

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

Altostratus lenticularis (higher than 6500 ft)

or

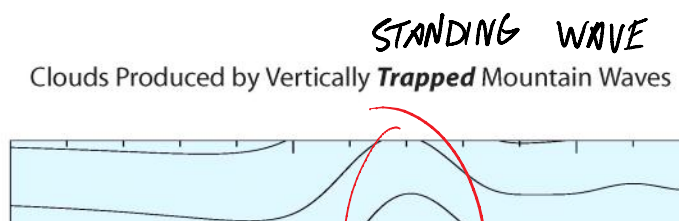
Stratocumulus lenticularis (lower)

or

Mountain Wave Cloud, trapped or lee

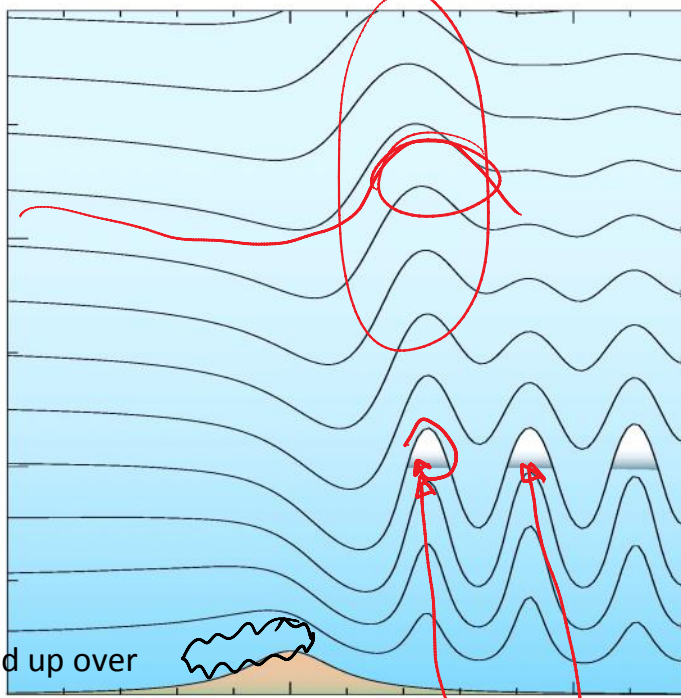
requires STABLE atmosphere

Thomas Carney et al.,
AC 00-57 Hazardous
Mountain Winds and
Clouds



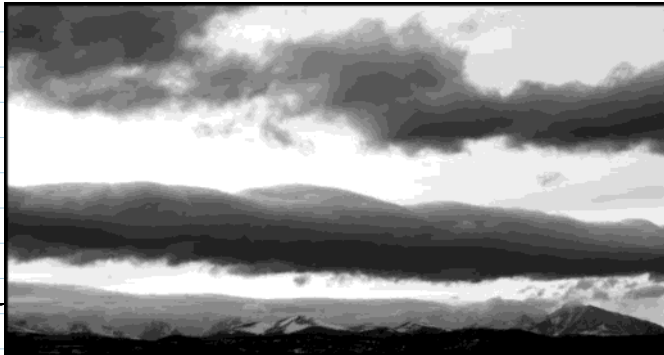
Thomas Carney et al.,
*AC 00-57 Hazardous
Mountain Winds and
Their Visual Indicators*
(Federal Aviation
Administration, 1997),
[http://rgl.faa.gov/Regulatory and Guidance Library/rgAdvisoryCircular.nsf/0/780437D88CBDAFD086256A94006FD5B8?OpenDocument](http://rgl.faa.gov/Regulatory%20and%20Guidance%20Library/rgAdvisoryCircular.nsf/0/780437D88CBDAFD086256A94006FD5B8?OpenDocument).

Clouds that sit right
on the Divide =
FOEHN cloud wall.
From air being forced up over
the mountains



Altostratus lenticularis. Typically 1 to 5 wave crests.

