

Unit 10

Cloud morphology

Nicole Mölders

SKY WATCHER CHART

High Clouds: cloud bases 16,000 - 50,000ft (5-15km)

<http://www.weather.gov/oa/brochures/cloudchart.pdf>

Typical Types: Cirrus (Ci), Cirrostratus (Cs), Cirrocumulus (Cc)

| | | | | | | | | |
|--|--|---|---|--|---|---|---|---|
|  |  |  |  |  |  |  |  |  |
| Ci Cirrus In the form of tufts, streaks, or bands. | Cc Cirrostratus Cirrus, as patches or layers, not increasing, or with halos. | Cc Cirrostratus Other small shaped patches of a cirrostratus. | Cc Cirrostratus In bands of streaks, increasing, becoming denser. | Cc Cirrostratus Cirrus bands, increasing, below 40° elevation. | Cc Cirrostratus Cirrus bands, increasing, not above 40° elevation. | Cs Cirrostratus Translucent, completely covering the sky. | Cs Cirrostratus Not increasing, not covering the whole sky. | Cc Cirrocumulus Clouds in rows, holes, or corrugations. |



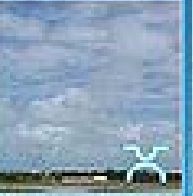

Middle Clouds: cloud bases 6,500 - 23,000ft (2-7km)

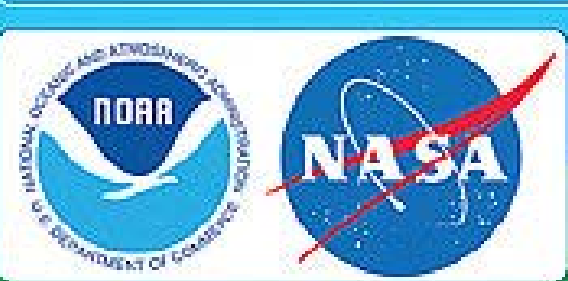
Typical Types: Altostratus (As), Altoaccumulus (Ac), Nimbostratus (Ns)



| | | | | | | | | |
|--|---|---|---|--|---|---|---|---|
|  |  |  |  |  |  |  |  |  |
| As Altostratus Usually seen transparent, sun or moon may be dimly visible. | As Altostratus Dense enough to hide the sun or moon. | As Altostratus Same transparent, one level, cloud extends change heavy. | As Altostratus Lens-shaped, in continuously changing shape and size. | As Altostratus One or more bands or layers, expanding, following. | As Altostratus From the spreading of textures or corrugations. | As Altostratus One or more optical types, or altostratus or nimbostratus. | As Altostratus With a comma-like hole or funnel. | As Altostratus Clouds in rows, holes, or corrugations. |

Low Clouds: cloud bases Up to 6,500 ft (0-2km)

Typical Types: Stratus (St), Stratocumulus (Sc), Cumulus (Cu), Cumulonimbus (Cb)

| | | | | | | | | |
|---|--|--|--|---|--|--|--|--|
|  |  |  |  |  |  |  |  |  |
| St Stratus Consists of the weather with featureless appearance. | St Stratus Moderately vertical extent, or lowering remains. | St Stratus Type not Stratus, surface not completely clear, no sun. | St Stratus From the spreading and following of nimbus. | St Stratus Not from the spreading and following of nimbus. | St Stratus In a continuous layer under ragged clouds. | St Stratus Under Cumulus Fractus clouds with rain or snow. | St Stratus Not spreading, bases at different levels. | St Stratus With dense top, white with an oval. |



| | | | | |
|---|--|---|--|---|
|  |  |  |  |  |
| Mammatus Drooping lower ends of heavy rain saturated clouds. | Spire Rapidly rotating column with a condensation cloud that touches the ground. | Wall Cloud Lowering of the rain the base of a cumulonimbus, often prior to a tornado formation. | Jelly Cloud Represents the leading edge of strong winds in a storm or a squall line. | Horn Cloud Formed by strong horizontal winds over shallow terrain. |

Special photo credit thanks to Jim W. Lee, Eric Kurb, Brian Kilmowski, and Eric Helgeson

SKY WATCHER CHART

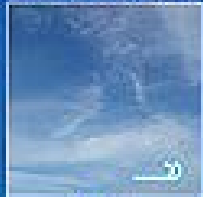
High Clouds: cloud bases 16,000 - 50,000ft (5-15km)

<http://www.weather.gov/oa/brochures/cloudchart.pdf>

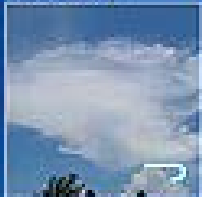
Typical Types: Cirrus (Ci), Cirrostratus (Cs), Cirrocumulus (Cc)



Ci Cirrus
In the form of streams, streaks, or tufts



Cj Cirrus
Cirrus, as patches or masses, not increasing, or with tails



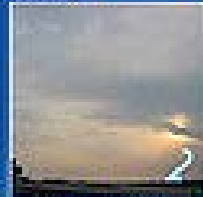
Ck Cirrus
Other small shaped masses of a cirrus-like



Cl Cirrus
In masses of streams, increasing, becoming denser



Cm Cirrostratus
Cirrus family, increasing, below 50° elevation



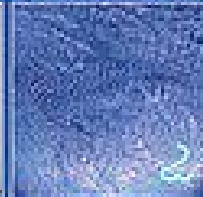
Cn Cirrostratus
Cirrus family, increasing, not above 50° elevation



