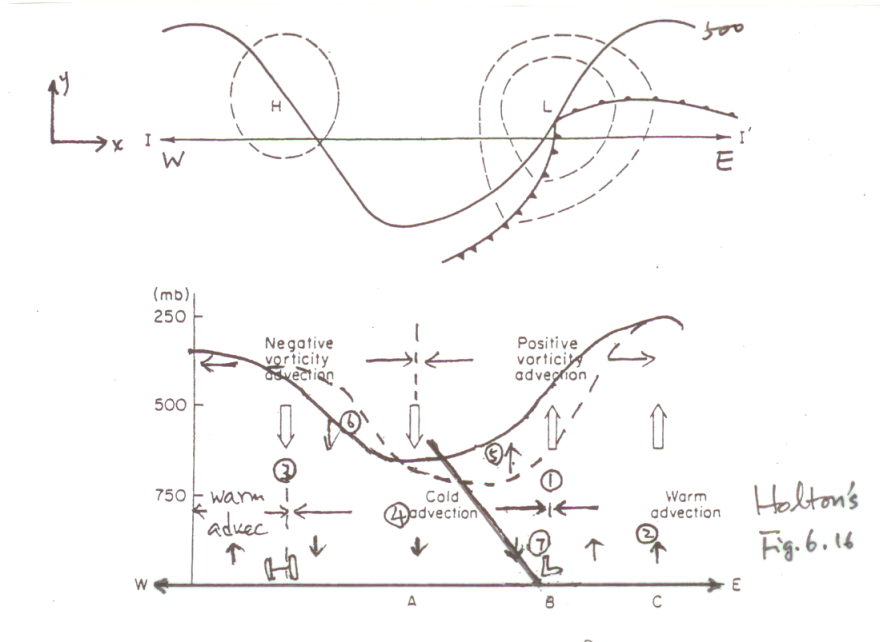


7.5 Idealized Model of a Developing Baroclinic Wave



A. Based on ω equation [simple form: $w \propto \frac{\partial}{\partial z} (-V_g \cdot \nabla \zeta_g) - V_g \cdot \nabla T$]

- (1) & (5): PVA at 500mb \rightarrow Positive differential VA $\rightarrow w > 0$.
- (2): Warm advection $\rightarrow w > 0$.
- (3) & (6): NVA at 500mb \rightarrow Negative differential VA $\rightarrow w < 0$.
- (4): Cold advection $\rightarrow w < 0$.

B. Based on χ equation [simple form: $-\chi \propto -V_g \cdot \nabla \zeta_g + \frac{\partial}{\partial z} (-V_g \cdot \nabla T)$]

- (5): Ahead of 500 mb trough \rightarrow PVA $\rightarrow \phi \downarrow$ and
 cold advection near surface $\rightarrow \frac{\partial}{\partial z} (-V_g \cdot \nabla T) > 0 \rightarrow \phi \downarrow$.
- (6): Ahead of 500mb ridge \rightarrow NVA $\rightarrow \phi \uparrow$ and
 cold advection near surface $\rightarrow \frac{\partial}{\partial z} (-V_g \cdot \nabla T) > 0 \rightarrow \phi \downarrow$. $\phi?$

C. Development of the surface low

- (7):
- (i) Overall $w > 0$ creates surface convergence \rightarrow spin up surface positive vorticity \rightarrow low deepens.
 - (ii) 500 mb vorticity strengthens due to PVA \rightarrow coupled with surface low.