Clouds stay stationary, but may move off and reform periodically



Ben Britton, FV 2010

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

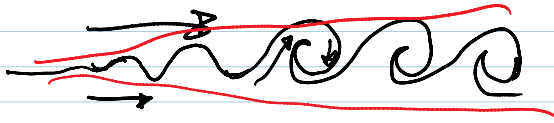
<http://www.colorado.edu/MCEN/flowvis/galleries/2007/assignment2.html>





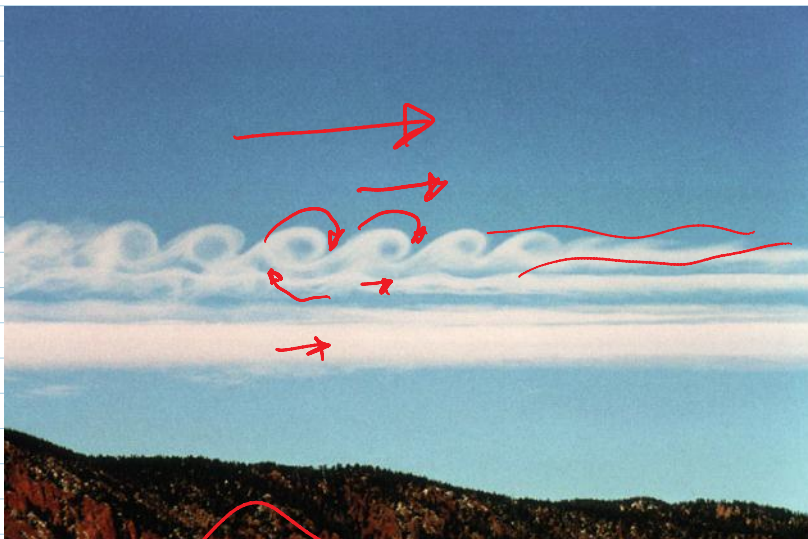
Tracy Eliasson FV 2007

