

Lecture Ch. 8a

- Review of Ch. 7 Concepts
 - Homework Ch. 7, Prob. 3
- Cloud Classification
- Precipitation Processes

Curry and Webster, Ch. 8

Please complete online evaluations!



Figure 8.1 View of the Earth from space.

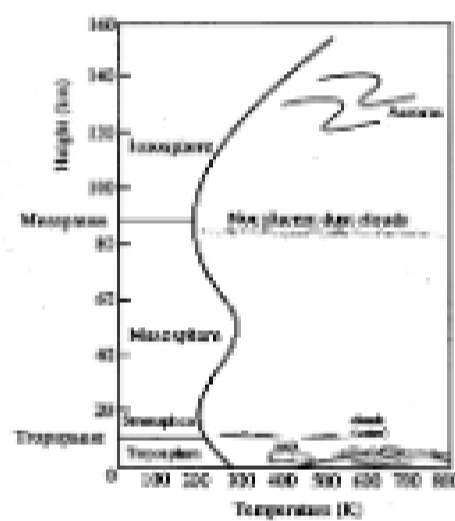


Figure 14.1 Vertical structure and features of Earth's atmosphere.

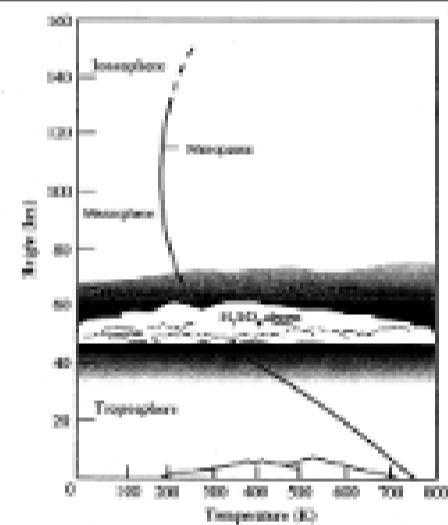


Figure 14.2 Vertical structure and features of Venus's atmosphere.

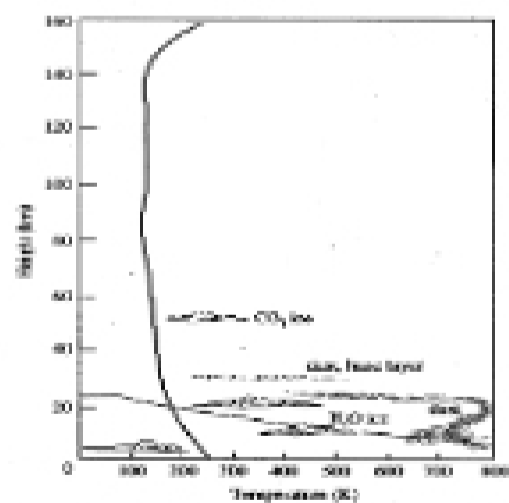


Figure 14.3 Vertical structure and features of the Martian atmosphere.

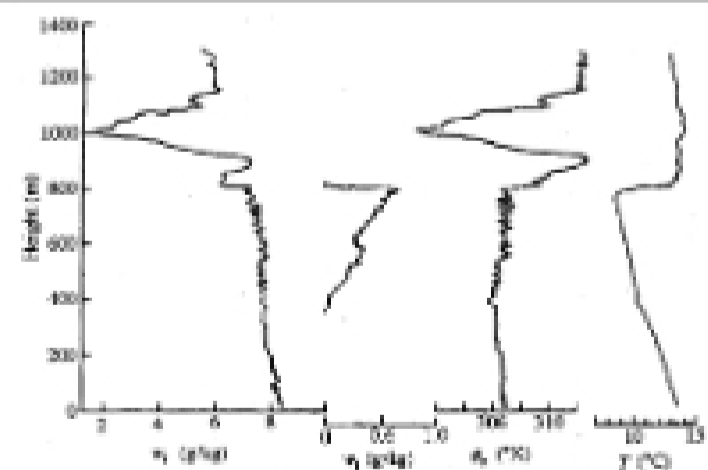
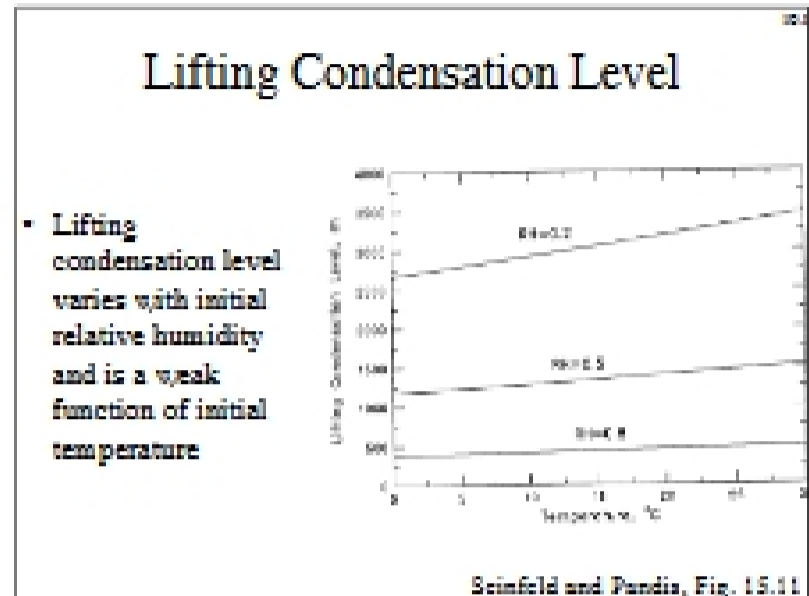
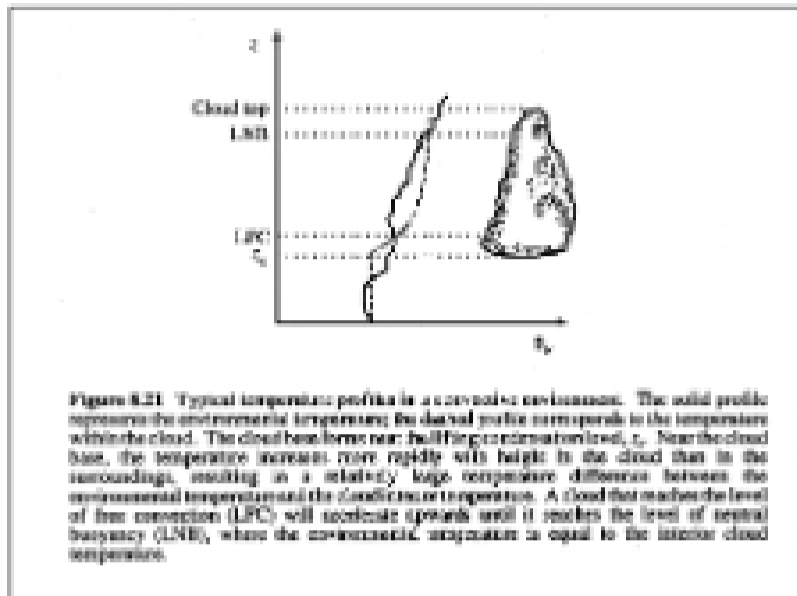


