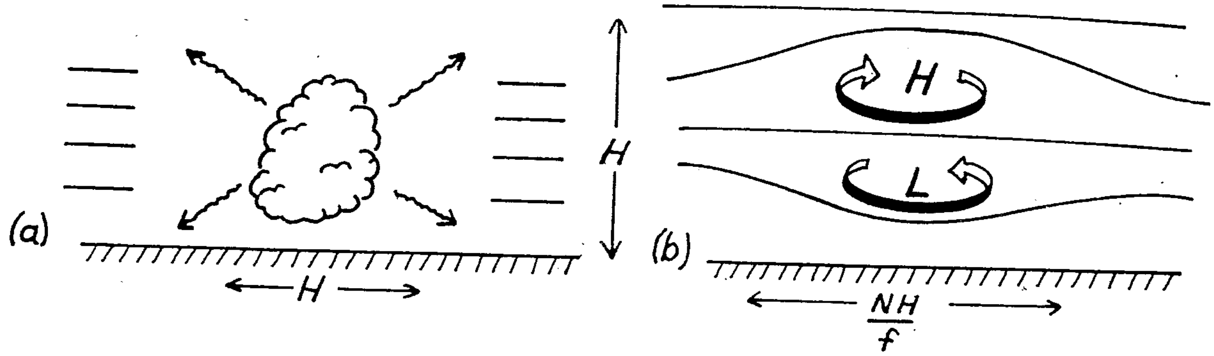

Figure 4 (a) The response of the free atmosphere to a cumulus cloud is to radiate gravity waves, which lead in the end to (b) a lens of less stratified air whose width is the deformation radius. (The solid lines are lines of constant pressure.)

from larger and smaller scales. An example of such a transfer process is the steady aftermath of cumulus convection, a lens of air of some height h and approximate diameter Nh/f that, to satisfy thermal wind balance, is associated with the vortex couplet shown in Fig. 4.

It would be interesting to try to calculate a Lagrangian energy spectrum. There might be a sharp drop of energy in the range of frequencies $f < \omega < N$ where it can be radiated into the stratosphere by gravity waves. This has implications for predictability, since the grid spacing of a numerical model could be chosen so that much of the time little energy is in the "grey area" around the grid spacing, which is neither well resolved nor possible to satisfactorily parameterize. Further, if an energy gap exists between the synoptic and cumulus scales, it is worth predicting the ensemble-average small-scale response to local large-scale conditions just because the response represents a different physical process important for its own sake.

In summary, the mesoscale is interesting both as the arena for many special weather events and as a transfer region in which the nature of scale interaction may change as the Rossby number passes through 1.