

GEF2200 Atmosfærefysikk 2014

Oppgavesett 4: Oppgaver til 21/2-2014

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

Sondediagram kan lastes ned fra kursets semesterside

WH06 3.18rstv

WH06 3.53

WH06 3.58 (find also the efficiency of this heat engine)

WH06 3.64

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 $T_A = 10^\circ\text{C}$, $T_B = 0^\circ\text{C}$ 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.
- d. Assume the lapse rate between 700 hPa and 400 hPa is close to dry adiabatic, and that the relative humidity is 95 % at A and 80 % at B. Find the level of free convection (LFC) for A and B. Comment on the likelihood that the conditional instability will be released in each case.

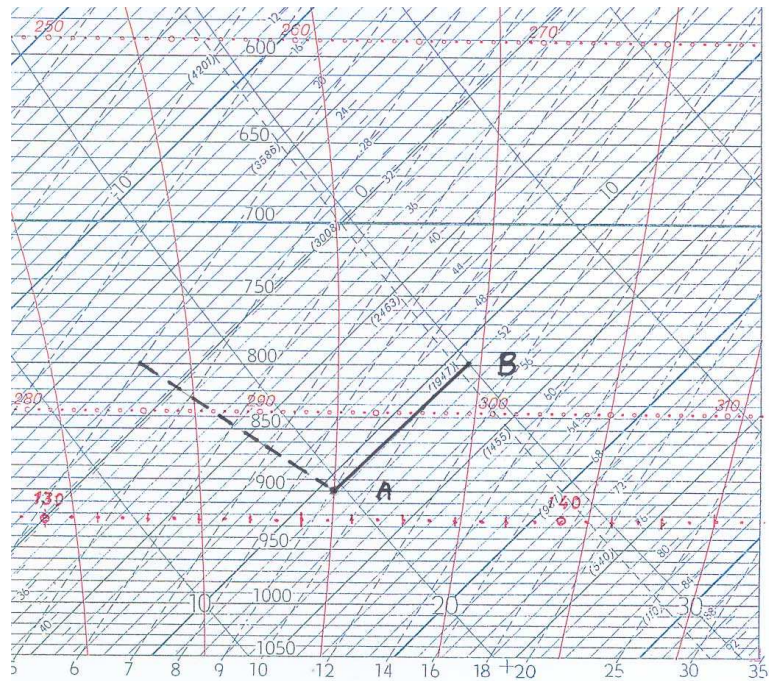


Figure 1: Temperatur T (heltrukken linje) og duggpunkt T_d (stiplet) for en sonde.

A.74.T

Eksamen GEF2200 08-1

Deler av en sondeoppstigning er vist i Figur 1, der temperaturen T og duggpunktstemperaturen T_d er gjengitt for et lag A-B.

- Hvordan er stabiliteten i laget A-B?
- Laget A-B heves 100hPa. Er laget mer eller mindre stabilt nå? Begrunn svaret kort.
- Laget heves 100hPa til. Hvordan er stabiliteten i laget A-B nå? Begrunn svaret kort.