

MET 3003 LECTURE 10, Clouds

19FEB07

I've looked at clouds from both sides now,
And still, somehow, I don't know clouds at all.
Judy Collins

I downloaded these pictures from the following sites

<http://www.cloudman.com/>

<http://www.atmos.washington.edu/atlas/Houze/>

<http://www.photolib.noaa.gov/>

Please don't use them for anything but teaching meteorology at FIU
MET 3003, Spring, 2007

How do clouds form?

- Buoyant saturated updrafts
- Forced lifting of moist, stable air due to passing weather systems
- Forced lifting as air passes over mountains
- Cooling by contact with a cold surface
- Mixing of parcels with different temperatures
- Cooling by expansion in tornadoes and waterspouts

How do we classify clouds?

- **Cumulus** (heaps, puffy, vertical development, water or ice)
- **Stratus** (Layers, low-level, mostly water)
- **Alto** (-cumulus or -stratus, middle level, water or ice)
- **Cirrus** (wisps, streaks, high-level, always ice)
- **Nimbus** (raining or snowing)

Proposed by Luke Howard (1803)

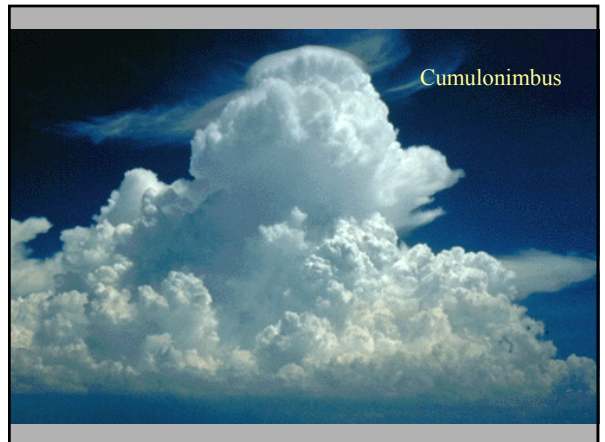
Cloud Levels (Etages)

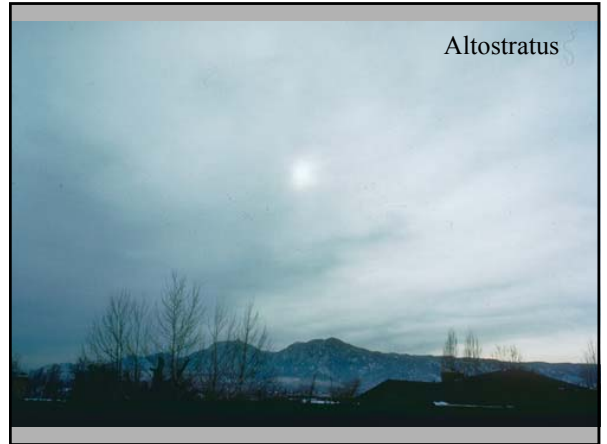
Etage	Tropics	Temperate	Polar	Clouds of Vertical Development
High (Ci,Cs,Cc)	6-18km	5-13 km	4-8 km	
Middle (As,Ac)	2-8km	2-7km	2-4 km	
Low (St, Sc,Ns)	0-2km	0-2km	0-2km	