Could also be from wind shear, via the Kelvin Helmholtz instability

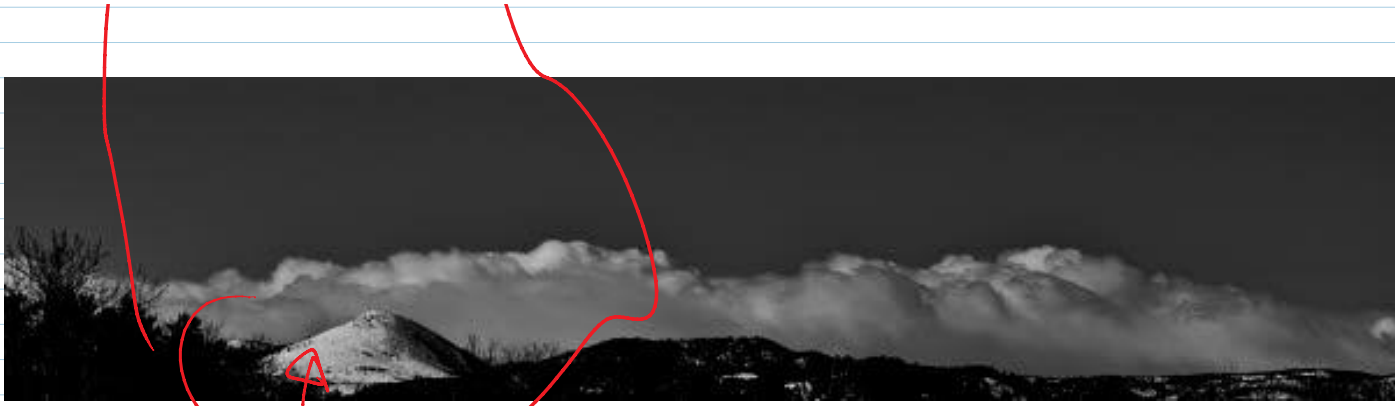


Rare to be able to see cross section like this

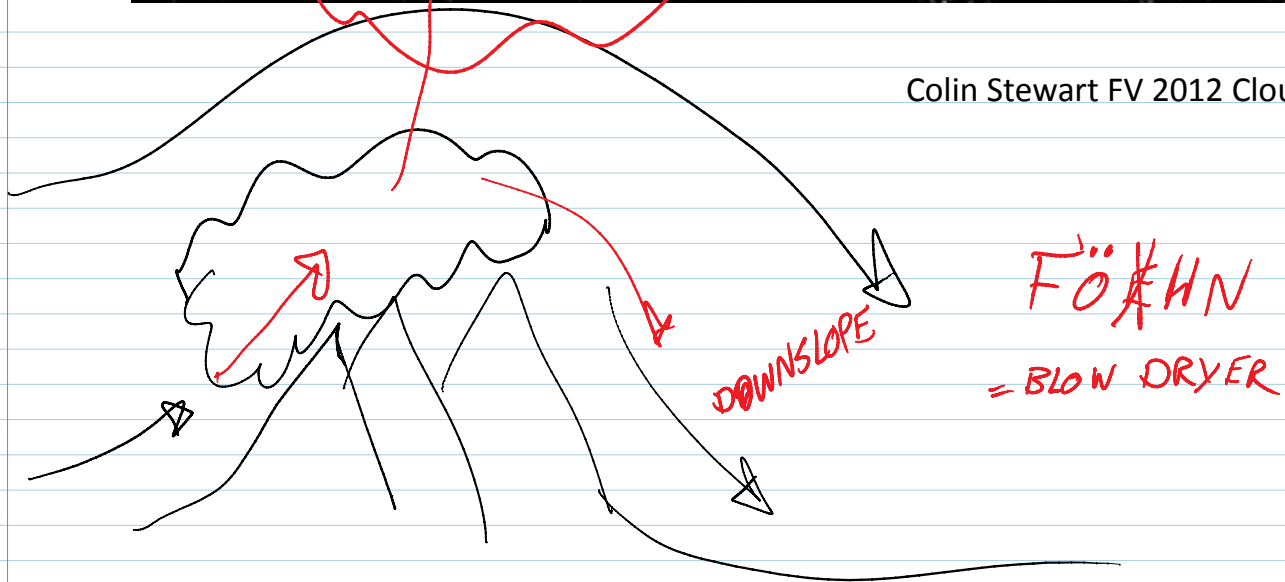
<http://cloudappreciationsociety.org/collecting/terry-robinson/>



Minute paper: Which way is the wind going?
Where is it faster?