Co Cirrostratus
Translucent, completely covering the sky



Cp Cirrostratus
Not increasing, not covering the whole sky



Cq Cirrocumulus
Clouds in well sorted rows or horizontal

Middle Clouds: cloud bases 6,500 - 23,000ft (2-7km)

Typical Types: Altostratus (As), Altoaccumulus (Ac), Nimbostratus (Ns)



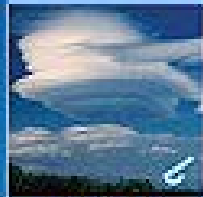
M1 Altostratus
Barely seen transparent, sun or moon may be dimly visible



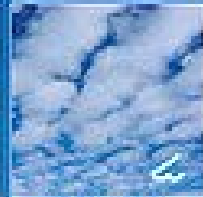
M2 Altostratus of Altostratus
Dense enough to hide the sun or moon



M3 Altostratus
Same transparent, one level, cloud masses change slowly



M4 Altostratus
Lens-shaped, in continually changing shape and size



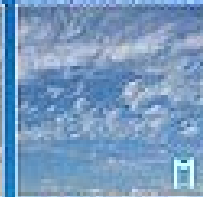
M5 Altostratus
One or more bands or layers, spreading, following



M6 Altostratus
From the spreading of streams or horizontal



M7 Altostratus
One or more vertical layers, or horizontal of horizontal



M8 Altostratus
With a comma-like tail or funnel



M9 Altostratus
Clouds in several levels

Low Clouds: cloud bases up to 6,500 ft (2-2km)

Typical Types: Stratus (St), Stratocumulus (Sc), Cumulus (Cu), Cumulonimbus (Cb)



L1 Stratus
Consists of the weather with featureless appearance



L2 Stratus
Moderately uniform vertical extent, or lowering remains



L3 Stratocumulus
Type not Stratus, surface not completely clear, no sun



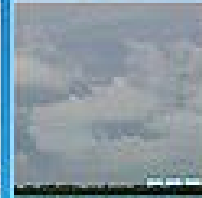
L4 Stratocumulus
From the spreading and following of nimbus



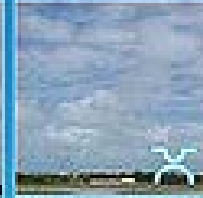
L5 Stratocumulus
Not from the spreading and following of nimbus



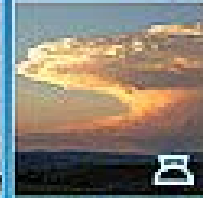
L6 Stratus
In a continuous layer under ragged clouds



L7 Stratus Fractus
Under Cumulus Fractus clouds with rain or snow



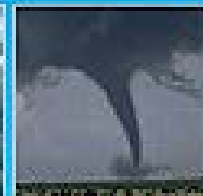
L8 Cumulus & Stratocumulus
Not spreading, bases at different levels



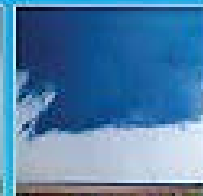
L9 Cumulonimbus
With dense top, white with an anvil



Mammatus
Drooping lower ends of heavy rain saturated clouds



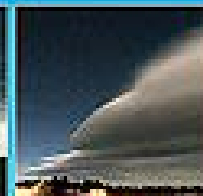
Spire
Rapidly rotating column with a conical top that touches the ground



Wall Cloud
Lowering of the rain the base of a cumulonimbus, often prior to a tornado formation



Jelly Cloud
Represents the leading edge of strong winds in a storm or a squall line



Horn Cloud
Formed by strong horizontal winds over shallow terrain

Special photo credit thanks to Jim W. Lee, Eric Kurb, Brian Kilmowski, and Eric Helgeson

SKY WATCHER CHART

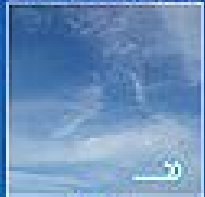
High Clouds: cloud bases 16,000 - 50,000ft (5-15km)

<http://www.weather.gov/oa/brochures/cloudchart.pdf>

Typical Types: Cirrus (Ci), Cirrostratus (Cs), Cirrocumulus (Cc)



Ci Cirrus
In the form of wispy, streaks, or tufts



Cj Cirrus
Cirrus, as patches or shafts, not increasing, or with light



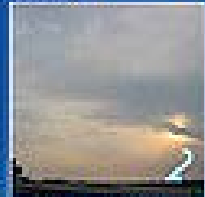
Ck Cirrus
Other small shaped patches of a cirrus cloud



Cl Cirrus
In patches or streaks, increasing, becoming denser



Cm Cirrostratus
Cirrus layer, increasing, lower 50° elevation



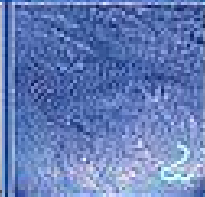
Cn Cirrostratus
Cirrus layer, increasing, not above 50° elevation



Co Cirrostratus
Translucent, completely covering the sky



Cp Cirrostratus
Not increasing, not covering the whole sky



Cc Cirrocumulus
Clouds in wavy rows or horizontal lines

Middle Clouds: cloud bases 6,500 - 23,000ft (2-7km)

Typical Types: Altostratus (As), Altoaccumulus (Ac), Nimbostratus (Ns)



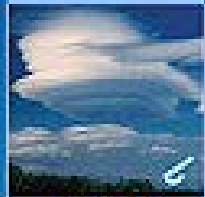
M1 Altostratus
Mostly seen transparent, sun



