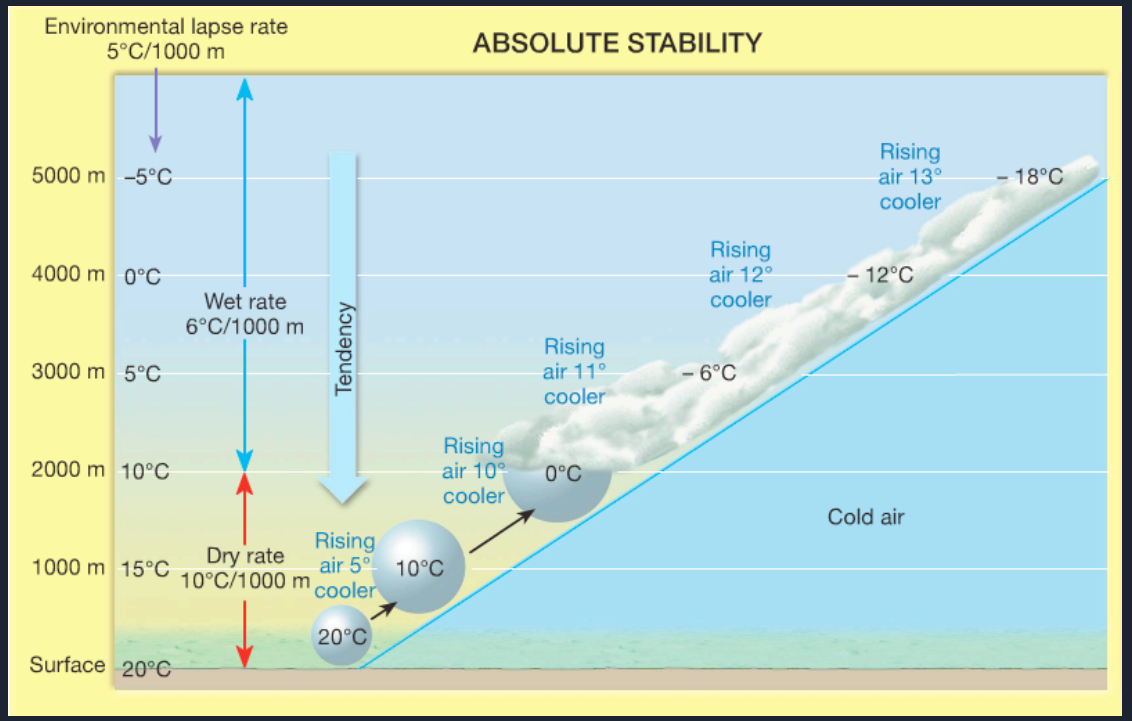
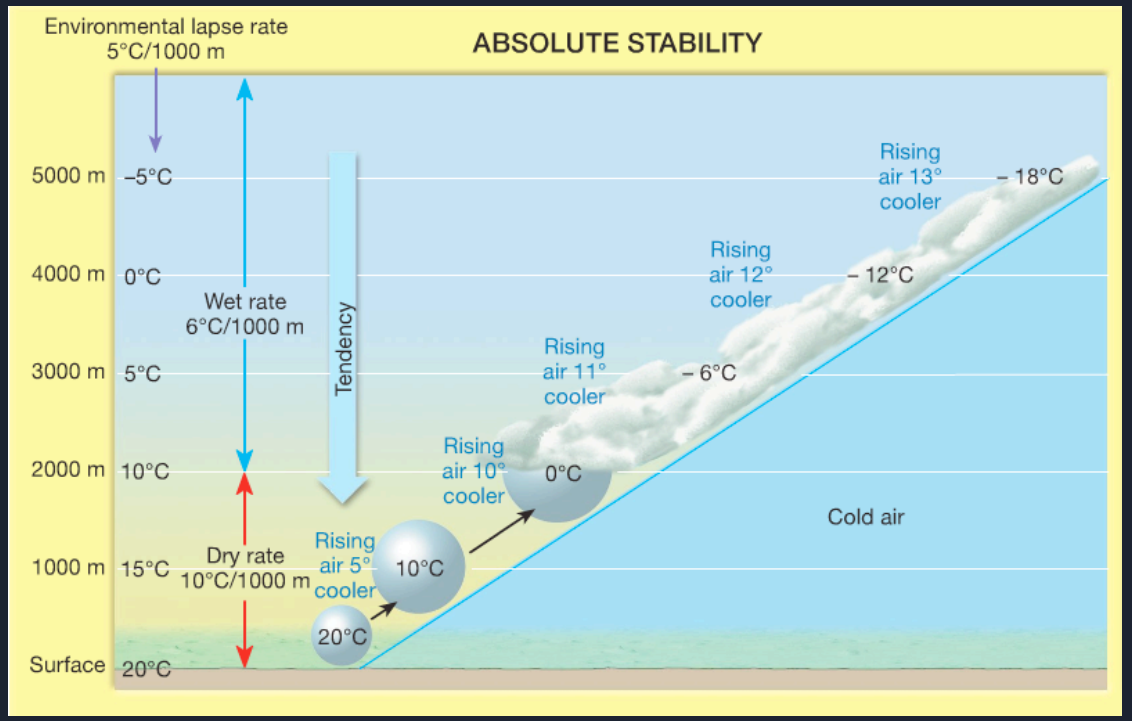
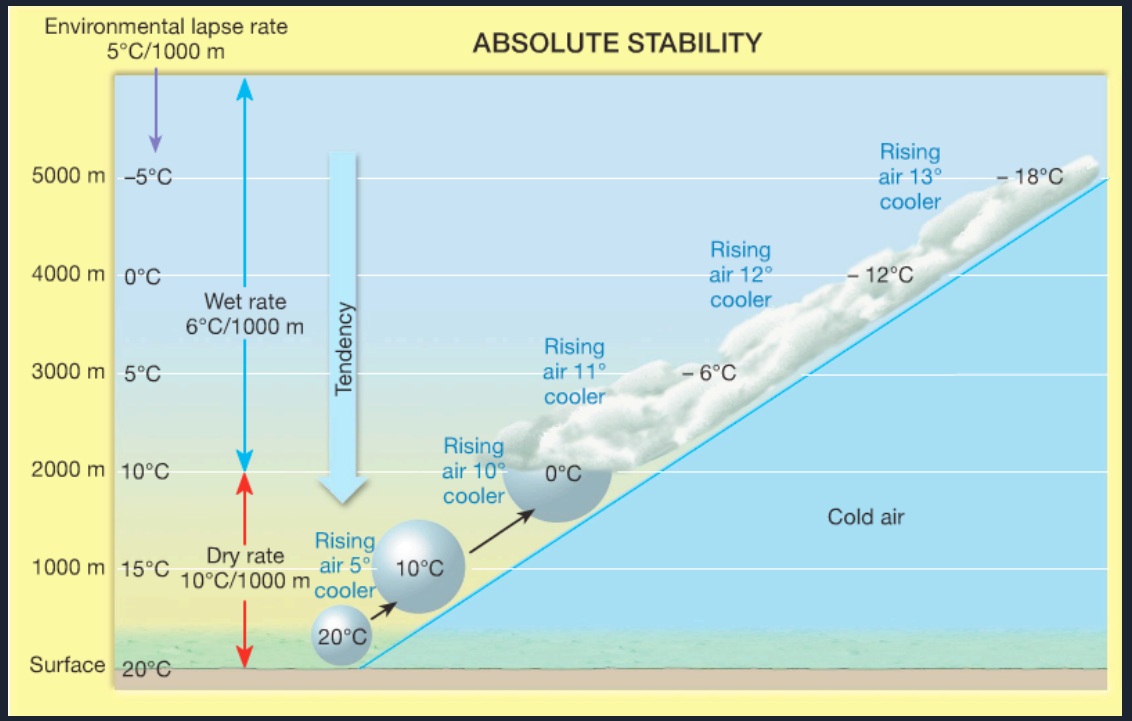

Environmental lapse rate
5°C/1000 m
ABSOLUTE STABILITY
5000 m
4000 m
3000 m
2000 m
1000 m
Surface
–5°C
0°C
5°C
10°C
15°C
20°C
Wet rate
6°C/1000 m
Dry rate
10°C/1000 m
Tendency
Rising air 5° cooler
10°C
20°C
Rising air 10° cooler
0°C
Rising air 11° cooler
– 6°C
Rising air 12° cooler
– 12°C
Rising air 13° cooler
– 18°C
Cold air

Processes that lift air



Processes that lift air

~ *Parcels* need to *rise* and *cool* to *saturation* (at the lifting condensation level) to form *clouds*.



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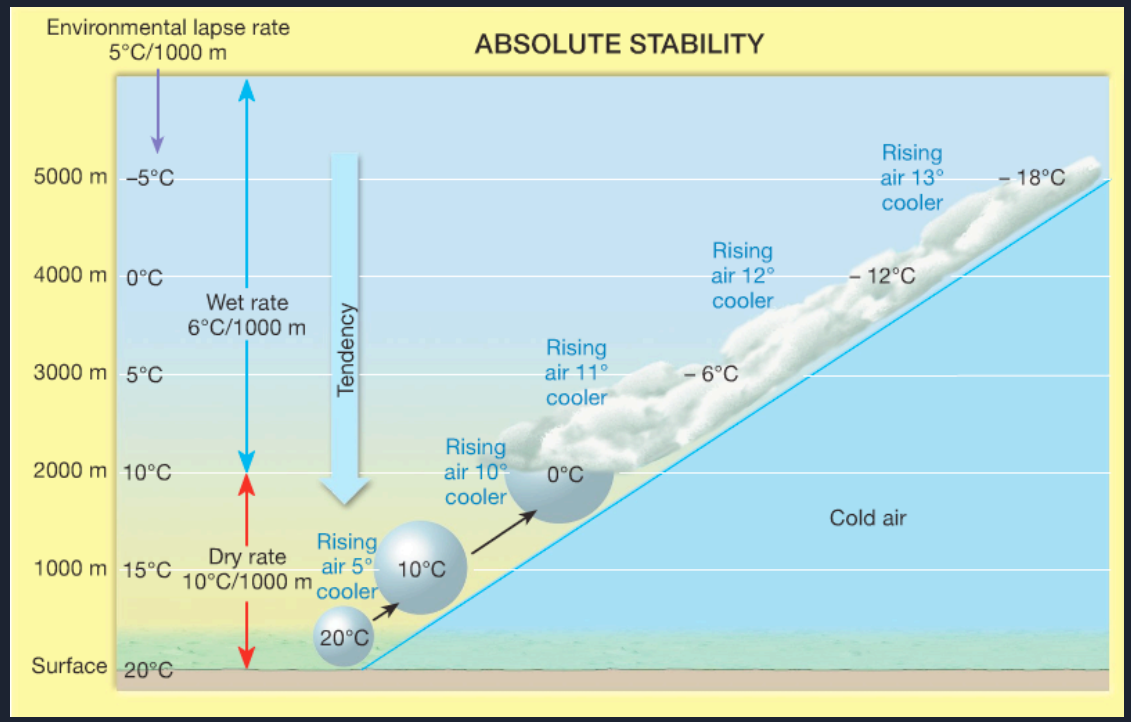
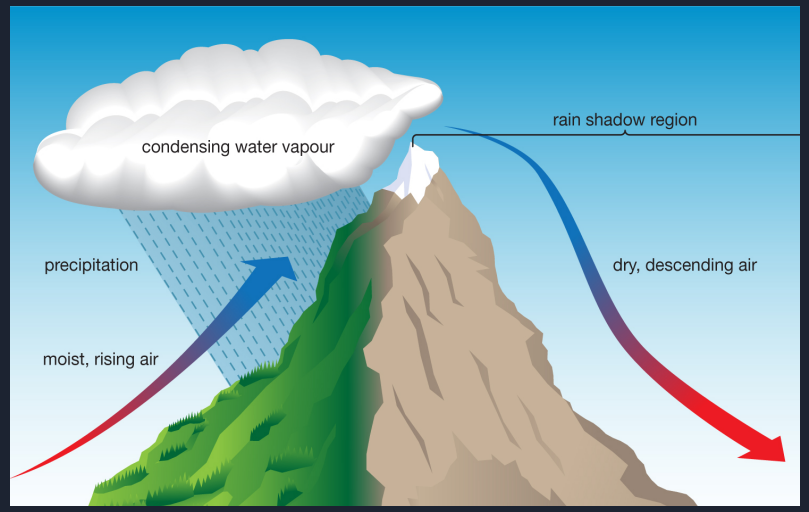


~ Because of ***gravity***, ***parcels resist upward motion unless*** they are ***warmer*** than the environment ***or forced to rise*** by some process.

