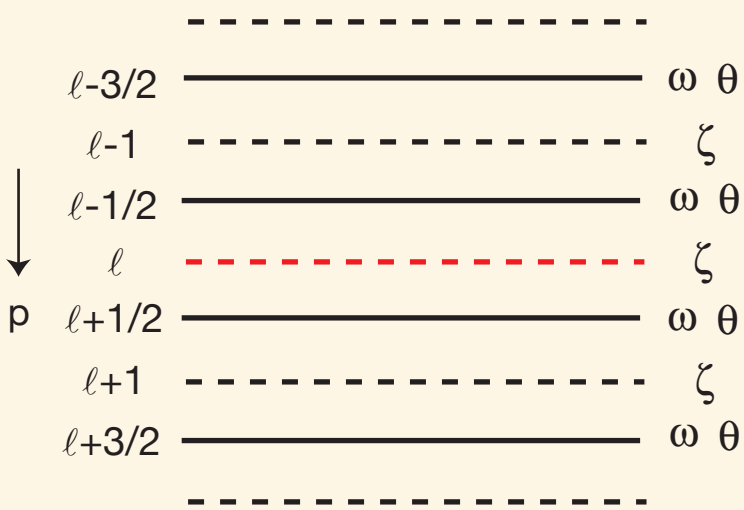
Charney-Phillips grid



$$\left(\frac{\partial}{\partial t}+\mathbf{v}\cdot\nabla\right)(\zeta+f)-f_0\frac{\partial\omega}{\partial p}=0 \qquad (1)$$

$$\left(\frac{\partial}{\partial t}+\mathbf{v}\cdot\nabla\right)\frac{\partial}{\partial p}\left(\frac{f_0}{\sigma}\theta\right)-f_0\frac{\partial\omega}{\partial p}=0 \qquad (2)$$

For the CP grid, discrete expressions for $-f_0\frac{\partial\omega}{\partial p}$ are the same between (1) and (2).

- Thus, in a discrete system based the CP grid, quasi-geostrophic potential-vorticity dynamics has almost complete analogy to that of the continuous system.
- In the primitive-equation system, however, the Second-Kind discretization error (i.e., error in vertical advection) also matters.