GEF2200 Atmosfærefysikk 2014

Oppgavesett 3: Oppgaver til 7/2-2014

Oppgaver hentet fra boka Wallace and Hobbs (2006) er merket WH06

I flere av oppgavene vil du få bruk for sondediagrammet (skew T-lnp-chart) som kan lastes ned fra kursets semesterside

E.2.T

An air parcel containing 1 g of water vapor and 400 g of dry air has temperature 5.0 °C and is located at 900 hPa. Find the following quantities for the air parcel:

a. Mixing ratio

b. Specific humidity

c. Relative humidity

d. Dew point temperature

e. Virtual temperature

f. Lifting condensation level

g. Potential temperature

h. Wet-bulb temperature

i. Equivalent potential temperature

E.3.T

a. A parcel of air cools when it is lifted. Why do dry parcels cool more rapidly than parcels saturated with respect to water vapor?

b. What is the difference between an adiabatic, a pseudoadiabatic and a saturated adiabatic process?

WH06 3.45

WH06 3.47

WH06 3.48

WH06 3.40

A.20.T

a. Define potential temperature (θ).
   Assume that the air is dry. What is the criterion for static stability of the atmosphere, given by θ?

b. Draw the two points A and B on a sonde diagram, with temperatures $T_A = 10°C$, $T_B = 0°C$ and pressures $p_A = 1000\text{hPa}$ and $p_B = 700\text{hPa}$. We assume the lapse rate is constant between A and B.

   Is the layer between A and B stable?

c. If an air parcel in the middle of this layer is displaced from its position, it will start oscillating. What do we call the frequency of these oscillations? Find the period of the oscillations in this case.

E.4.T

Two saturated air parcels with different temperatures mix at constant pressure. As a result some of the water vapor condenses. Why is that?