~ ***Four mechanisms force*** parcels to ***rise***:

~ *Four mechanisms **force** parcels to **rise**:*

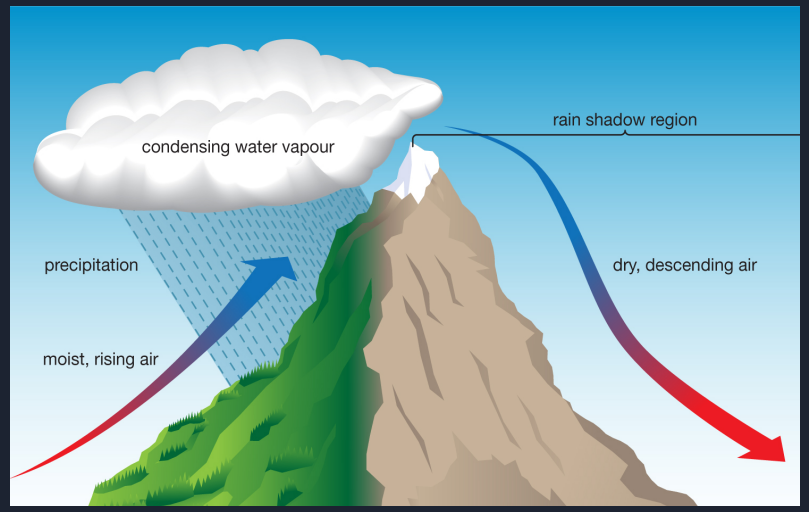
1) Orographic lifting

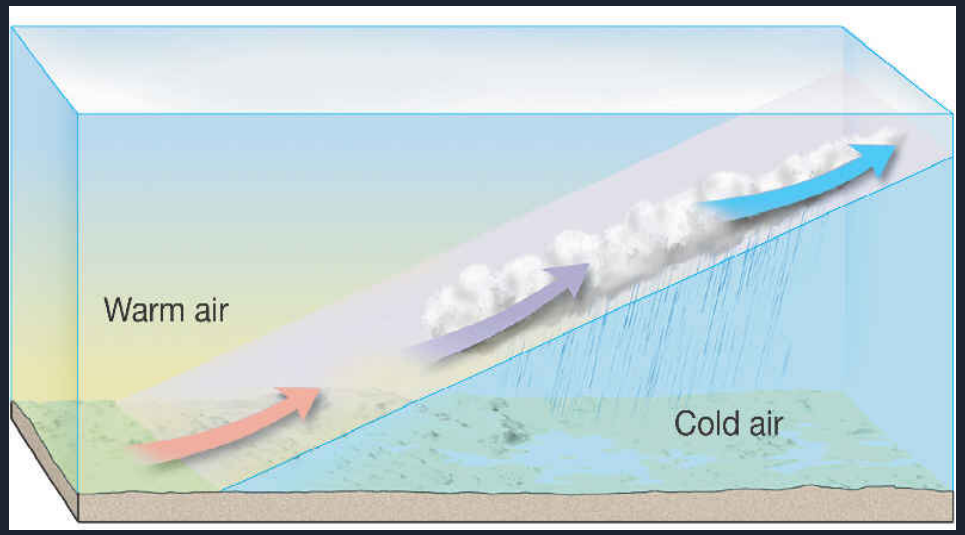


~ *Four mechanisms **force** parcels to **rise**:*

1) Orographic lifting

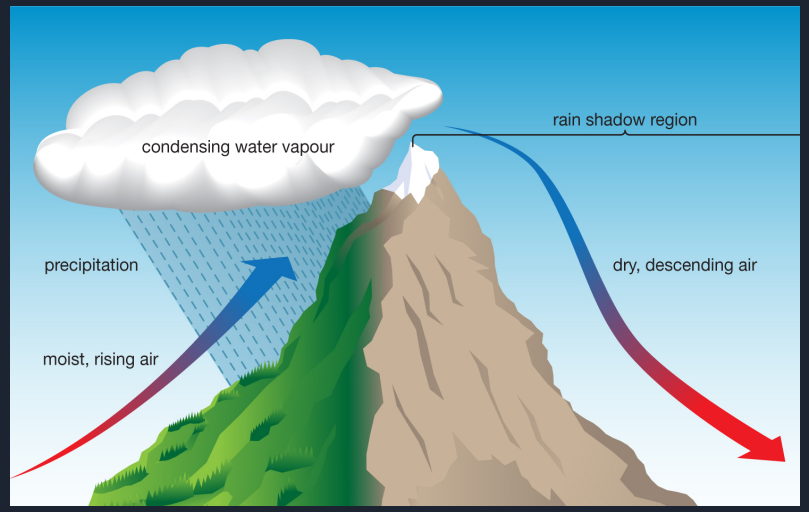
2) ***Frontal wedging***

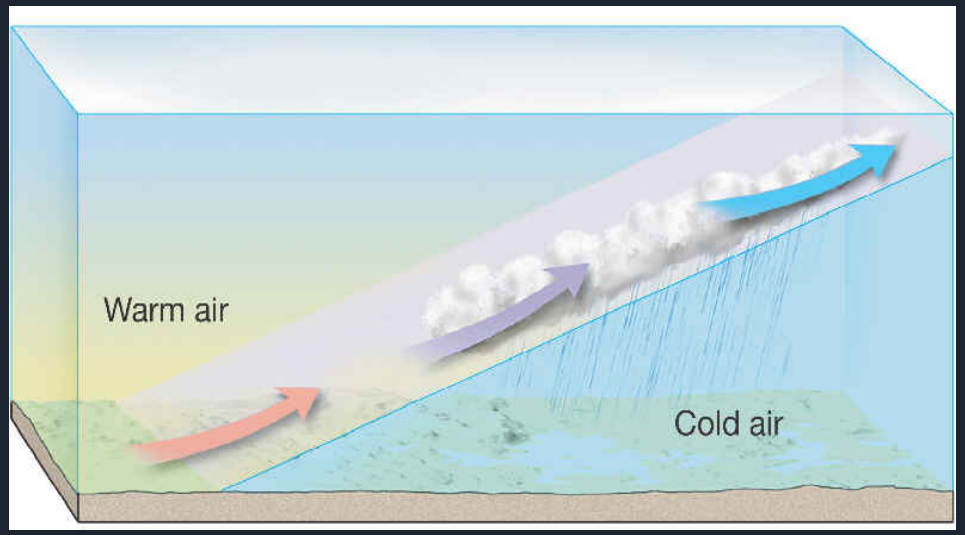


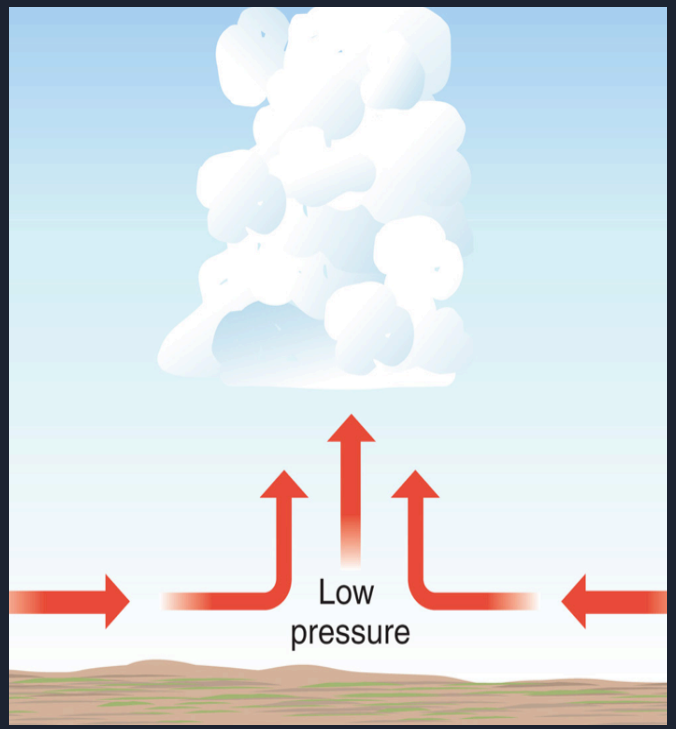


~ *Four mechanisms **force** parcels to **rise**:*

1) Orographic lifting
2) Frontal wedging
3) ***Convergence***







~ *Four mechanisms **force** parcels to **rise**:*