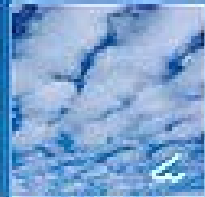
M2 Altostratus of Altostratus



M3 Altostratus
Same transparent, sun level



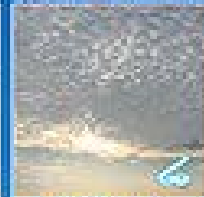
M4 Altostratus
Low-shaped, or horizontally



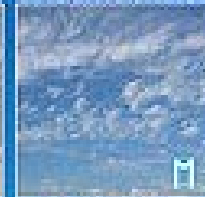
M5 Altostratus
One or more bands or layers



M6 Altostratus
From the spreading of



M7 Altostratus
One or more optical layers



M8 Altostratus
With comma-like tufts



M9 Altostratus
Clouds in wavy rows

the rest of moon

Low Clouds: cloud bases Up to 6,500 ft (0-2km)

Typical Types: Stratus (St), Stratocumulus (Sc), Cumulus (Cu), Cumulonimbus (Cb)



L1 Cumulus
Curved at the weather with different appearance



L2 Cumulus
Moderately vertical updraft, or horizontal cumulus



L3 Cumulonimbus
Tower and fibrous, diffuse and mammal-like clouds, or anvil



L4 Stratocumulus
From the spreading and following of cumulus



L5 Stratocumulus
Not from the spreading and following of cumulus



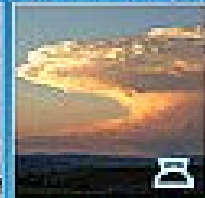
L6 Stratus
In a continuous layer under scattered clouds



L7 Stratus Fractus
Under Cumulus Fractus clouds with rain or snow



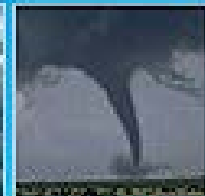
L8 Cumulus & Stratocumulus
Not spreading, some at different levels



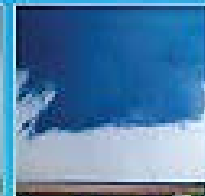
L9 Cumulonimbus
With fibrous top, often with an anvil



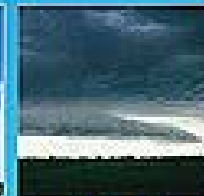
Altostratus
Clouds lower ends of heavy rain saturated clouds



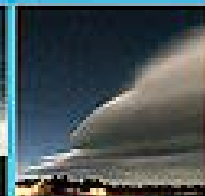
Cumulus
Rapidly rotating columns with a cumulonimbus cloud that touches the ground



High Cloud
Layering at the top the base of a cumulonimbus, often prior to imminent turbulence