Colin Stewart FV 2012 Clouds 1



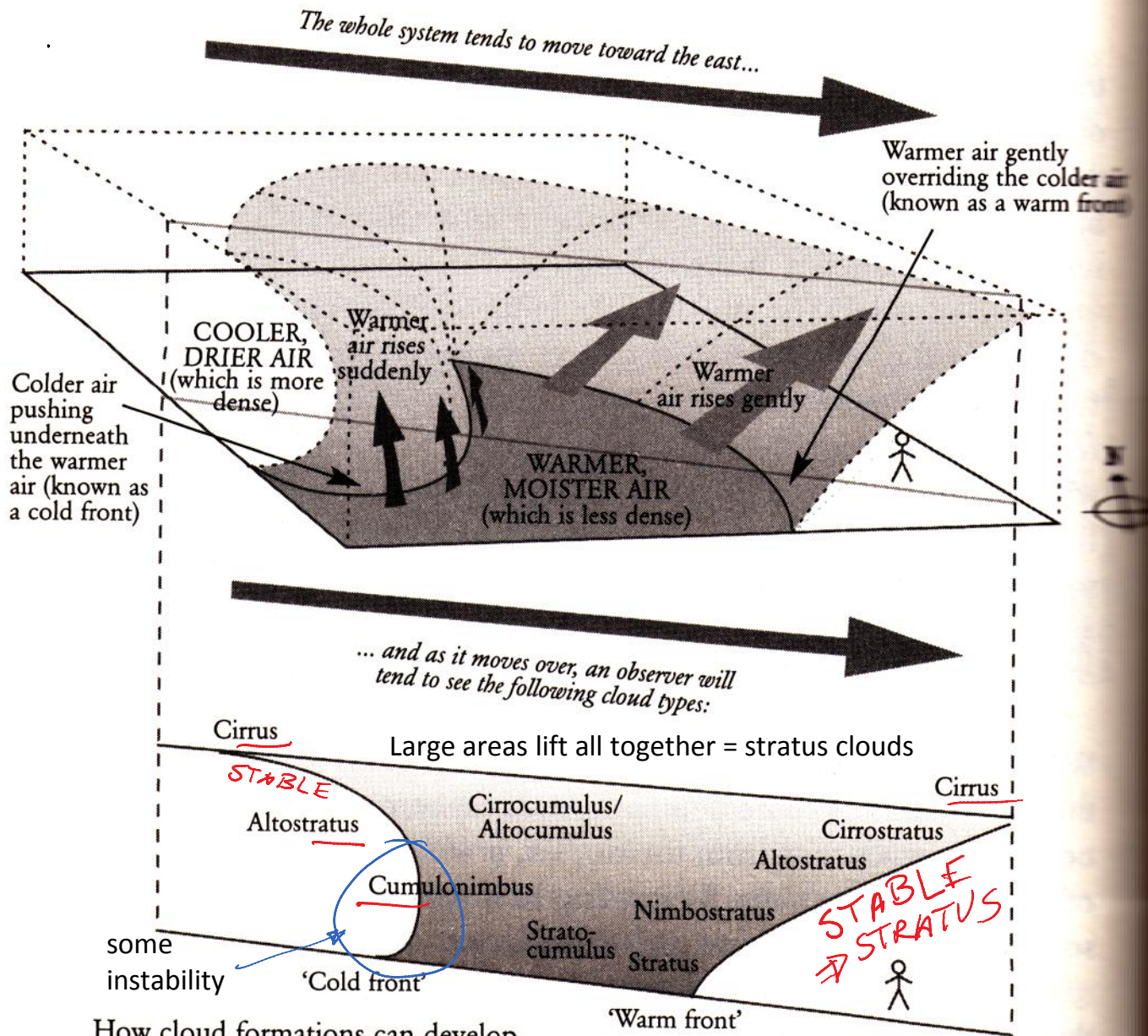
Föhn clouds suggest winds coming over the mountains: the presence of a CHINOOK (pre-cold-front, warm, strong, downslope winds, or a BORA (post-cold-front, cold, strong, downslope winds). Also called cap clouds.

3: Synoptic uplift = weather system clouds.

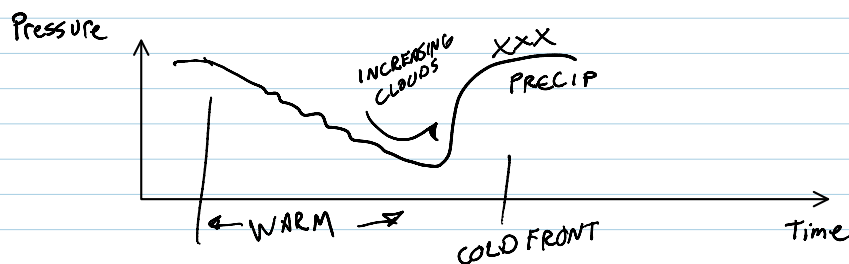
Weather system progressions; 'synoptic scale' uplifts (1000 km across).
Any type of cloud is possible.