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2) Frontal wedging
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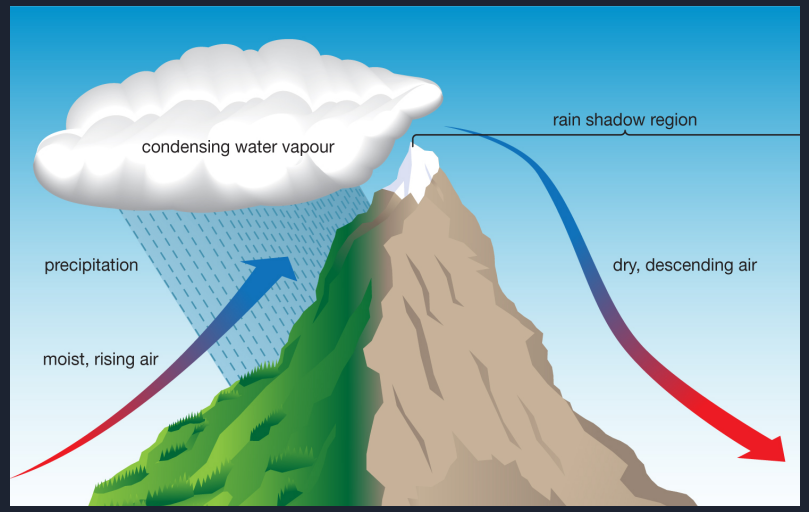
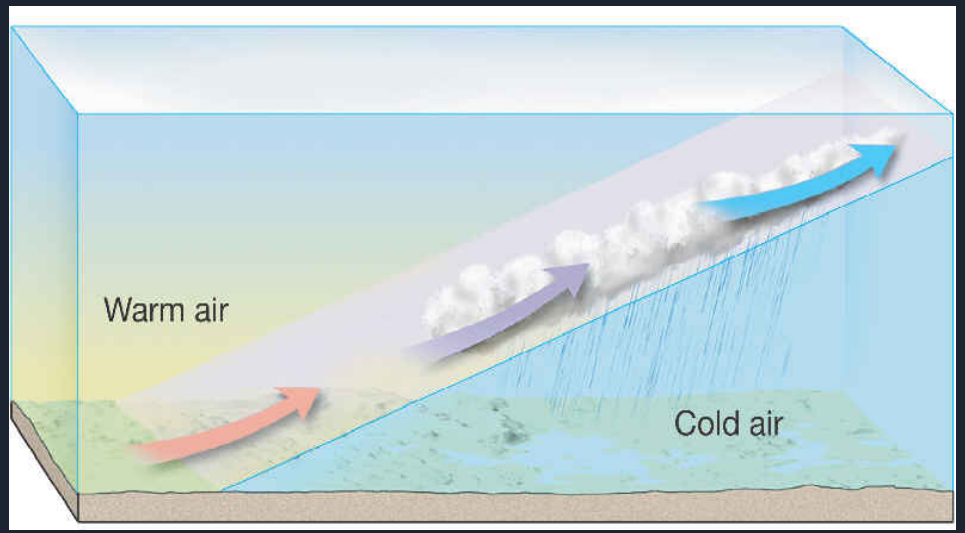
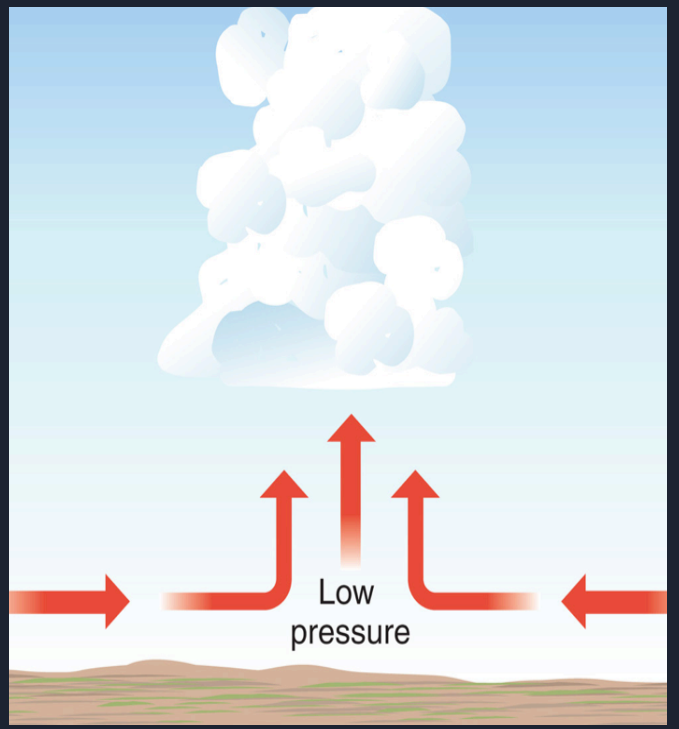
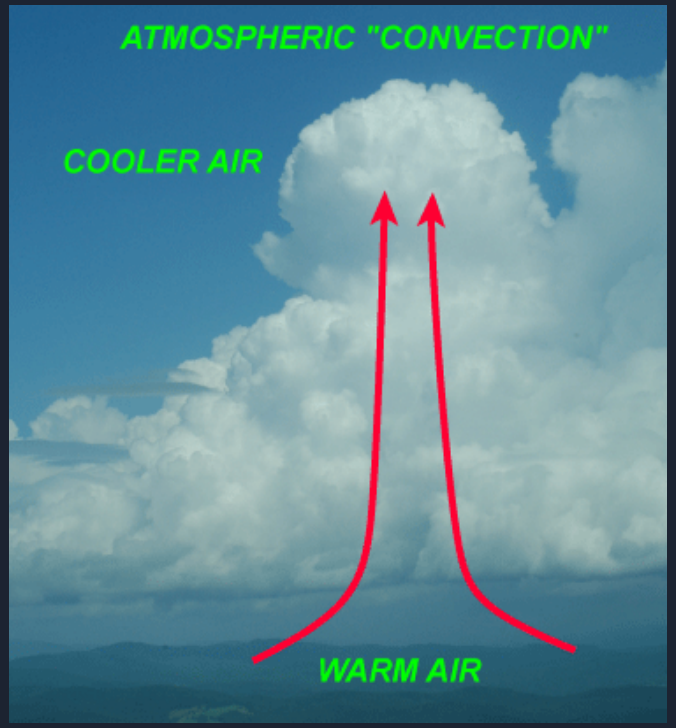
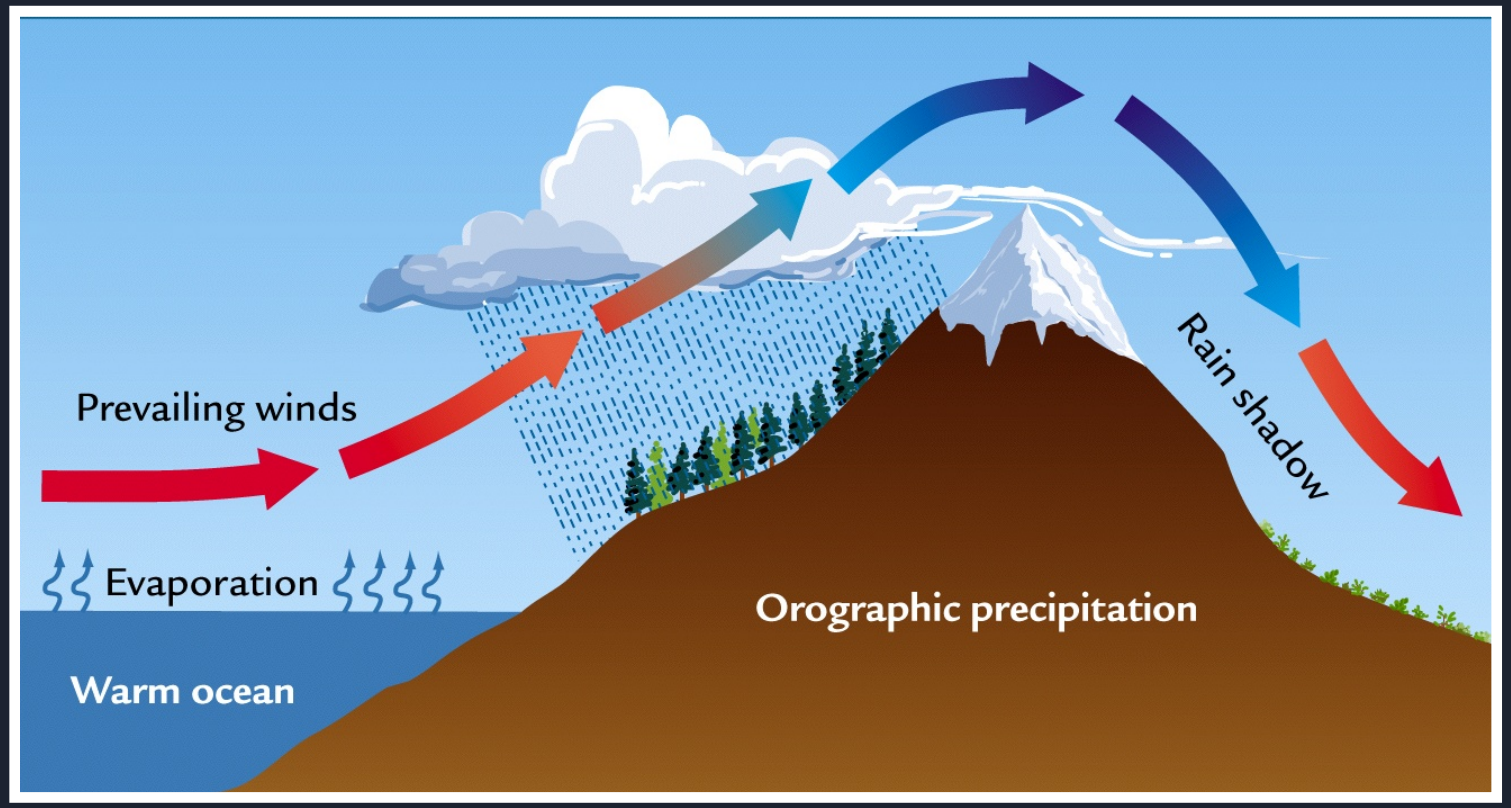
4) ***Convective heating***



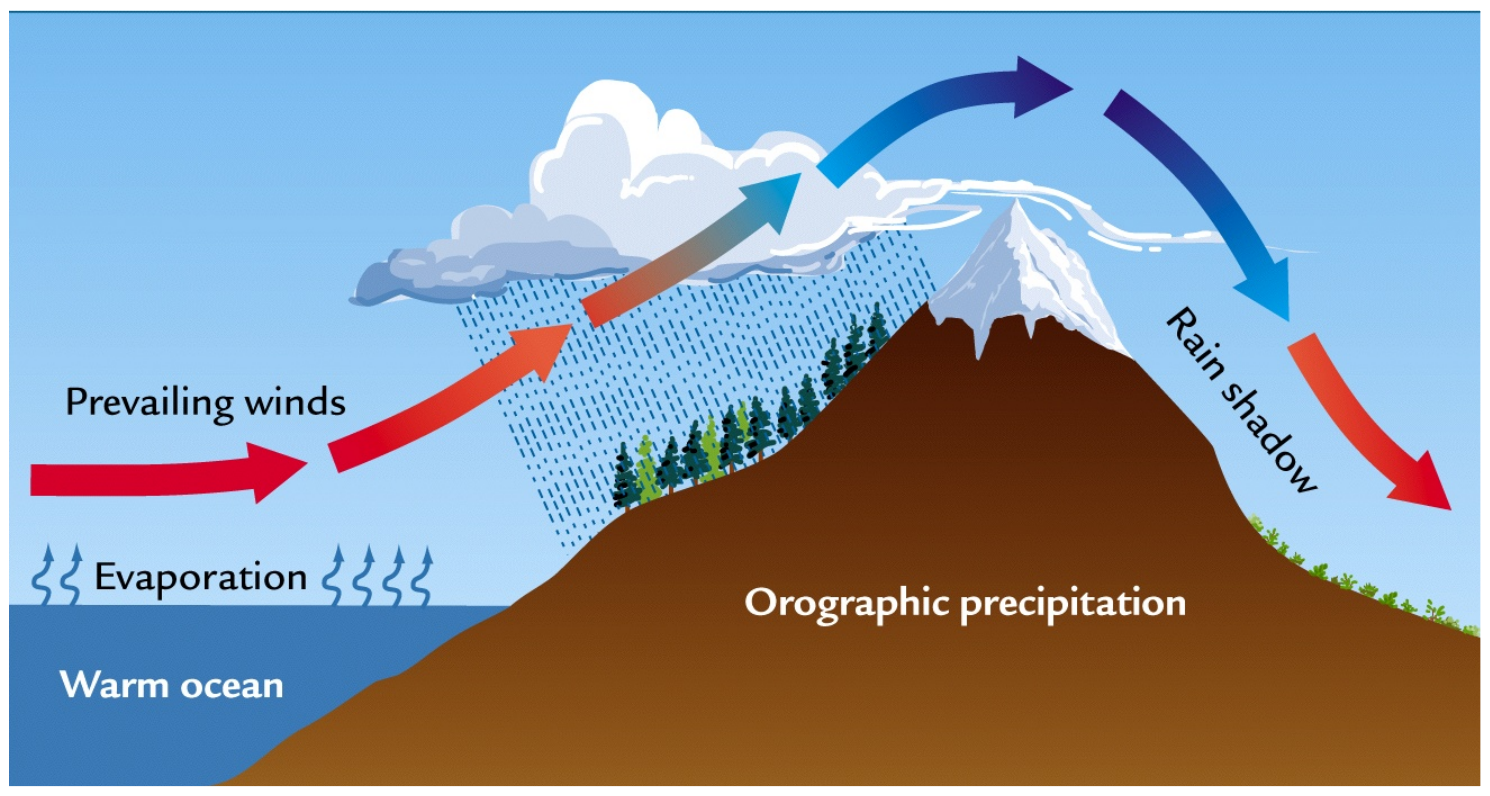







Prevailing winds
Evaporation
Warm ocean
Orographic precipitation
Rain shadow

~ ***Orographic lift*** happens when ***mountains*** act as ***barriers*** to the ***flow***.