Cumulus



Cumulonimbus



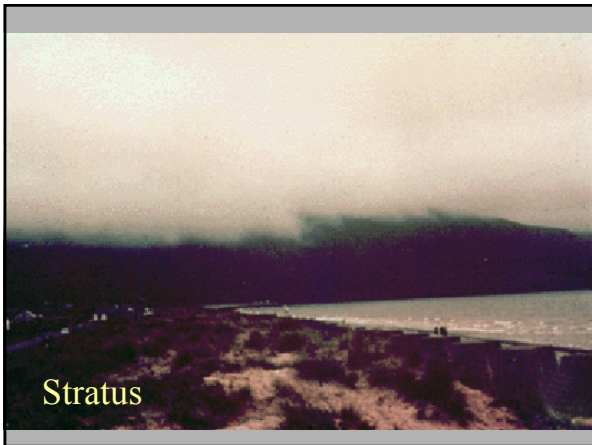




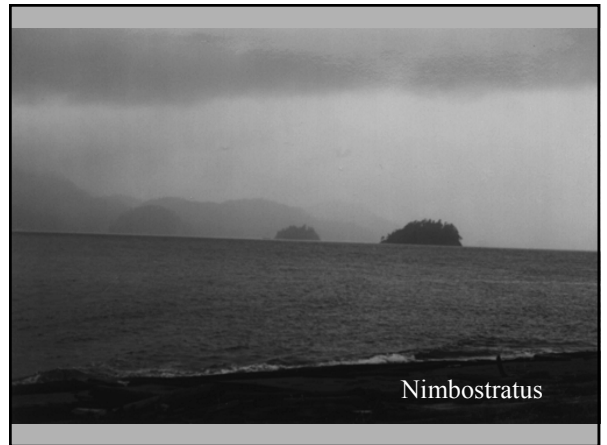
Stratus



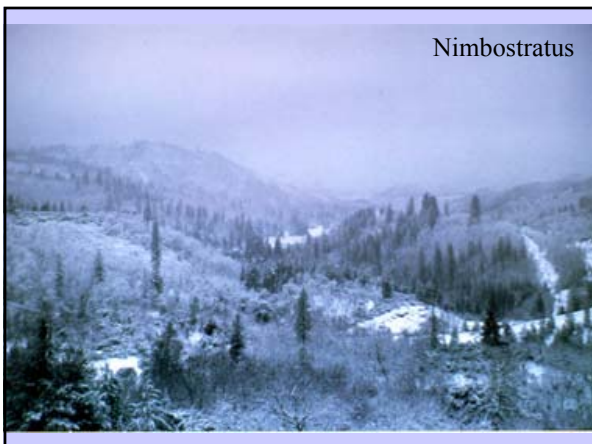
Mountain Valley Fog in Austria



Stratus



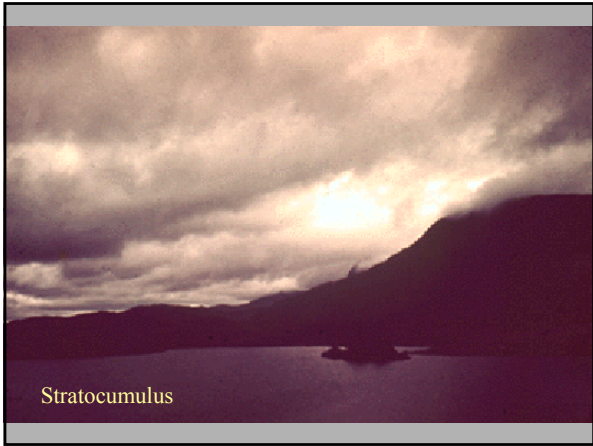
Nimbostratus



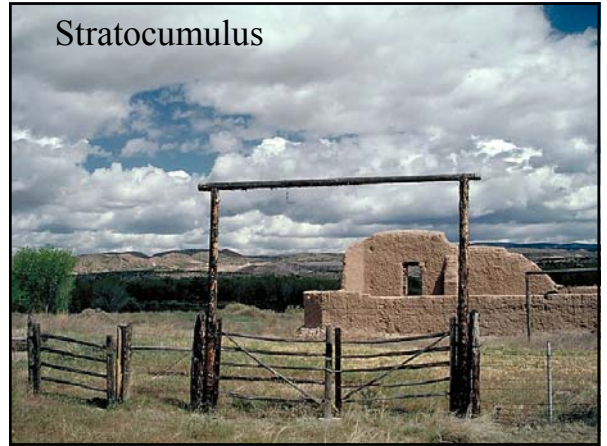
Nimbostratus



Stratocumulus



Stratocumulus



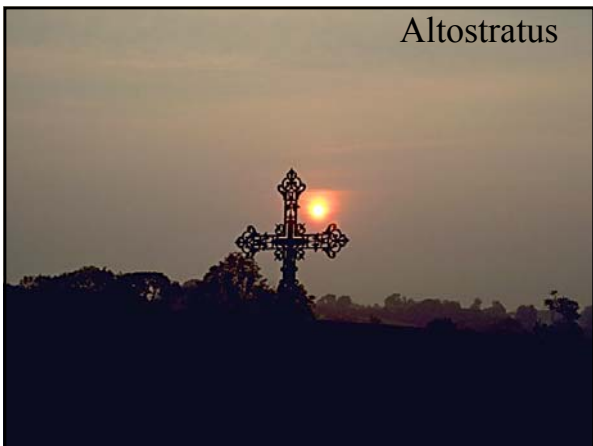