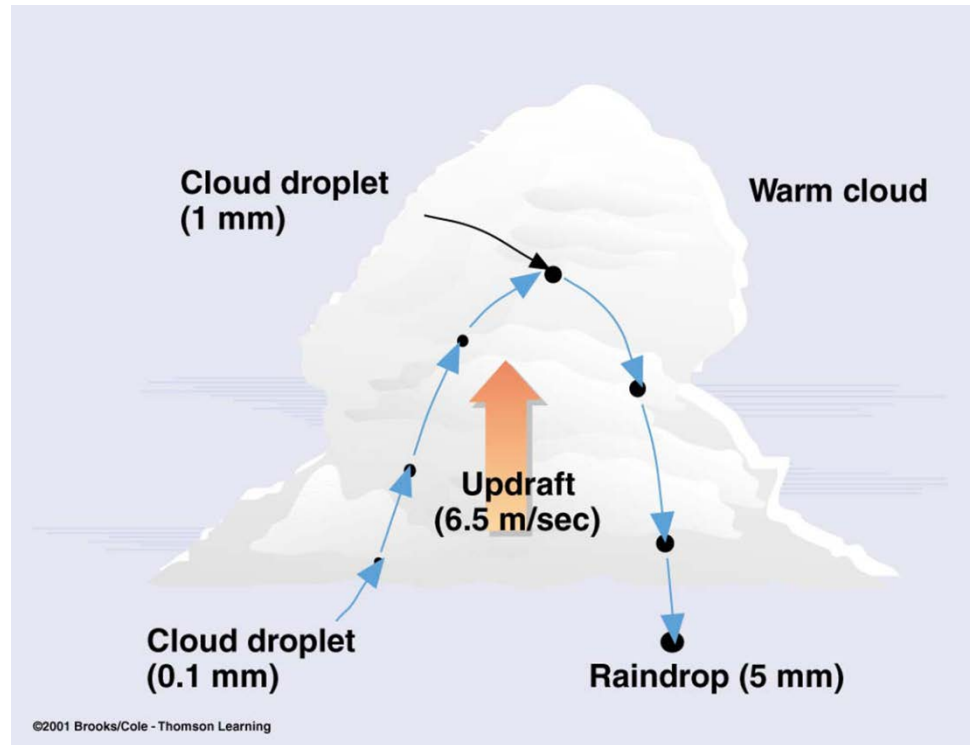
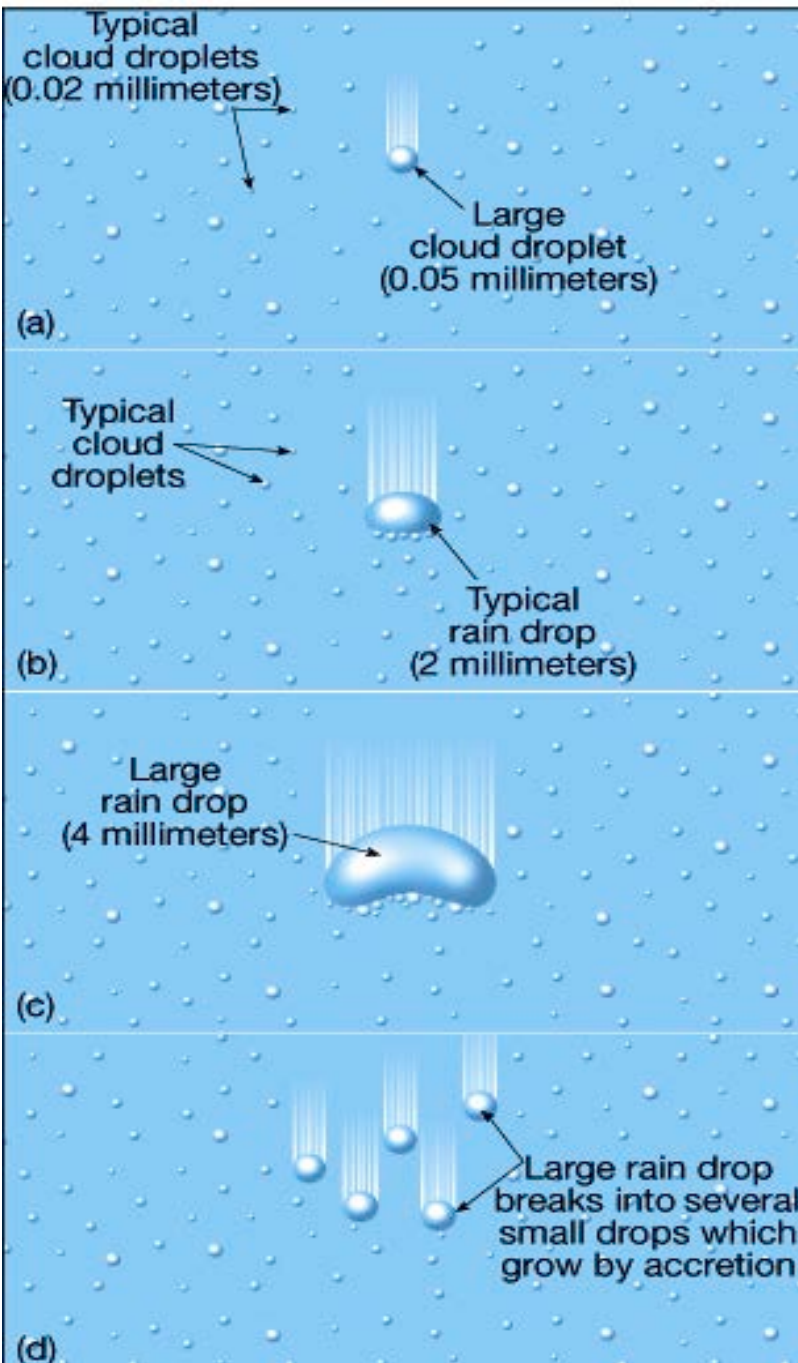
Low Cloud
Represents the leading edge of strong winds in presence of a disturbance