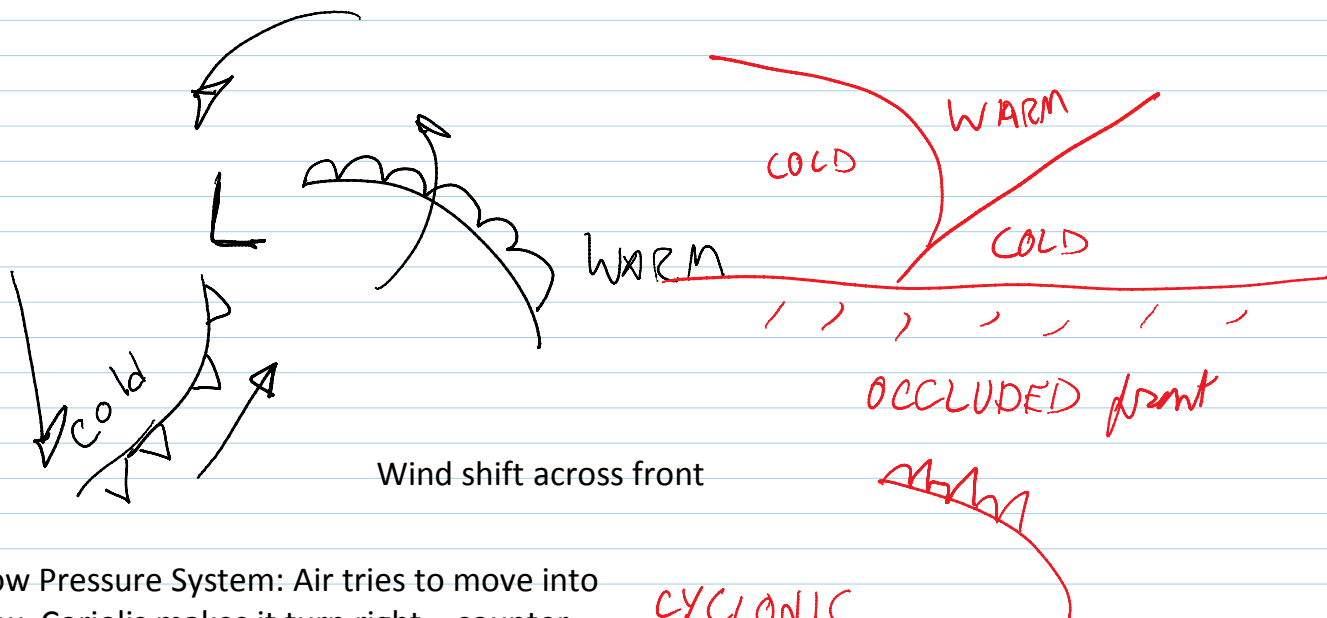
Inserted from: <file:///C:/Users/hertzber/Documents/01CLASSES/FlowVis/Content/scanned images/TypWeatherSystem.tif>

The Cloudspotter's Guide pg186 THE HIGH CLOUDS



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.



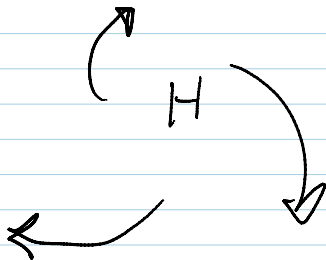


Low Pressure system: Air tries to move into low. Coriolis makes it turn right = counter clockwise circulation. Typically unstable.