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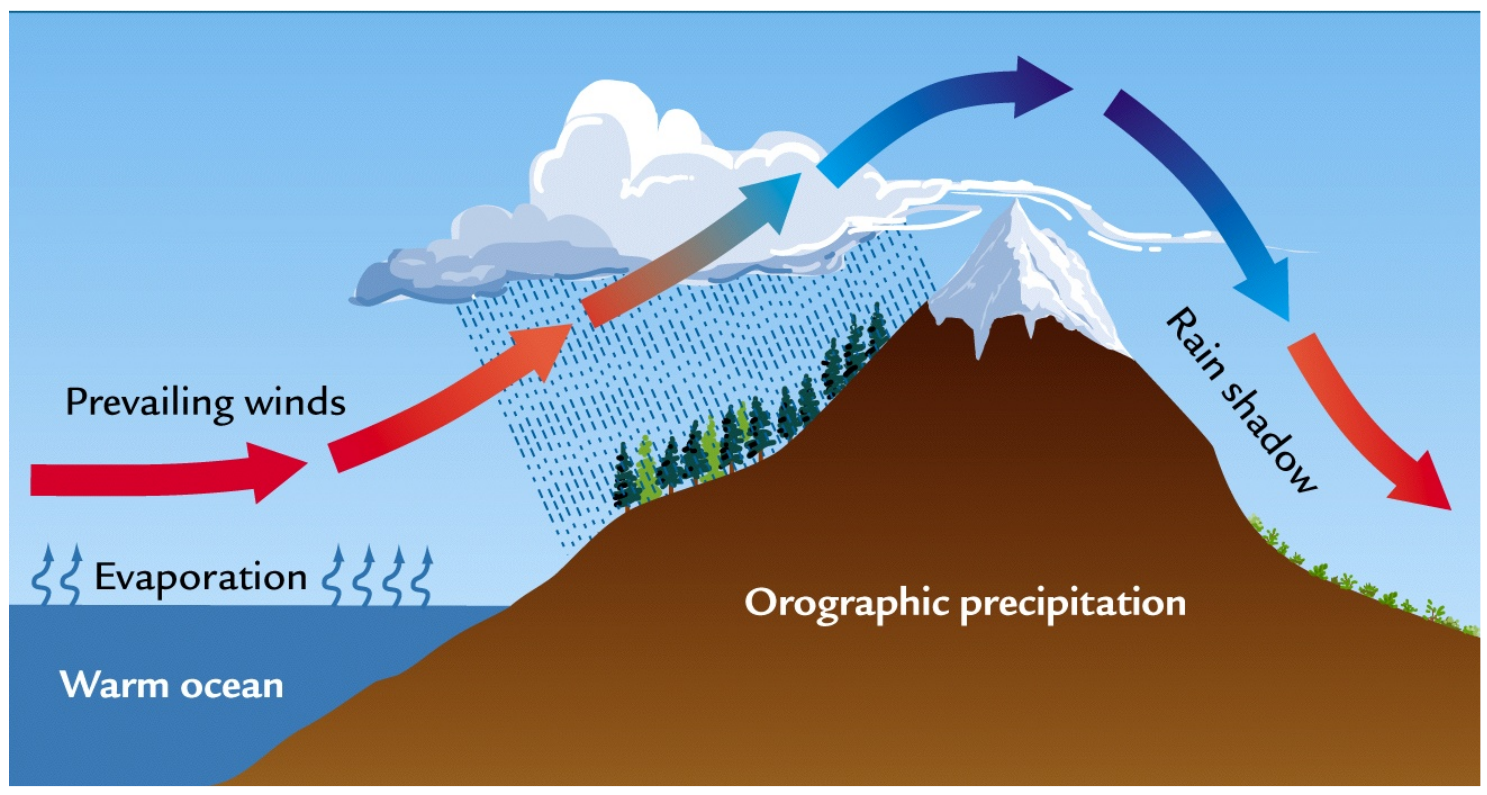
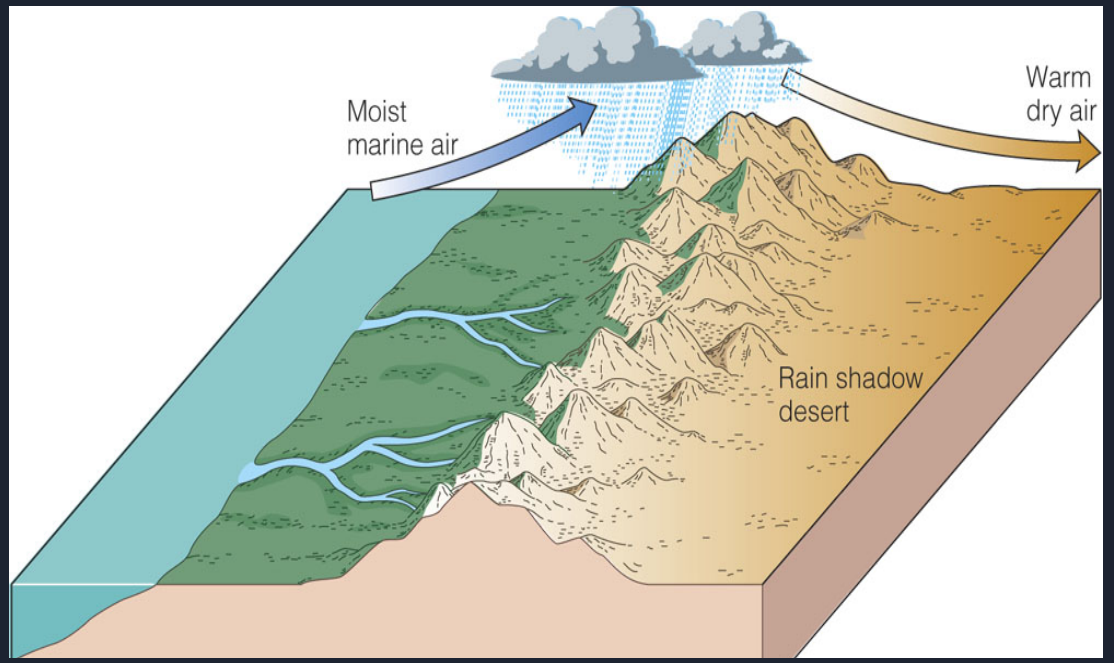
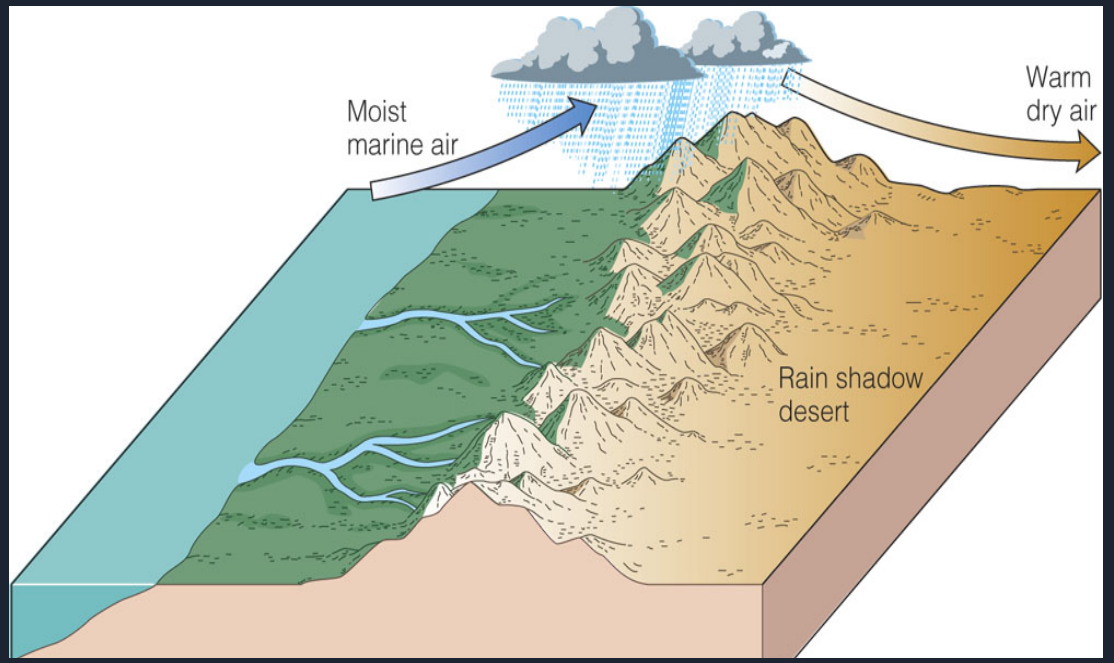
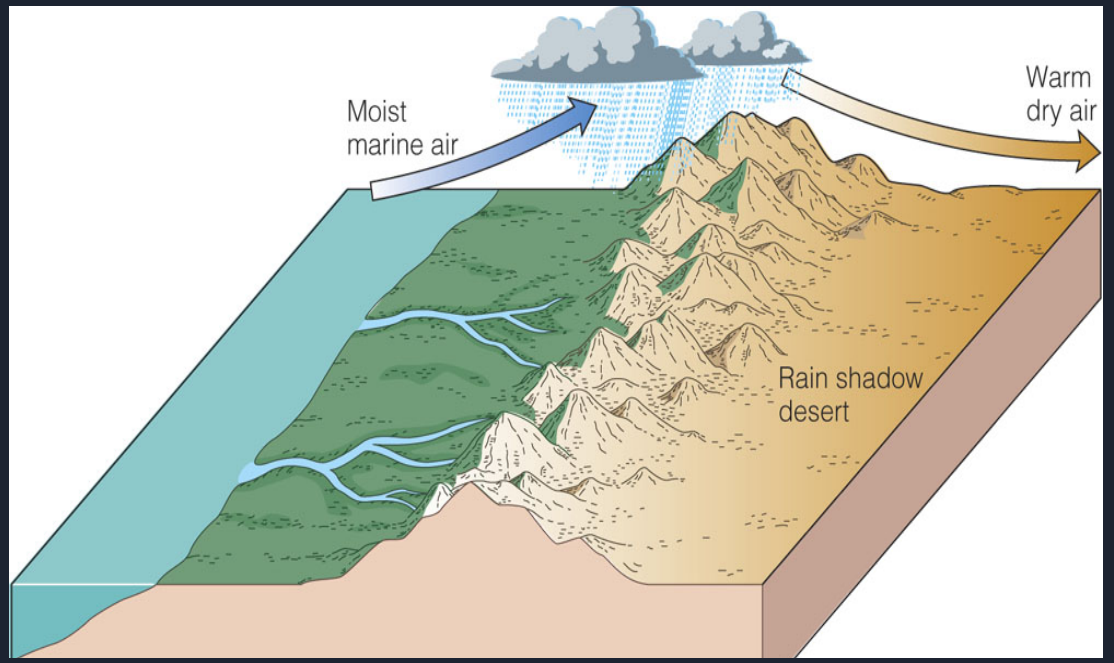


~ As ***parcels*** are ***forced up*** the mountain, they ***expand*** and ***cool*** forming ***clouds*** and ***precipitation*** on the ***windward side***.