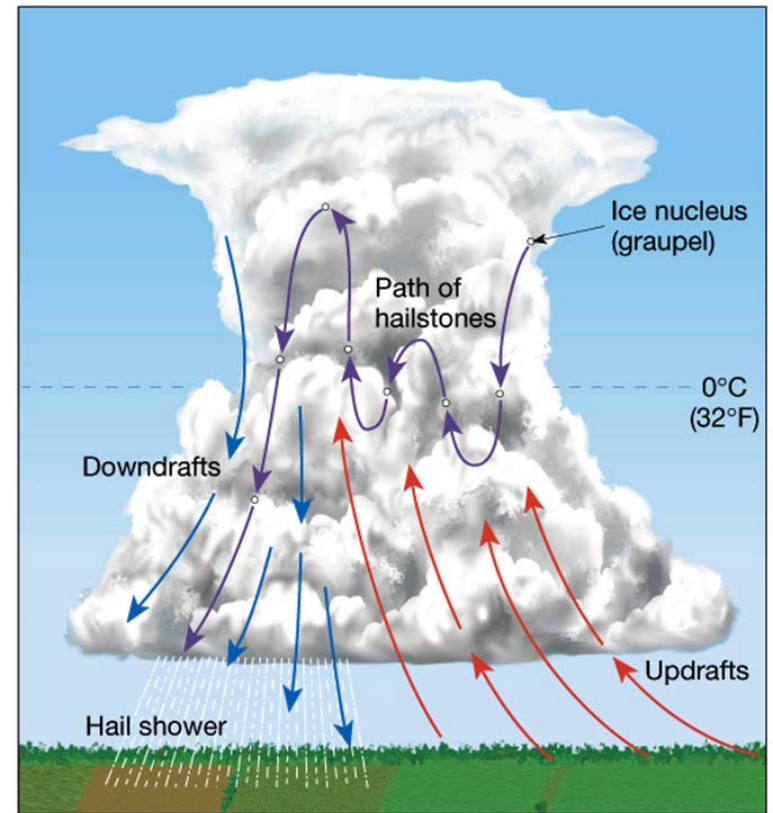
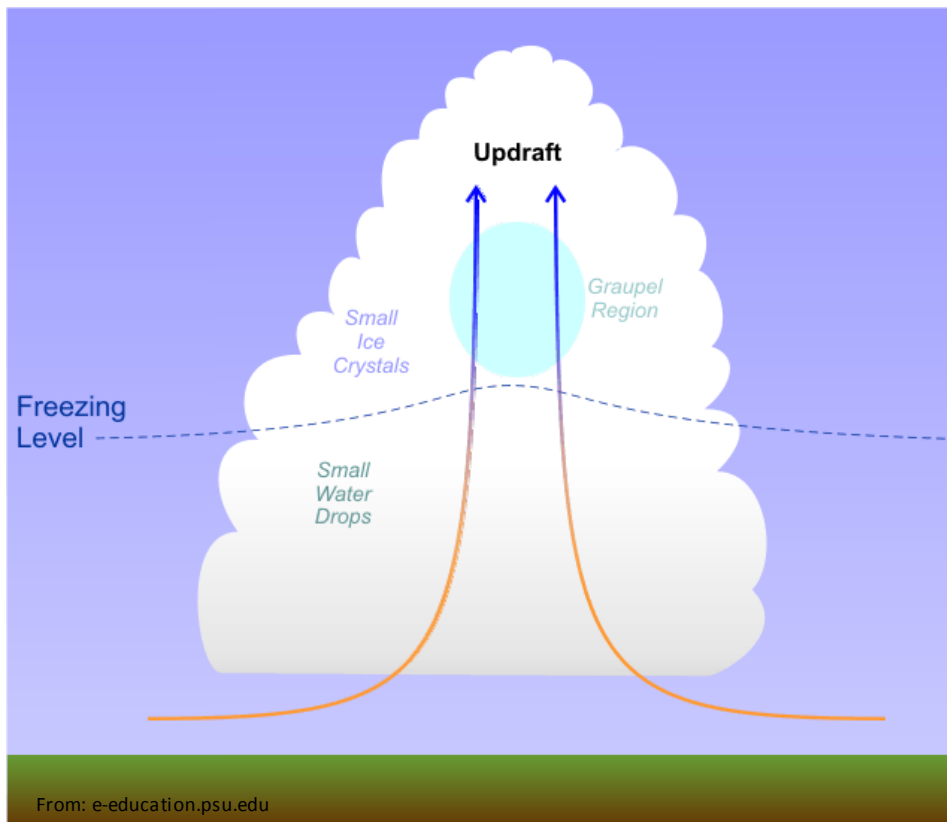
Storm Cloud
Formed by strong horizontal winds over shallow terrain

Special photo credit thanks to Jim W. Lee, Eric Kurb, Brian Kilmowski, and Eric Helgeson

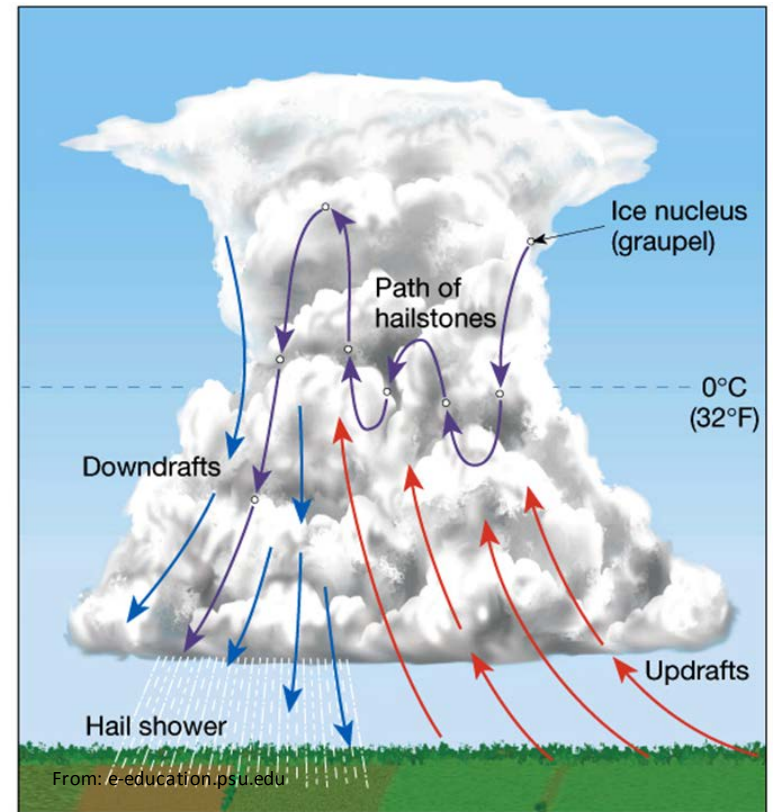
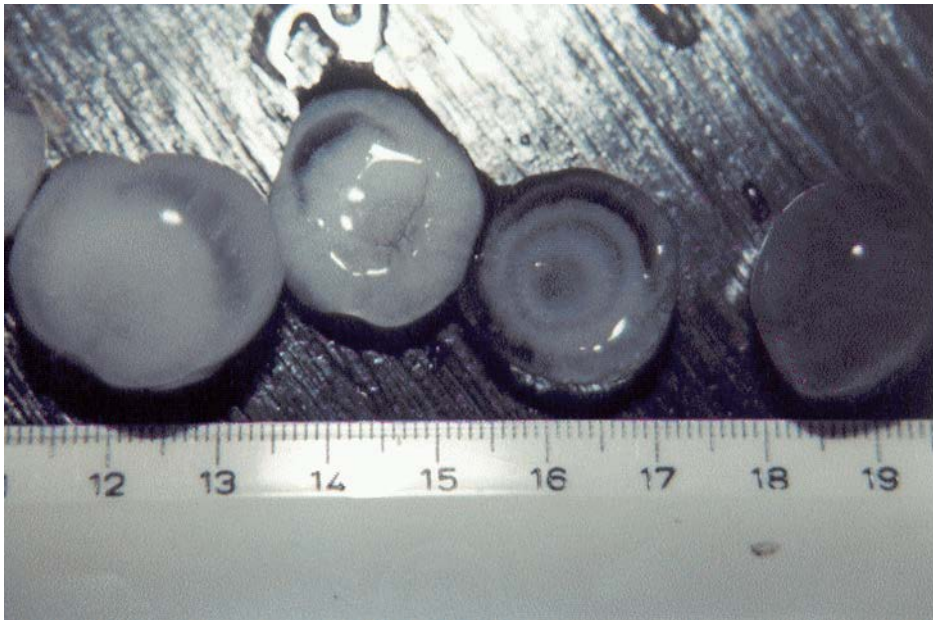
Process of warm clouds: Collision-Coalescence