Figure 8.19 Vertical structure of a stratocumulus cloud deck observed over the North Sea (55°N). Over the depth of the boundary layer, the total water mixing ratio and the potential temperature are nearly constant, indicating a well-mixed layer. The cloud base is at about 400 m. (After Nicholls, 1994.)



Cloud Classification

Clouds are also distinguished by the heights above ground level at which they form:

- 1) high clouds whose bases are higher than 6 km in the tropics and 3 km in the polar regions (suffix: cirri);
- 2) middle clouds whose bases lie between 2 and 6 km in the tropics and 2 and 4 km in the polar regions (suffix: alto);
- 3) low clouds whose bases lie below 2 km;
- 4) clouds of vertical development.

The prefix nimbo or the suffix nimbus indicates the presence of rain.

NOTE: In this text, the cloud classification is based on the main cloud

Cumulus Clouds

Swelling Cumulus
Active heaped-up cloud with flat bottom and growing cauliflower top.
[<http://www.fox8wghp.com/spacious.htm>]

Cumulonimbus Clouds

Cumulonimbus
Massive cloud system producing heavy showers, sometimes with hail. Most active clouds may have lightning and thunder. A few spawn tornadoes.
[<http://www.fox8wghp.com/spacious.htm>]

Stratus Clouds

Stratus
Low lying layer of cloud (called fog if on the ground) with no structure.
[<http://www.fox8wghp.com/spacious.htm>]

Cirrus Clouds

Cirrus

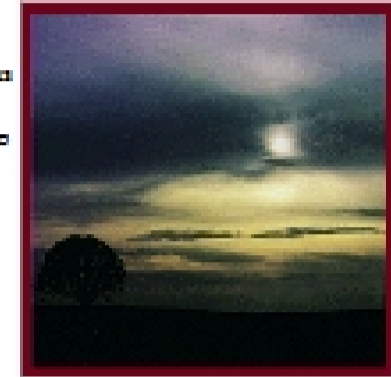
An ice crystal cloud, wispy in appearance. May produce ice crystal snow in winter or in mountains.
<http://www.fox8wghp.com/spacious.htm>



Altostratus Clouds

Altostratus

Thickly layered water droplet cloud. Sun seen as through ground glass.
<http://www.fox8wghp.com/spacious.htm>



Nimbostratus Clouds

Nimbostratus

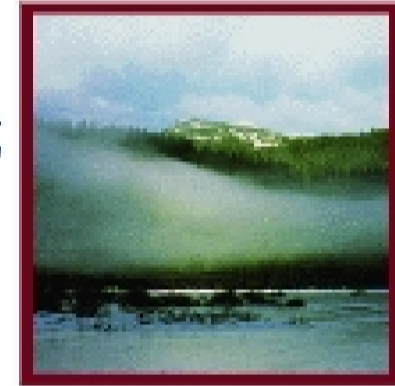
Thick layered cloud - usually dark gray. Produces continuous rain or snow over large area.
<http://www.fox8wghp.com/spacious.htm>



Stratus Clouds

Stratus

Low lying layer of cloud (called fog if on the ground) with no structure.
<http://www.fox8wghp.com/spacious.htm>



Ship Tracks

- What are they?
 - aerosol "signatures" from ships
- Ship tracks form in non polluted areas
 - Last 1-2 days
- Counter global warming
Why?

What are the characteristics of "ship tracks"?

Ship Track Observations	Events/Optical	Refractive/Aerosol
Comisar	1998	\uparrow albedo = 20%
Cookley, Bernsten, Decker	1997	\uparrow R_{total} = 3.9% \uparrow R_{water} = 1.9% R_{total} = 0.0%
Radka, Cookley, King	1999	\uparrow R_{total} = 13.0% \uparrow = 240%
King, Radka, Hobbs	1993	\uparrow R_{total} = 220% \uparrow R_{water} = 47% \uparrow R_{ice} = 220% \uparrow R_{NO_2} = 220%