Moist
marine air
Warm
dry air
Rain shadow
desert

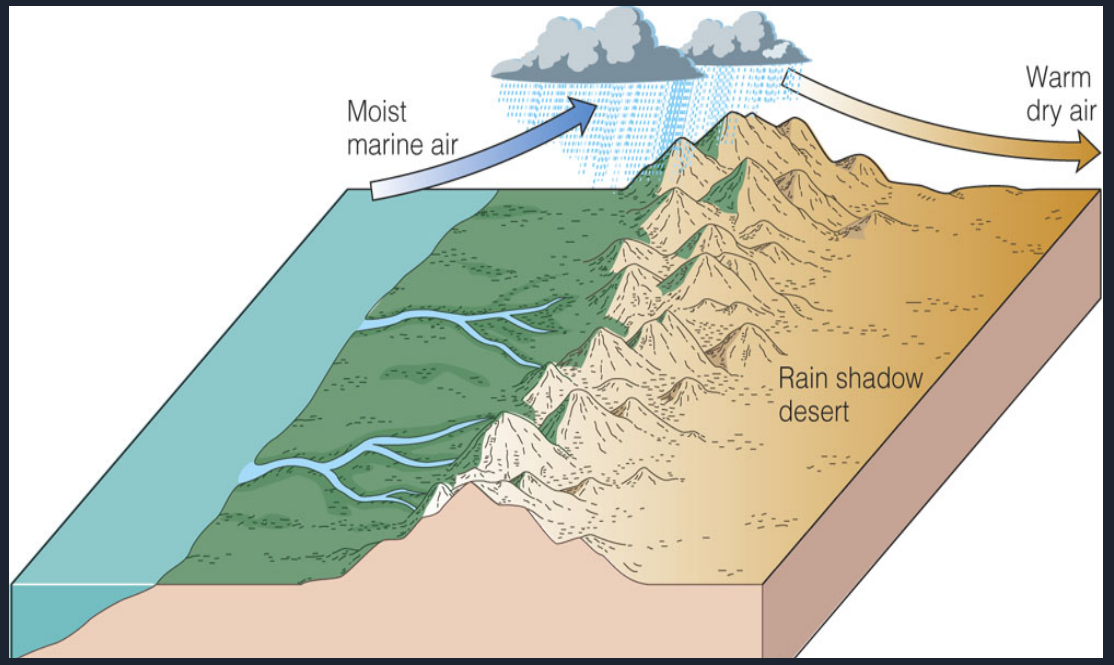


~ When the ***air*** reaches the ***leeward side***, much of the ***moisture*** has been ***lost***.



~ When the ***air*** reaches the ***leeward side***, much of the ***moisture*** has been ***lost***.

~ In addition, as the ***air descends*** it will ***compress*** and ***warm***, resulting in many of the worlds largest ***deserts***.



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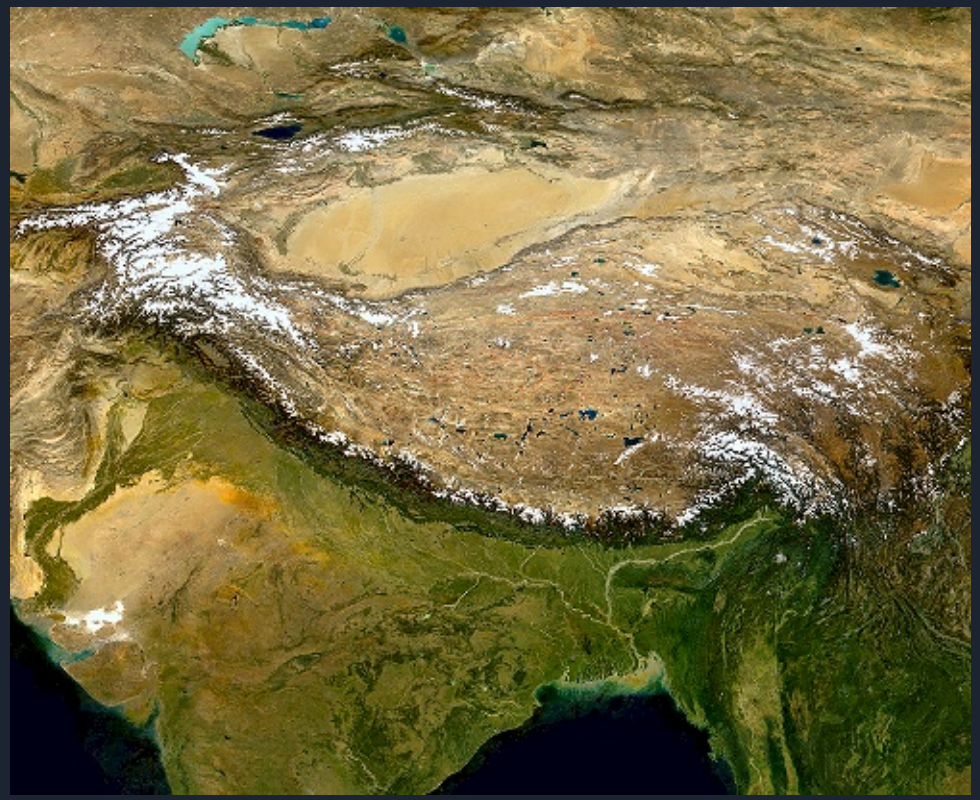

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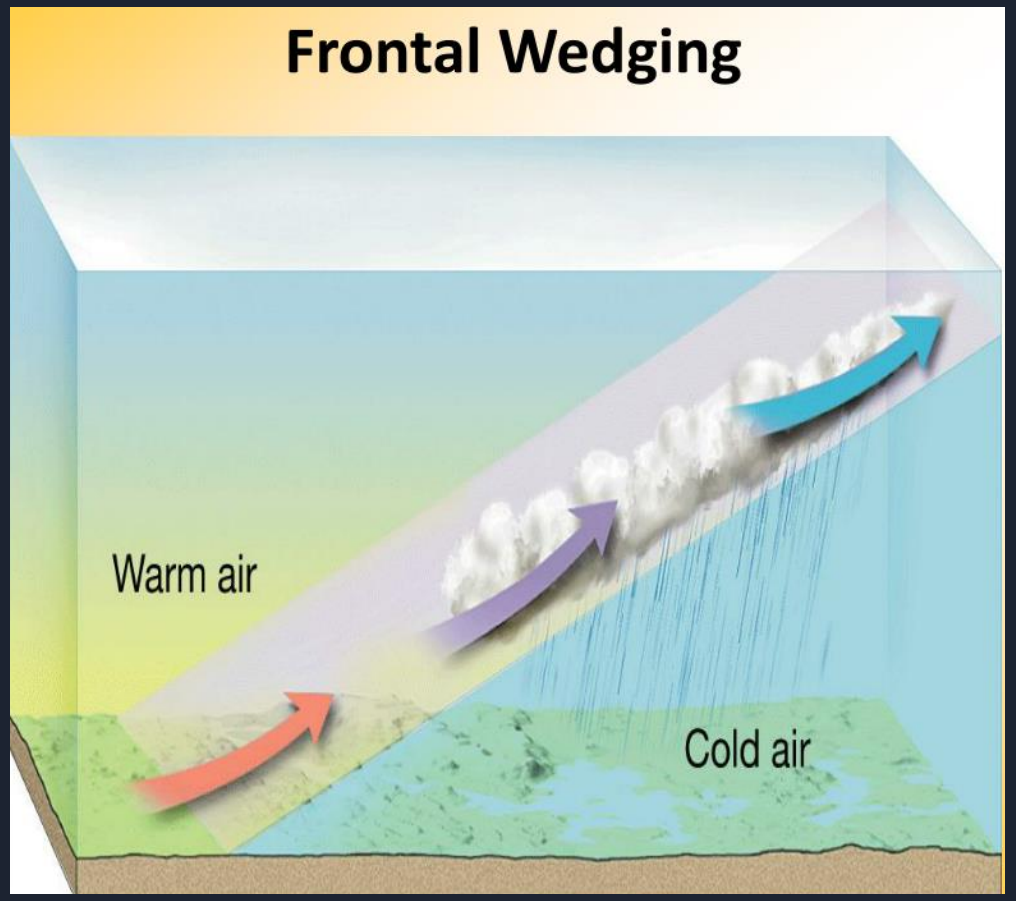
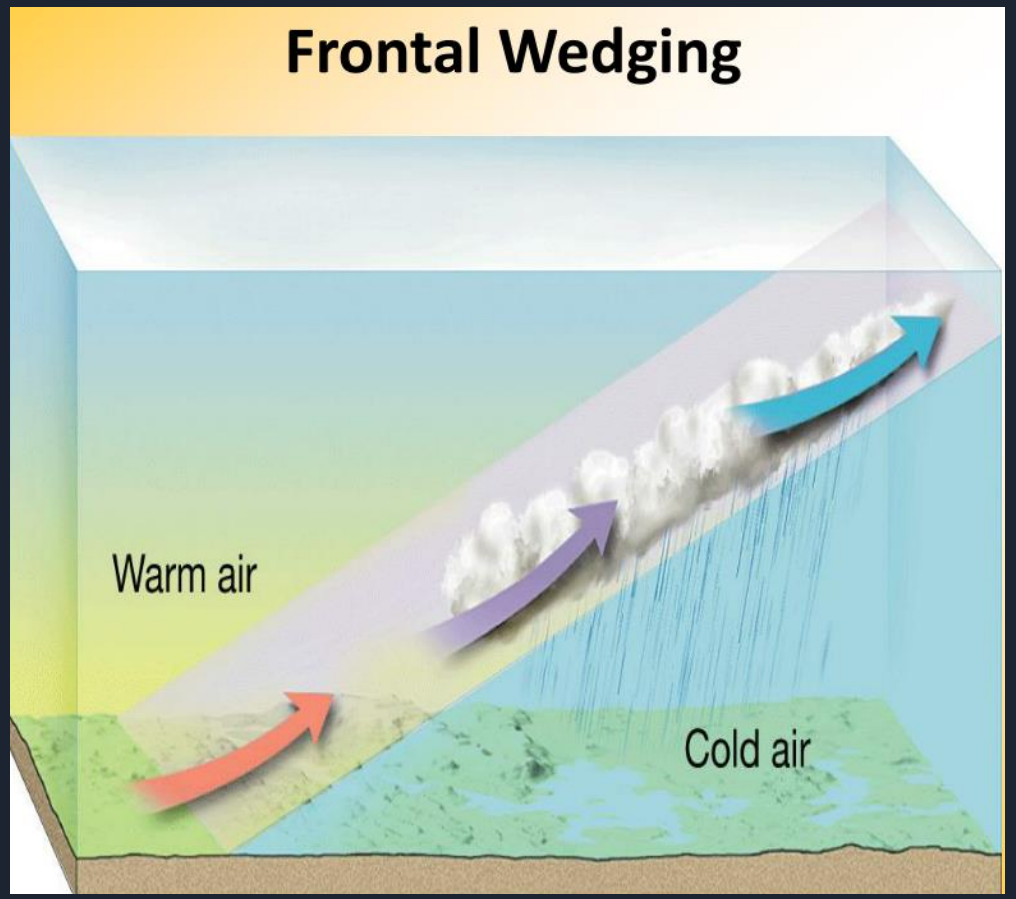

Frontal Wedging
Warm air
Cold air

~ When ***air*** of ***different temperatures*** meet, a ***front*** is formed with ***cold***, ***dense air*** acting as a ***barrier*** over which the ***warm***, ***less dense*** ***air*** is ***forced*** to ***rise***.