Cold cloud processes involve the ice phase



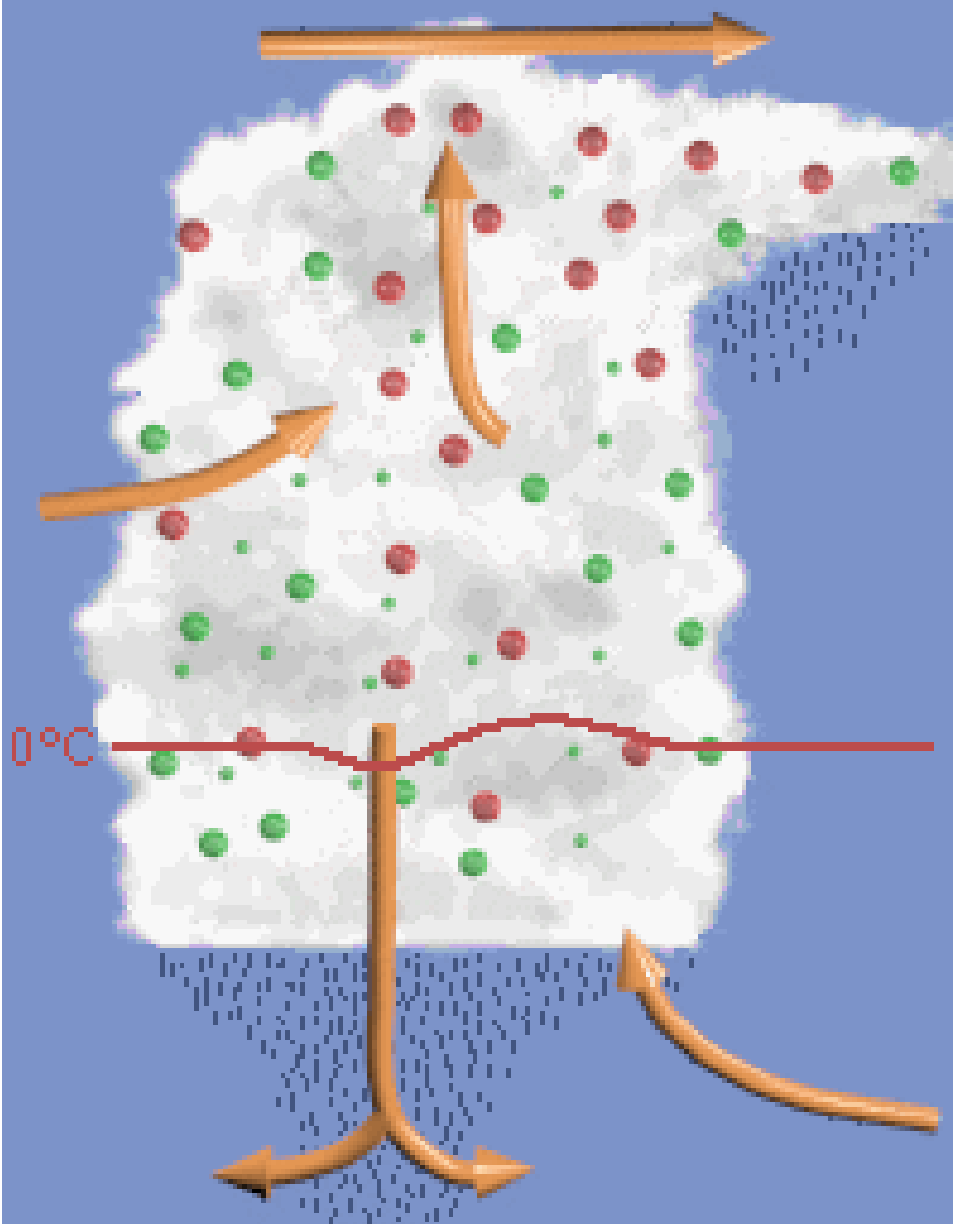
Cold cloud processes involve the ice phase