Stratocumulus



Stratocumulus



Stratus & Stratocumulus

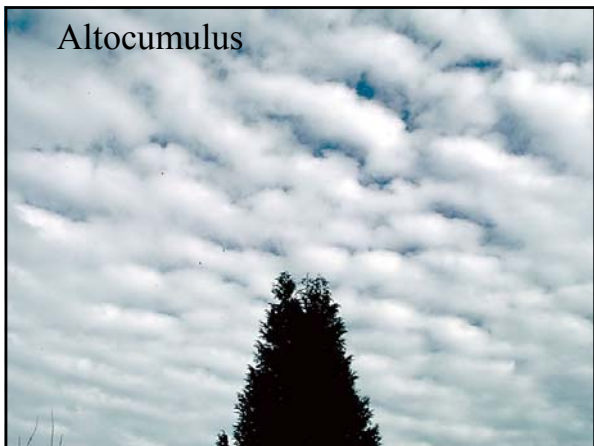


Altostratus

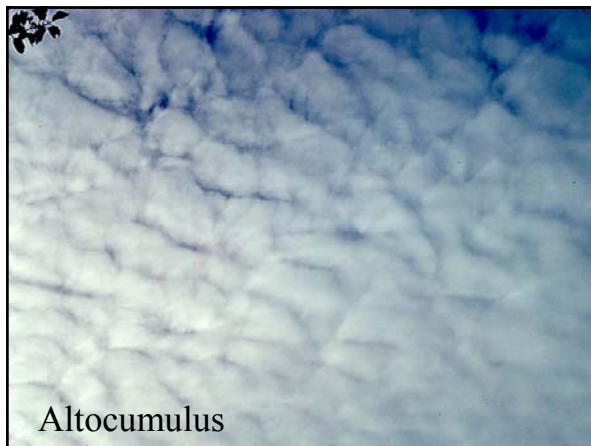


Altostratus

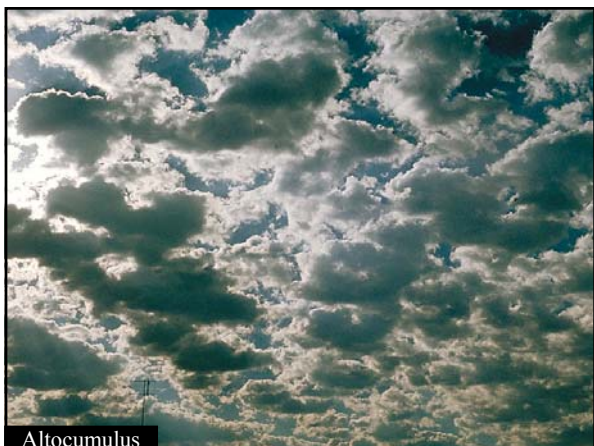
Alto cumulus



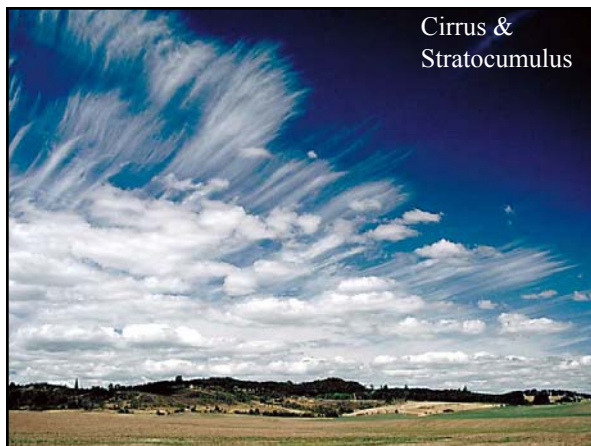
Alto cumulus



Alto cumulus



Cirrus & Stratocumulus



Cirrus



Halos

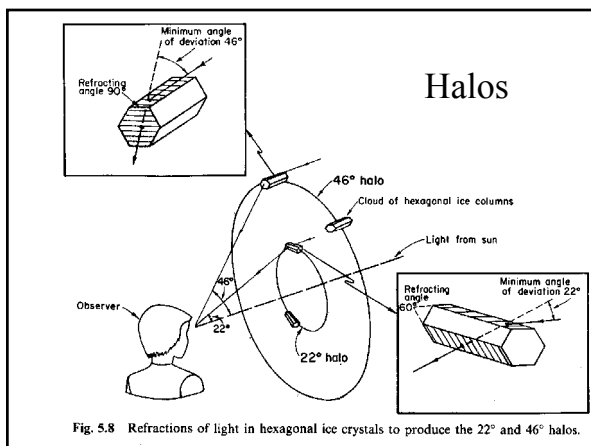