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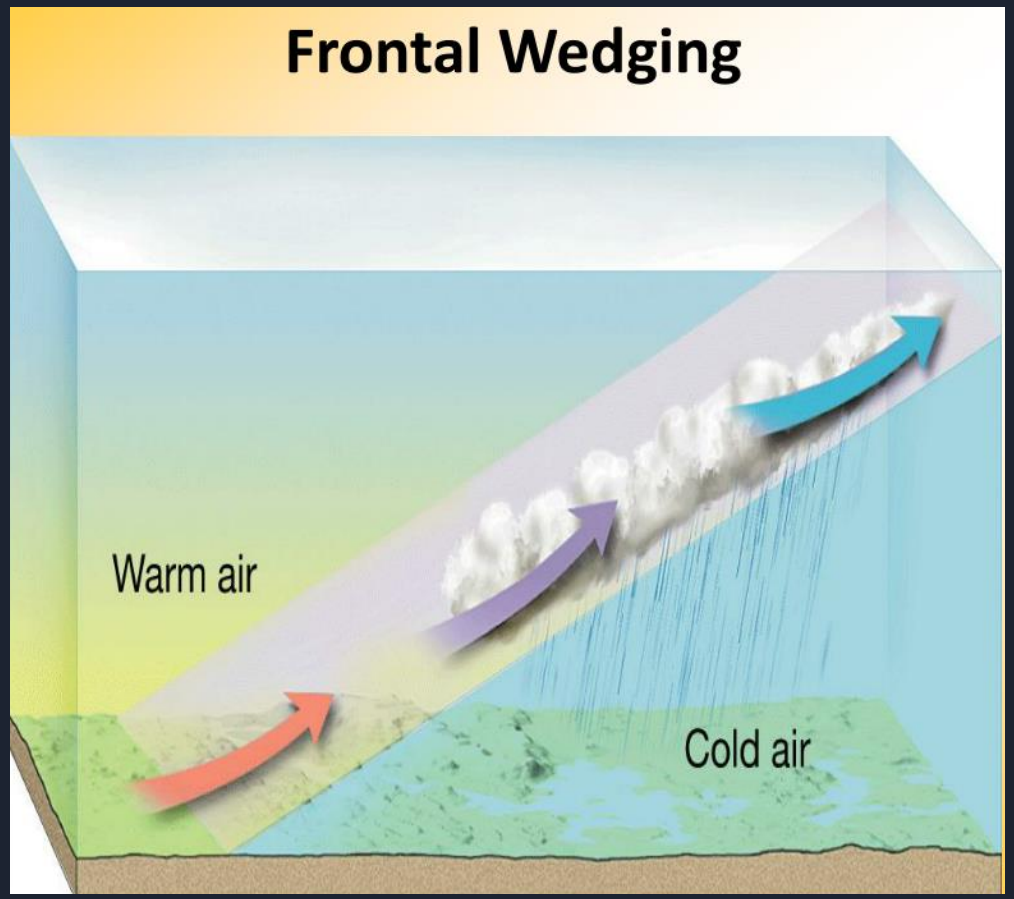

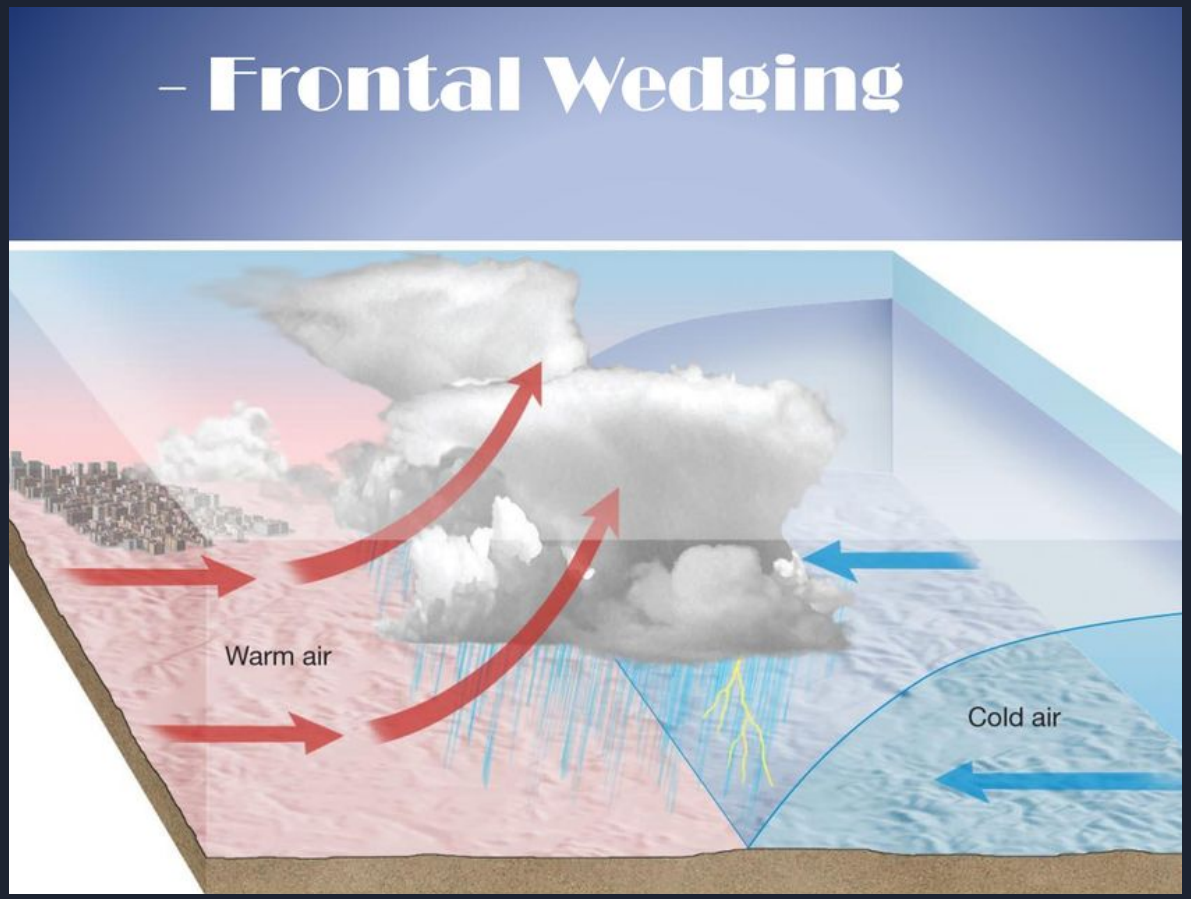

~ More generally, whenever ***air flows together*** from multiple directions, it ***piles up*** and it ***can't go into*** the ***ground***, so it ***rises***.

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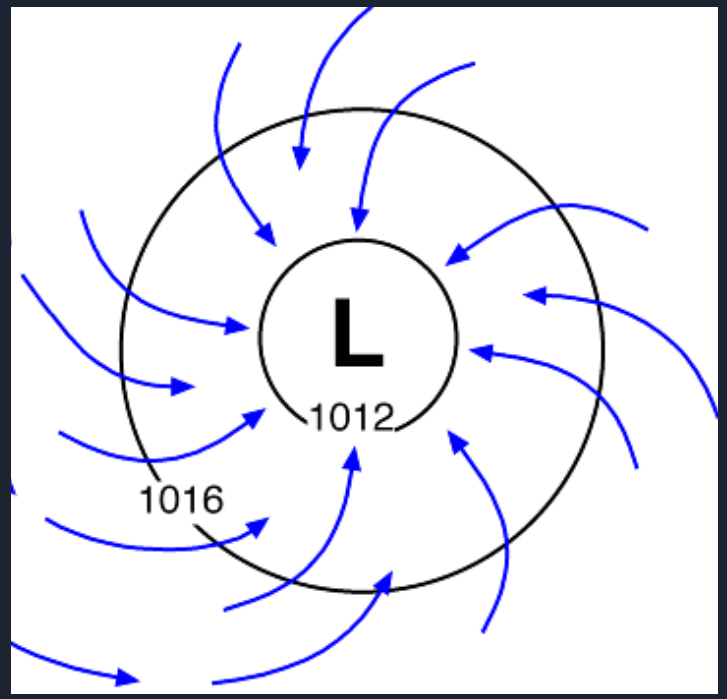

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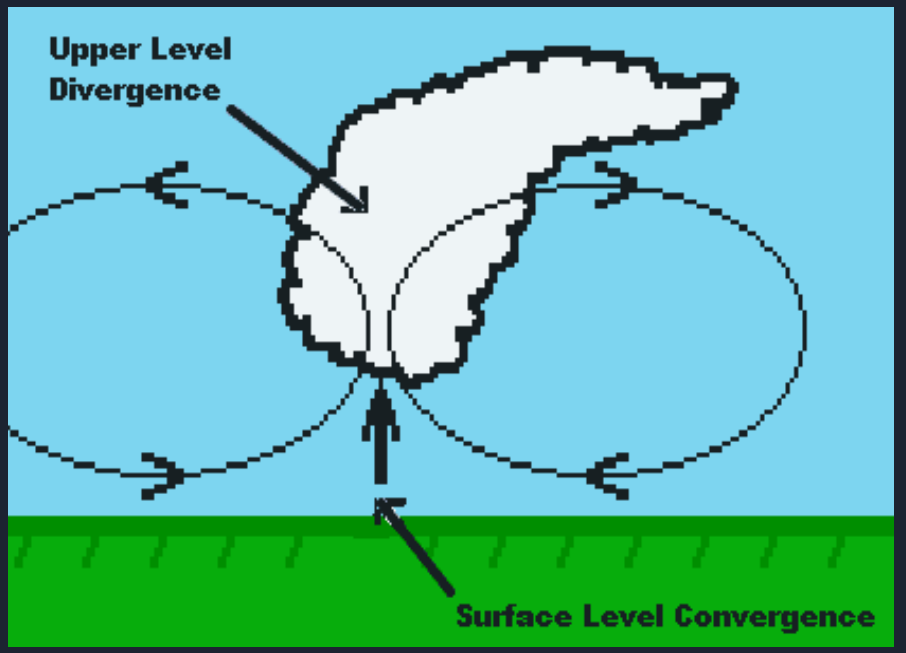