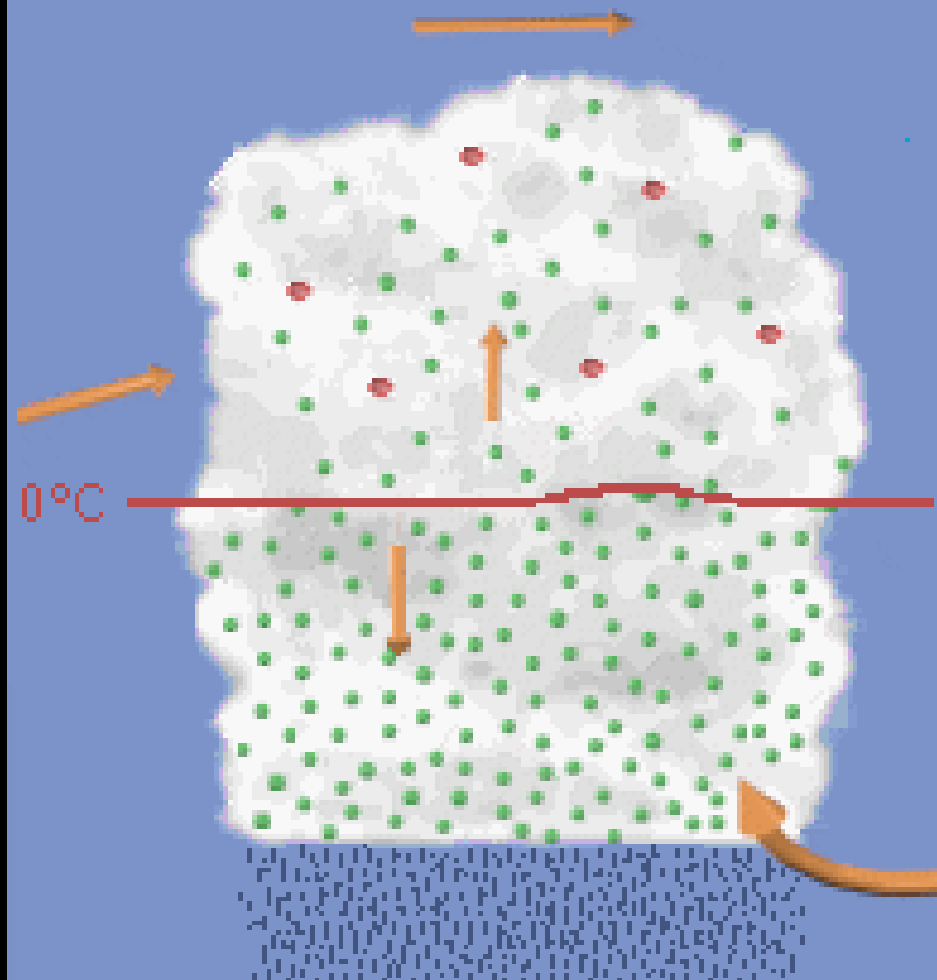
Results of cloud Seeding



Continental



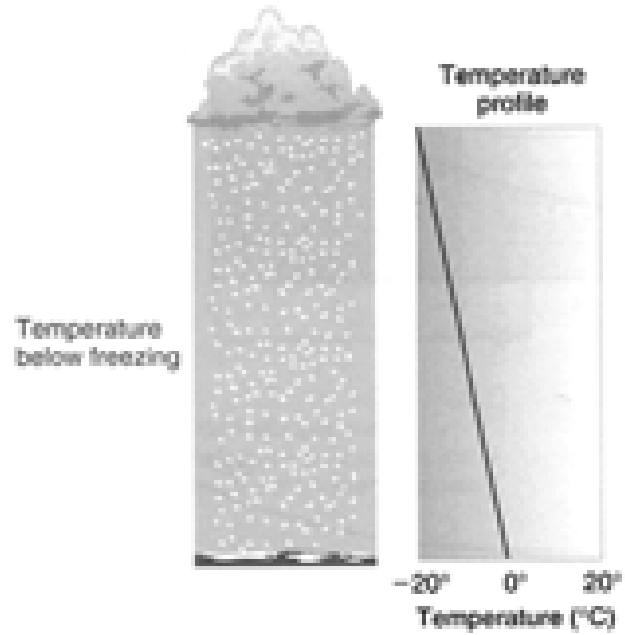
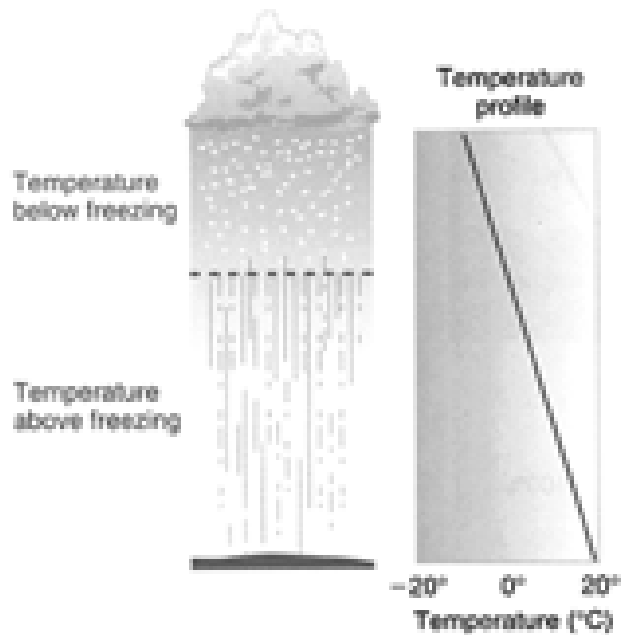
Maritime Tropical



