Session 9

1. A cylindrical column of air at 30° N with radius 100 km expands to twice its original radius. If the air is initially at rest, what is the mean tangential velocity at the perimeter after expansion? In your consideration assume a barotropic fluid.

2. Using Kelvin's circulation theorem calculate the rate of change of circulation for a sea breeze scenario where the circulation is confined between the 925 and 975 hPa surfaces and the temperature difference between the land and the ocean is 20^oC. Assuming that this rate persists compute the circulation after one hour. What is, approximately, the corresponding wind speed if the mean temperature in the layer is 15^oC and the horizontal scale of the motion is 40 km.