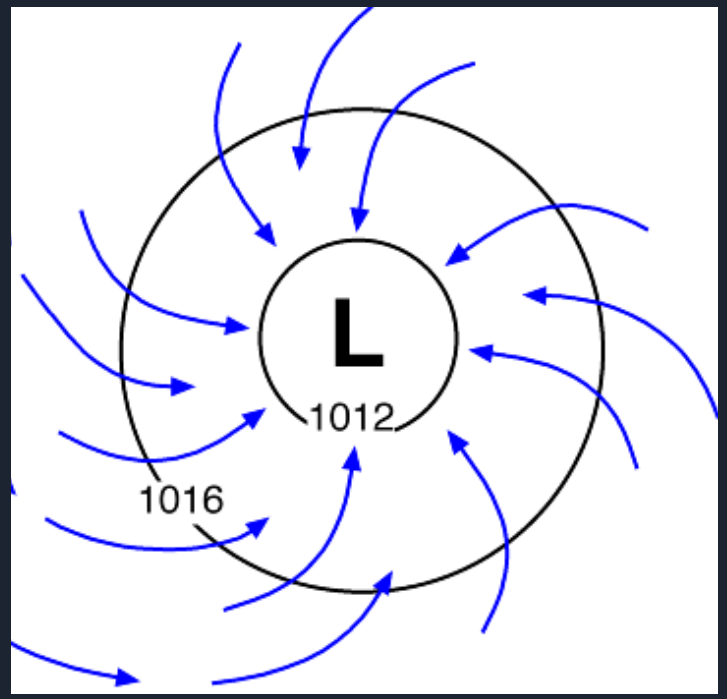

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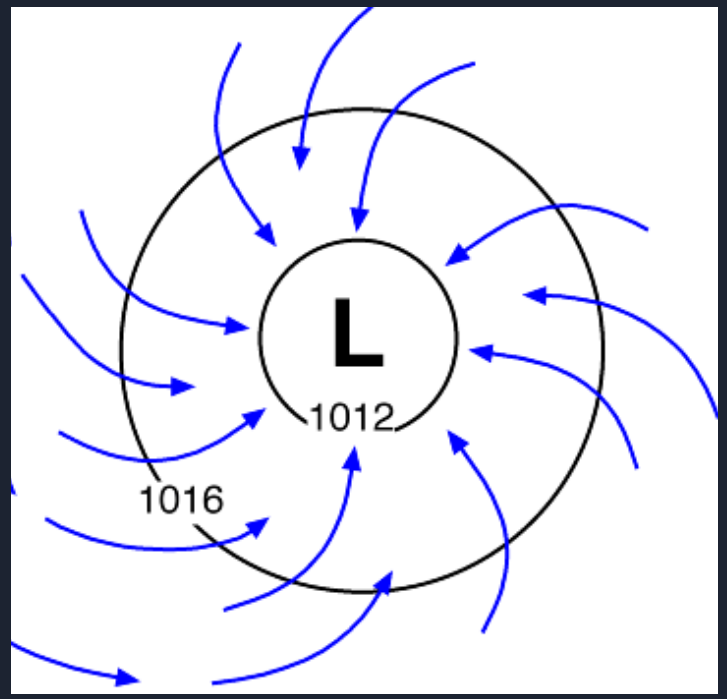

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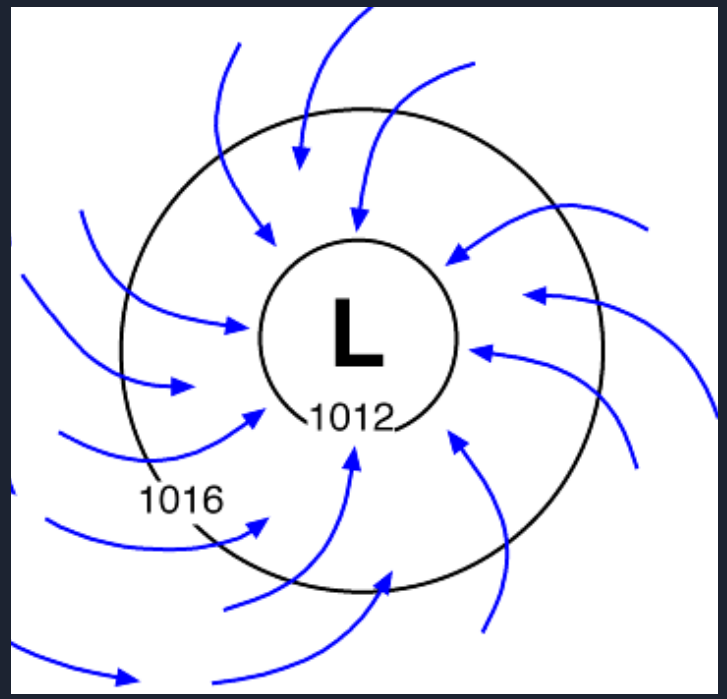

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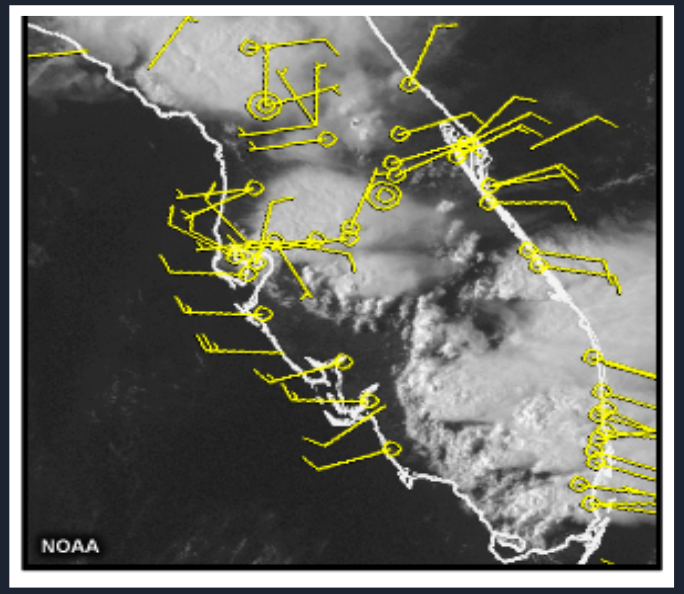

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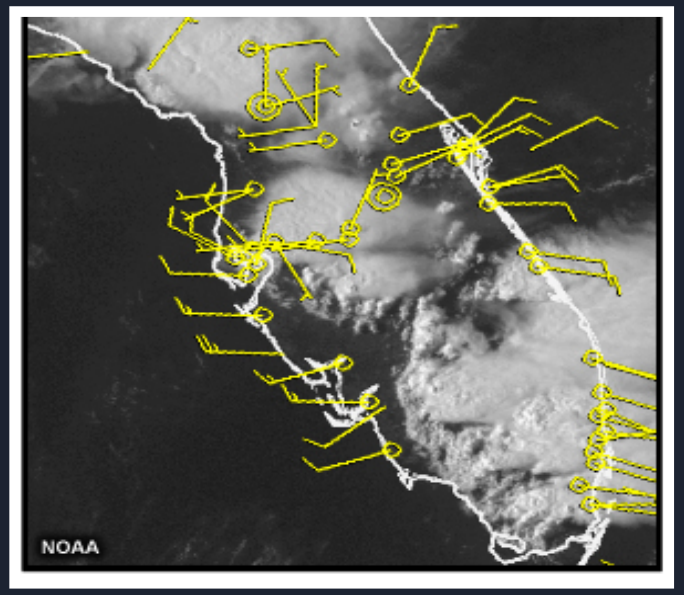