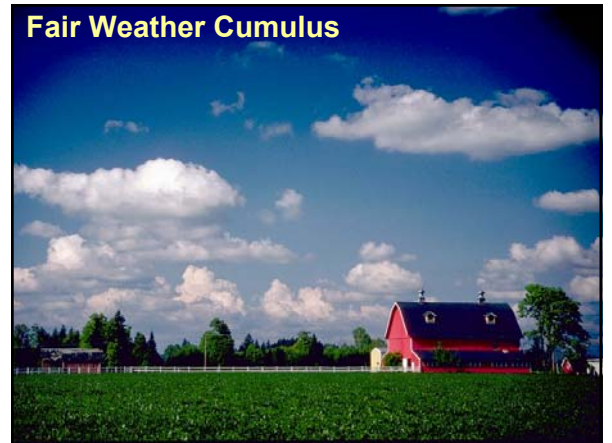
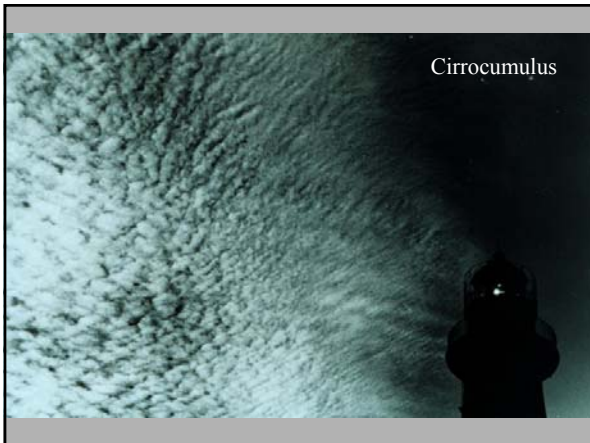
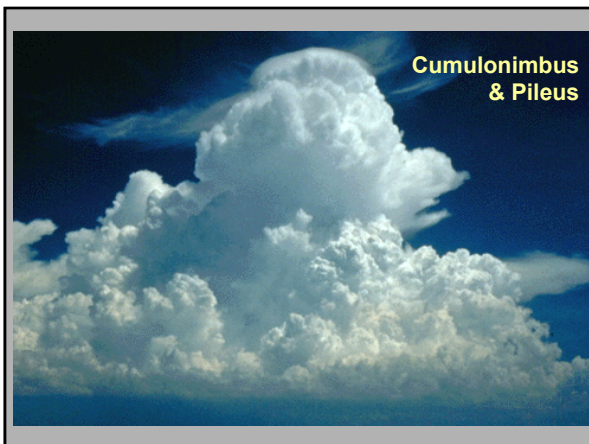
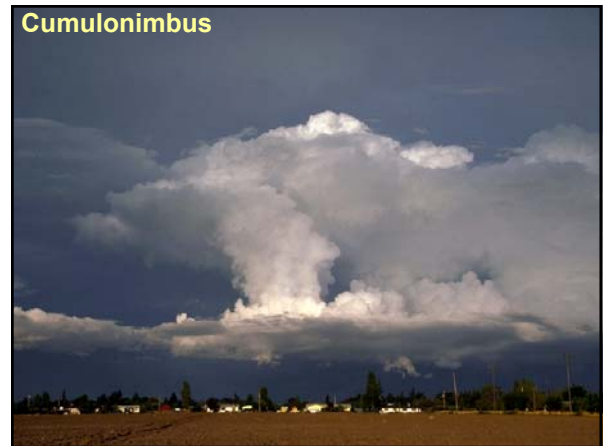
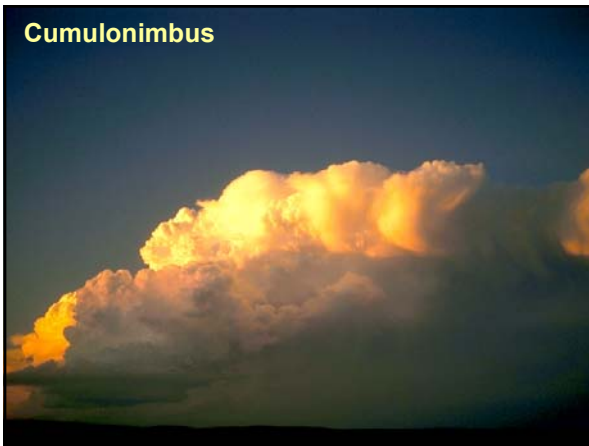
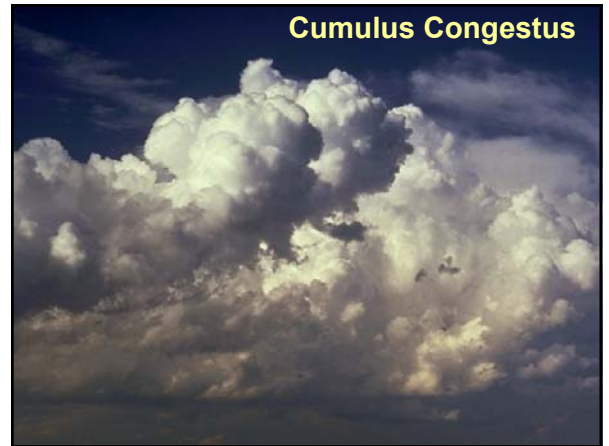
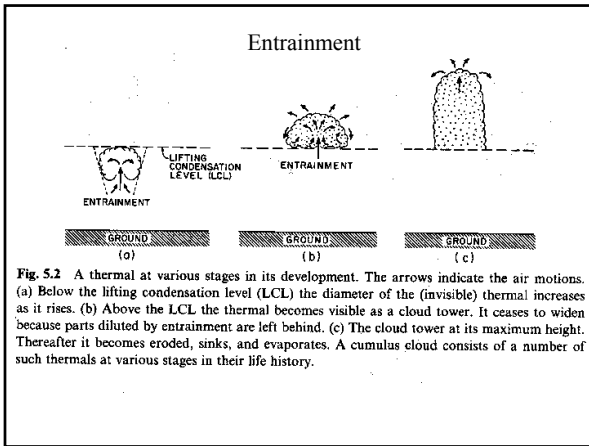
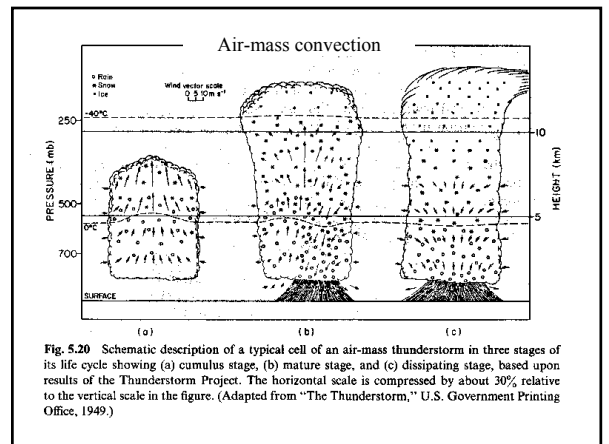
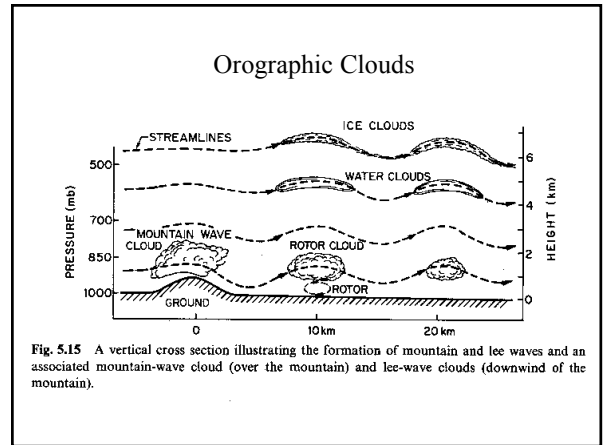
