Today: Clouds from orographics and weather systems
Meet your team. Discuss contact info, your first project and (optionally) a name for your team.

Cloud image submission: Include
1) your edited image
2) your original (unedited) image
3) the appropriate Skew-T diagram
4) a short statement of cloud type and stable or unstable atm.

Clouds = droplets or ice MOVING UPWARDS

Lift mechanisms:
1. Instability
2. Orographics: terrain, mountains
3. Synoptic scale weather systems; local instability. Both at warm and cold fronts; cold air pushes under in a cold front, warm air overruns in a warm front.
4. Convergence: shoreline temperature differences and cyclonic uplift

2: Orographic clouds, caused by topography, i.e. mountains

Most common interesting cloud in spring is the

Altocumulus lenticularis (higher than 6500 ft)
or
Stratocumulus lenticularis (lower)
or
Mountain Wave Cloud, trapped or lee

requires STABLE atmosphere

Clouds Produced by Vertically *Trapped* Mountain Waves

Thomas Carney et al.,
AC 00-57 Hazardous
Mountain Winds and
Weather Effects
Altocumulus lenticularis. Typically 1 to 5 wave crests.

Clouds stay stationary, but may move off and reform periodically.

If there's more wave crests, or short wavelengths, it's probably NOT a mountain wave cloud; more likely altocumulus undulatus, from gravity waves in the atmosphere, like ripples on a liquid surface.

http://www.colorado.edu/MCEN/flowvis/galleries/2007/assignment2.html
Could also be from wind shear, via the Kelvin Helmholtz instability

Rare to be able to see cross section like this

http://cloudappreciationsociety.org/collecting/terry-robinson/

Minute paper: Which way is the wind going?
Where is it faster?
Foehn clouds suggest winds coming over the mountains: the presence of a CHINOOK (pre-cold-front, warm, strong, downslope winds, or a BORA (post-cold-front, cold, strong, downslope winds). Also called cap clouds.

3: Synoptic uplift = weather system clouds.

Weather system progressions; 'synoptic scale' uplifts (1000 km across). Any type of cloud is possible.
The whole system tends to move toward the east...

Warmer air gently overriding the colder air (known as a warm front)

COOLER, DRIER AIR (which is more dense)

Colder air pushing underneath the warmer air (known as a cold front)

Warmer air rises suddenly

...and as it moves over, an observer will tend to see the following cloud types:

Cirrus

Large areas lift all together = stratus clouds

Altostratus

Cirrostratus

Cirrocumulus/Altocumulus

Cumulonimbus

Stable

Stratocumulus

Altostratus

Nimbostratus

Stratus

Some instability

Cold front

Warm front

How cloud formations can develop as a region of low pressure, or ‘depression’, passes over. Those who think this looks complicated will be depressed to learn that it is in fact a very simplified diagram of a weather system.
Low Pressure System: Air tries to move into low. Coriolis makes it turn right = counter clockwise circulation. Typically unstable.

High pressure system: Air tries to move out. Coriolis makes it turn right = clockwise circulation. Weak or nonexistent fronts, so no instability.

Wind shift across front

4: Convergence uplift along shorelines

Cool sea breeze is pulled in

Warms quickly, air rises, pressure drops
Divergence aloft creates convergence and lift at surface. Pumping action.