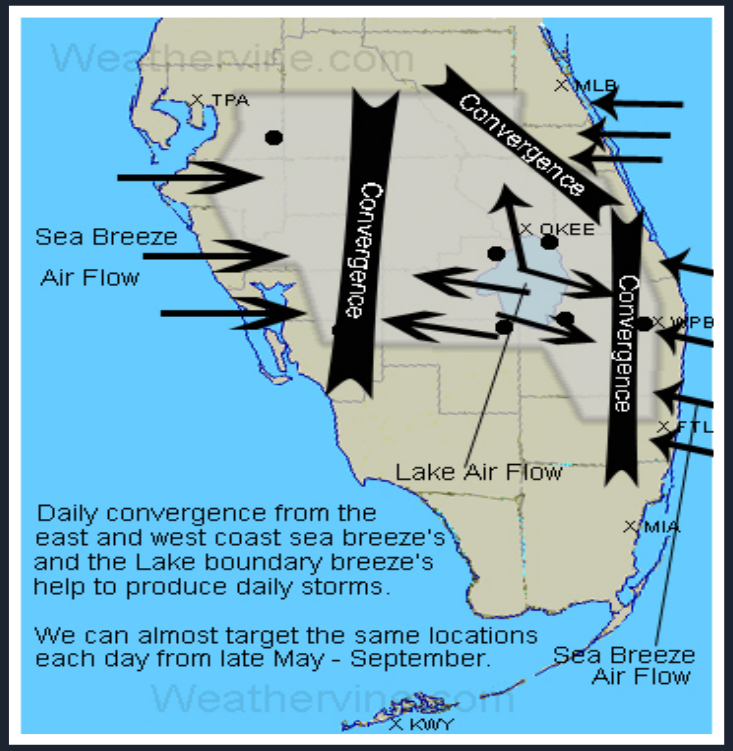

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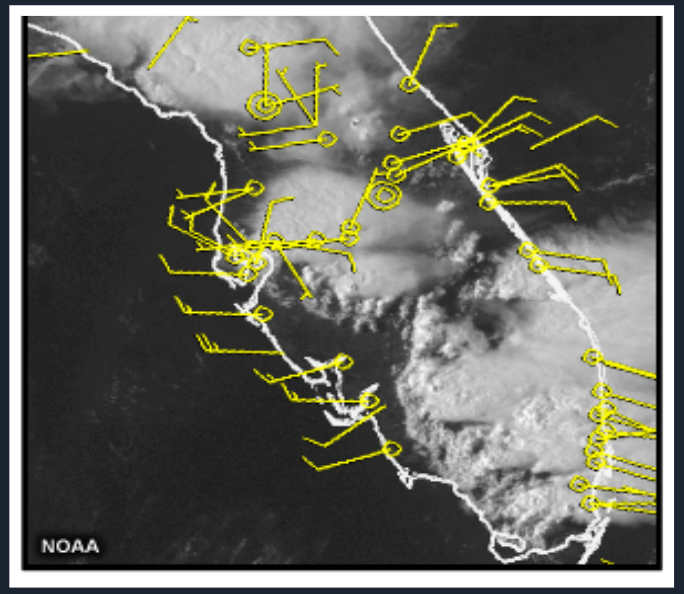
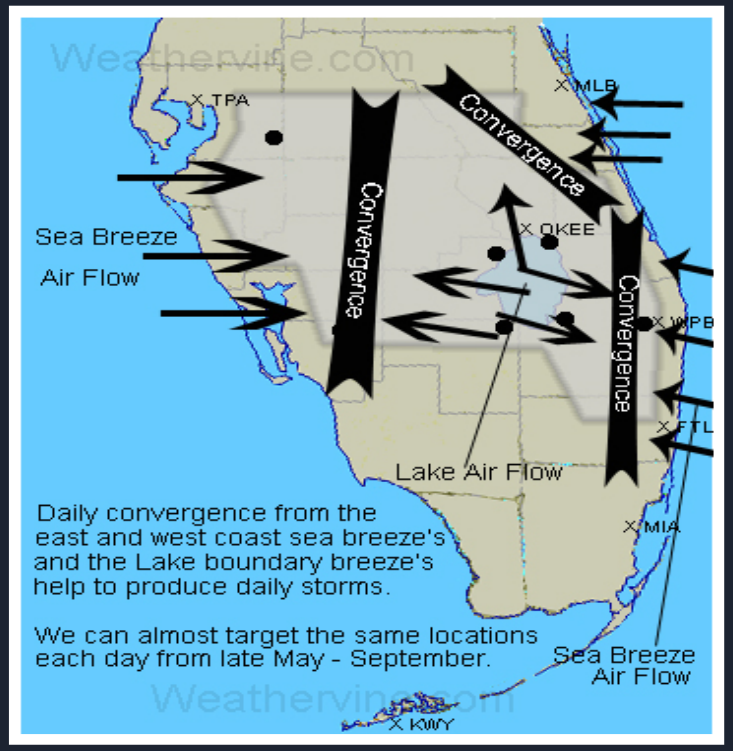
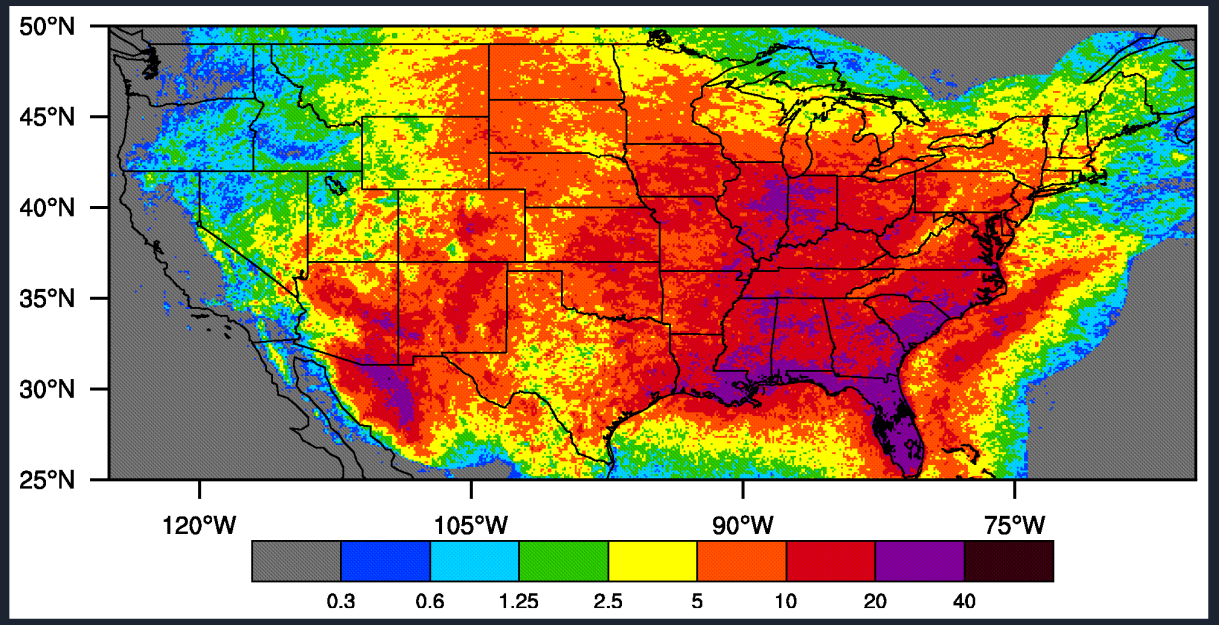
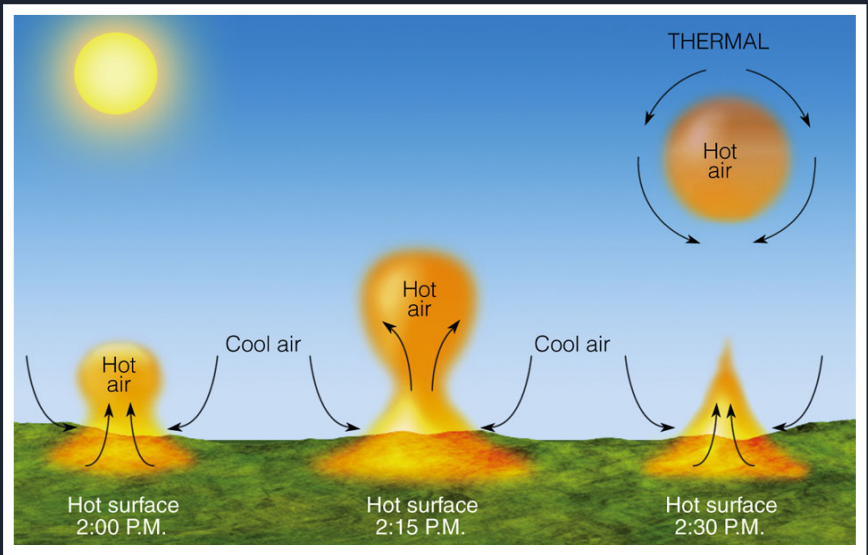






~ Finally, if one ***surface*** is ***heated*** ***more*** than its ***surroundings***, it will be ***buoyant*** and will ***rise*** in ***thermals***.



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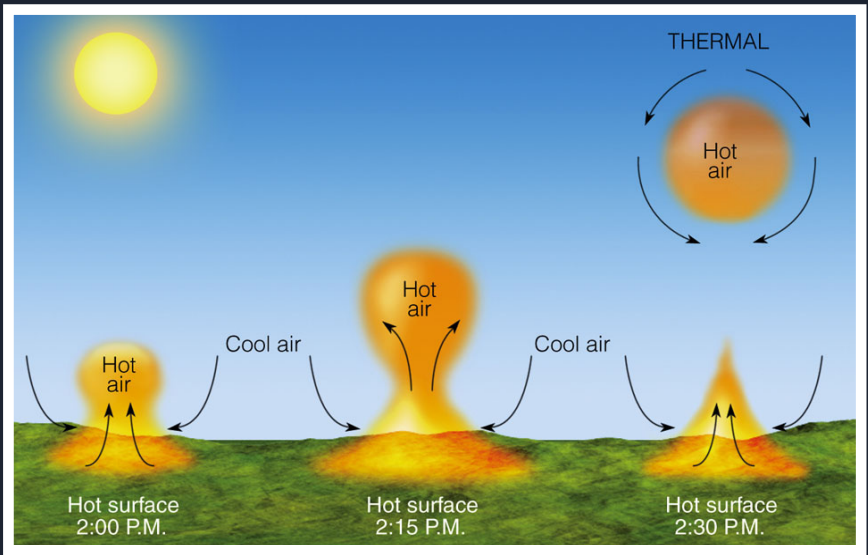

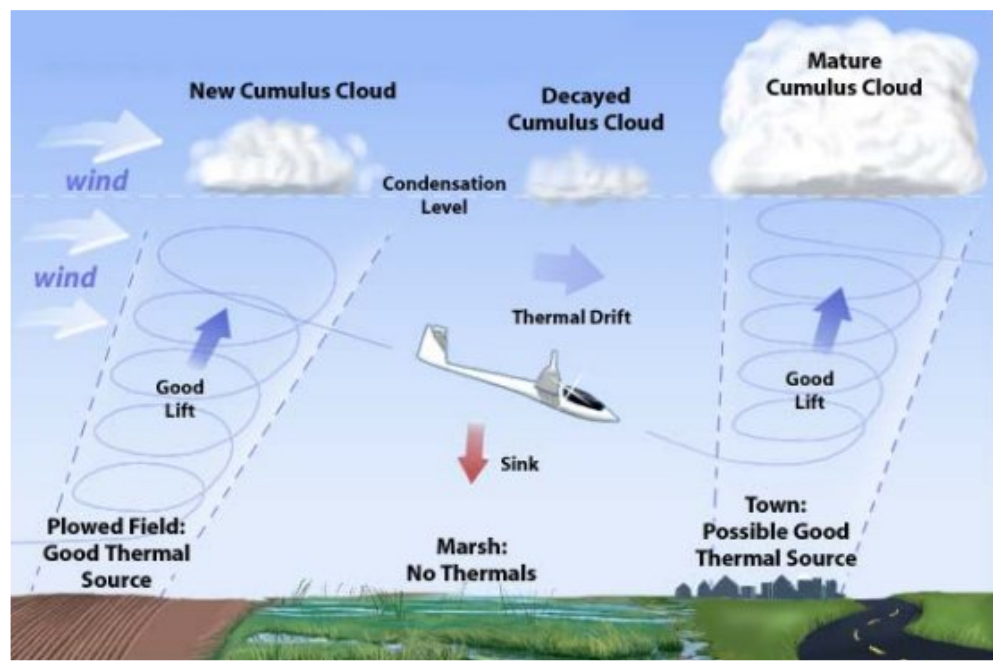

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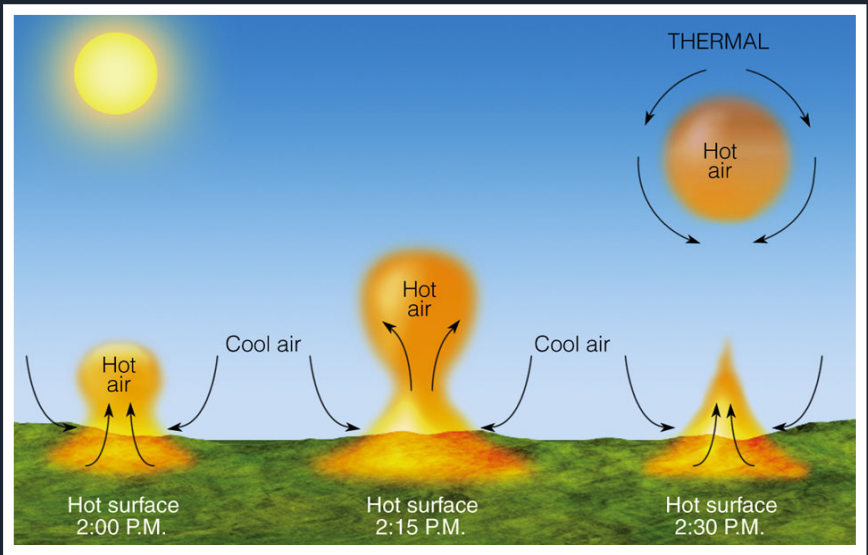

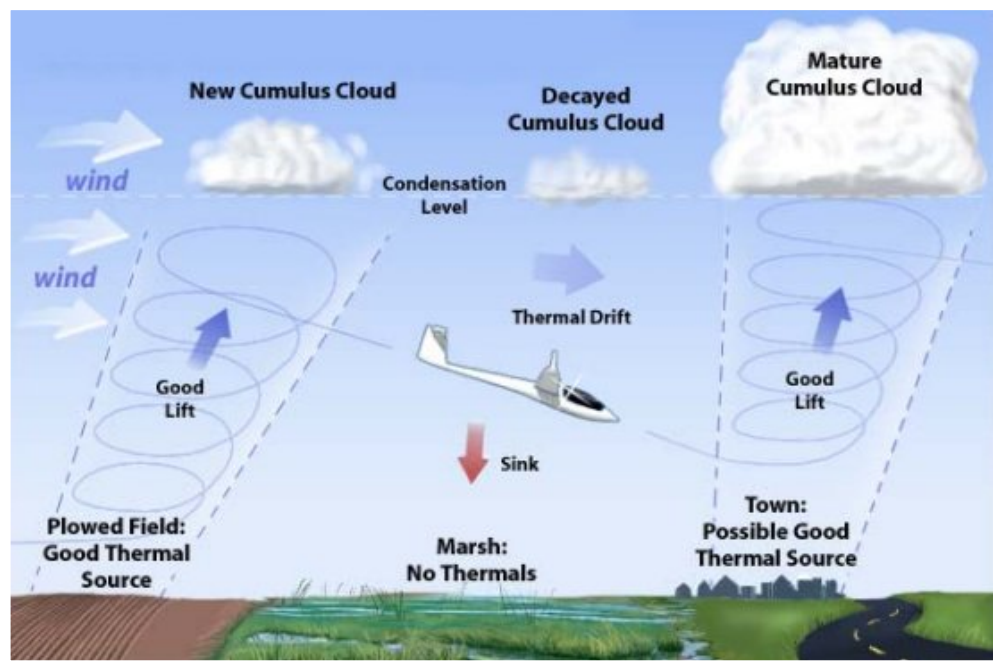

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~ This ***localized convective lift*** may produce ***summer thunderstorms***, but the ***lift*** usually ***isn't strong enough*** to produce ***deep clouds***.