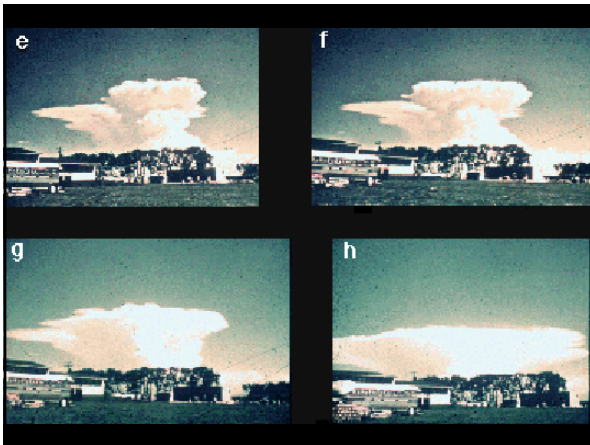
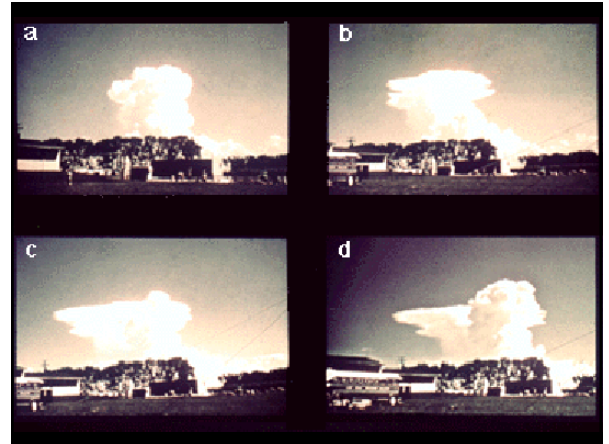


Fig. 5.8 Refractions of light in hexagonal ice crystals to produce the 22° and 46° halos.









Summary

- Know generally how clouds form (more next time)
- Know what **Cloud Droplets** and **Cloud Ice** are
- Know the four cloud levels or etages
- Know the families of clouds: Stratus, Alto-, Cirrus, Cumulus, and Nimbus
- Be able to recognize and explain the formation of the following clouds: **Stratus, Stratocumulus, Fog, Altostratus, Altocumulus, Cirrus, Cirrostratus, Cirrocumulus, Fair Weather Cumulus, Towering Cumulus, Cumulus Congestus, Cumulonimbus, Pileus, Lenticular Clouds.**

FINIS

For more images, visit the FIU on-line Cloud Atlas:

http://www.fiu.edu/~willough/FIU_Cloud_Atlas_06.html