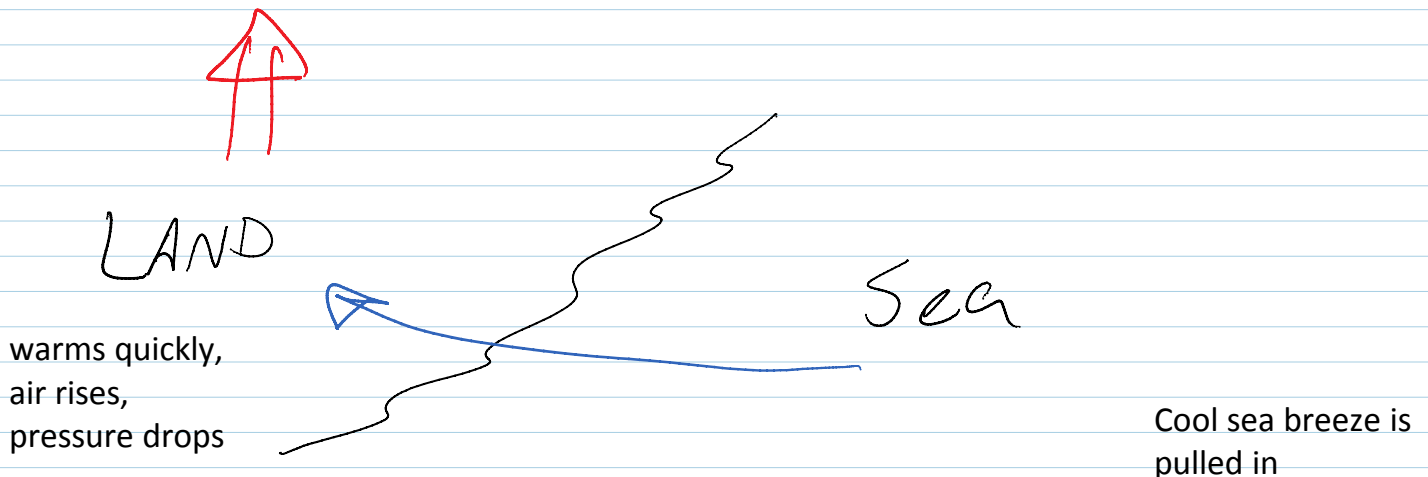
CYCLONIC

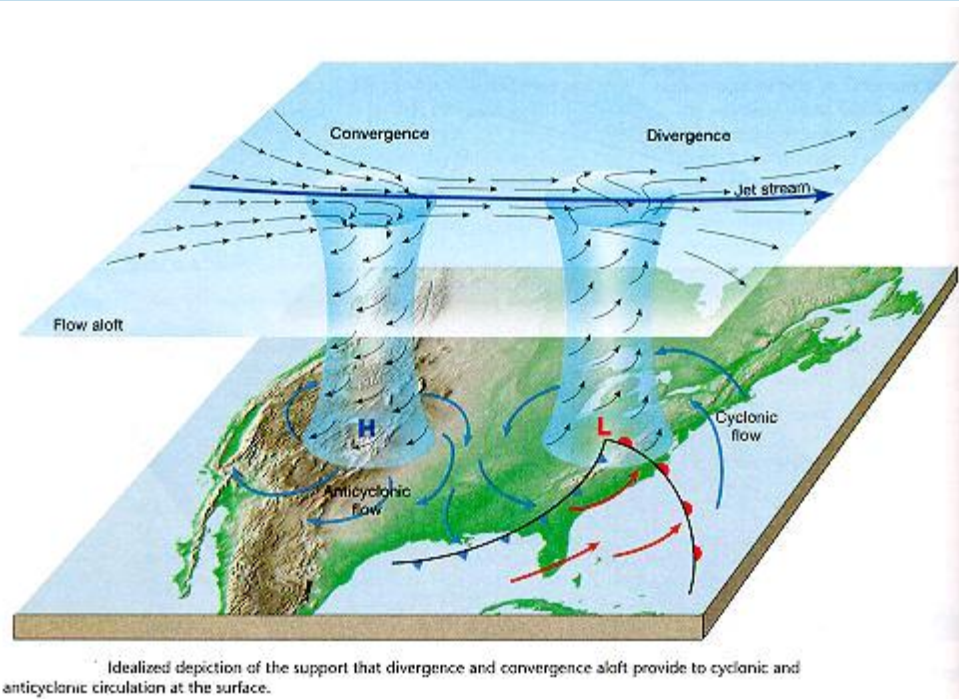
High pressure system: Air tries to move out. Coriolis makes it turn right = clockwise circulation. Weak or nonexistent fronts, so no instability.

ANTICYCLONIC



4: Convergence uplift along shorelines





Divergence aloft creates convergence and lift at surface. Pumping action.

<http://earth.usc.edu/~stott/Catalina/WeatherPatterns.html>