Polar Front Theory

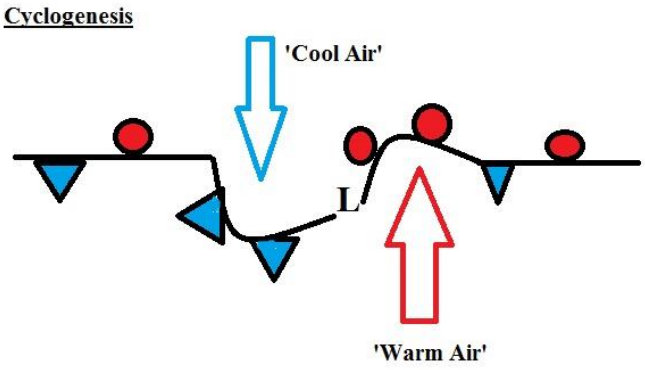
- **During World War I, Vilhelm Bjerknes and others observed that low pressure systems formed along a boundary separating polar air to the north and warmer air to the south.**
    - **This is known as the 'polar front theory' or the 'Norwegian cyclone model'.**

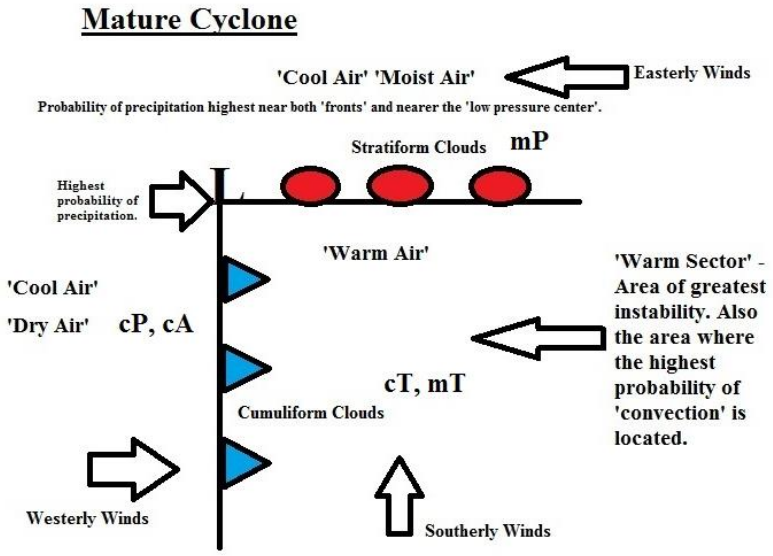
The Life Cycle of a Mid-Latitude Cyclone

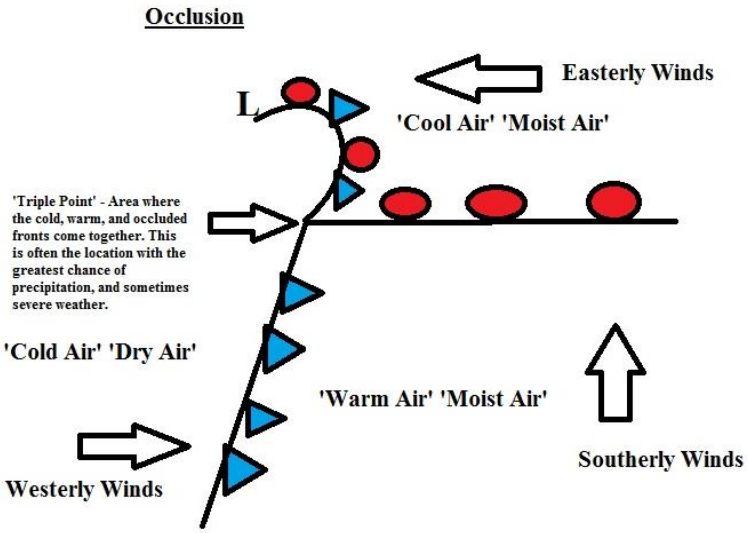
- **Cyclogenesis**
    - **Defined as the formation of a low pressure system along a frontal boundary.**
    - **As it occurs, a 'kink' develops along the boundary.**
        - **This creates a counterclockwise rotation around low-pressure.**
    - **Afterwards, low pressure intensifies with distinct warm and cold fronts emerging.**
    - **They observed cyclogenesis occurs near the greatest temperature contrasts.**
- **Mature Cyclone**
    - **As the low pressure system reaches its peak intensity, several things occur:**
        - **Cumuliform clouds form along the cold front.**
        - **A wide band of stratiform clouds develops along the warm front.**
        - **Clear skies are observed in the 'warm sector', the area between the cold front and warm front.**
    - **The isobars are straight in the warm sector and curved in the 'cold region'.**
    - **The warm front will *always* be ahead of the cold front.**
    - **Warm fronts are usually oriented 'west-east' with the low-pressure center at the western edge of the front.**
    - **Cold fronts are usually oriented 'north-south' with the low-pressure center at the northern edge of the front.**
- **Occlusion**
    - **In the latter stages of a low pressure storm system, it becomes occluded.**
        - **Temperature differences across the occluded front are not as great as across the cold and warm front.**
    - **Occlusion represents the end of the cyclone's life cycle.**

<u>Helpful Link</u>:

http://www.weather.gov/jetstream/cyclone


Cyclogenesis
'Cool Air'
L
'Warm Air'


Mature Cyclone
'Cool Air' 'Moist Air'
Easterly Winds
Probability of precipitation highest near both 'fronts' and nearer the 'low pressure center'.
Stratiform Clouds
mP
Highest probability of precipitation.
L
'Warm Air'
'Cool Air'
'Dry Air'
cP, cA
'Warm Sector' - Area of greatest instability. Also the area where the highest probability of 'convection' is located.
cT, mT
Cumuliform Clouds
Westerly Winds
Southerly Winds


Occlusion
Easterly Winds
'Cool Air' 'Moist Air'
L
'Triple Point' - Area where the cold, warm, and occluded fronts come together. This is often the location with the greatest chance of precipitation, and sometimes severe weather.
'Cold Air' 'Dry Air'
'Warm Air' 'Moist Air'
Southerly Winds
Westerly Winds