A

RAIN

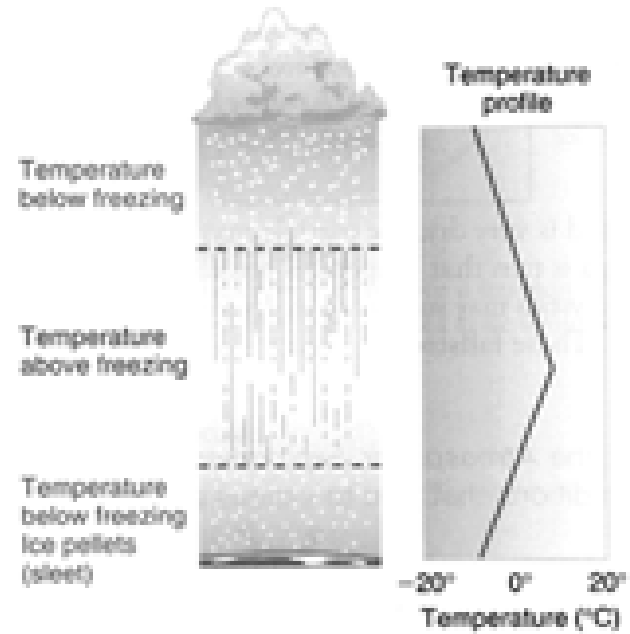
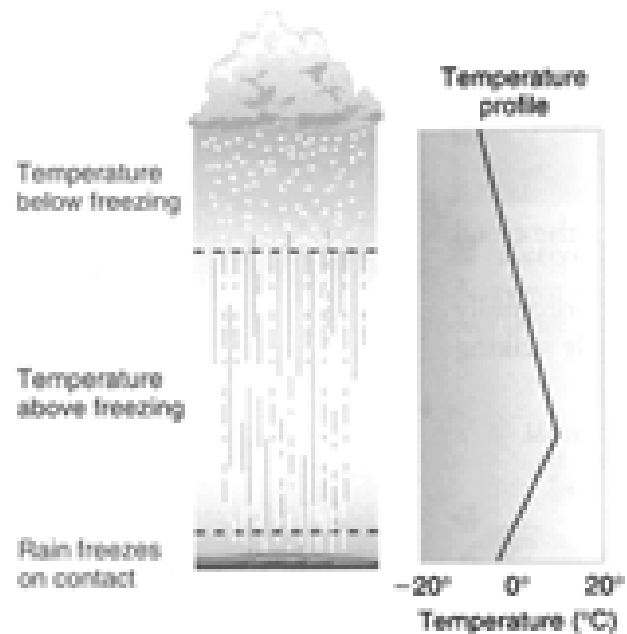
SNOW



C

FREEZING RAIN

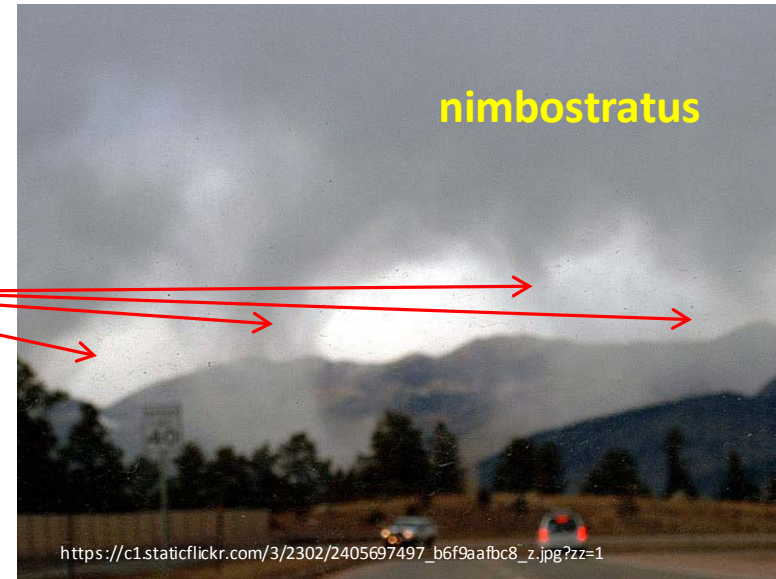
SLEET



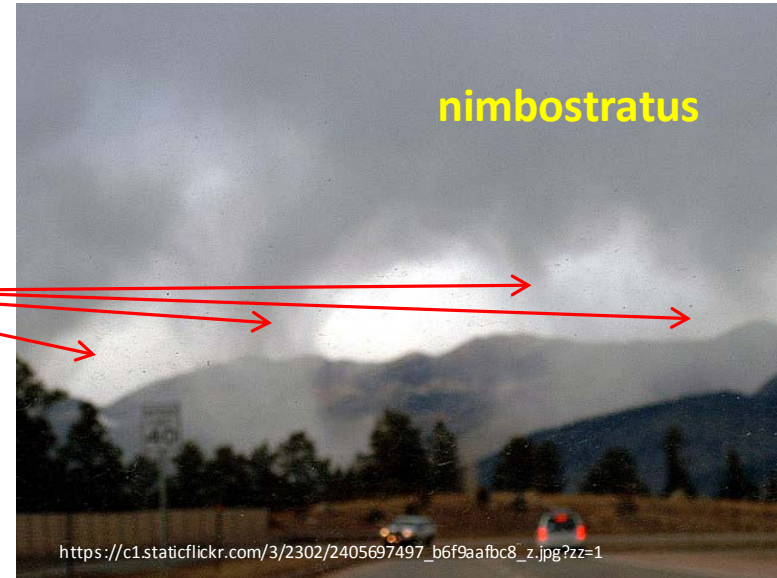
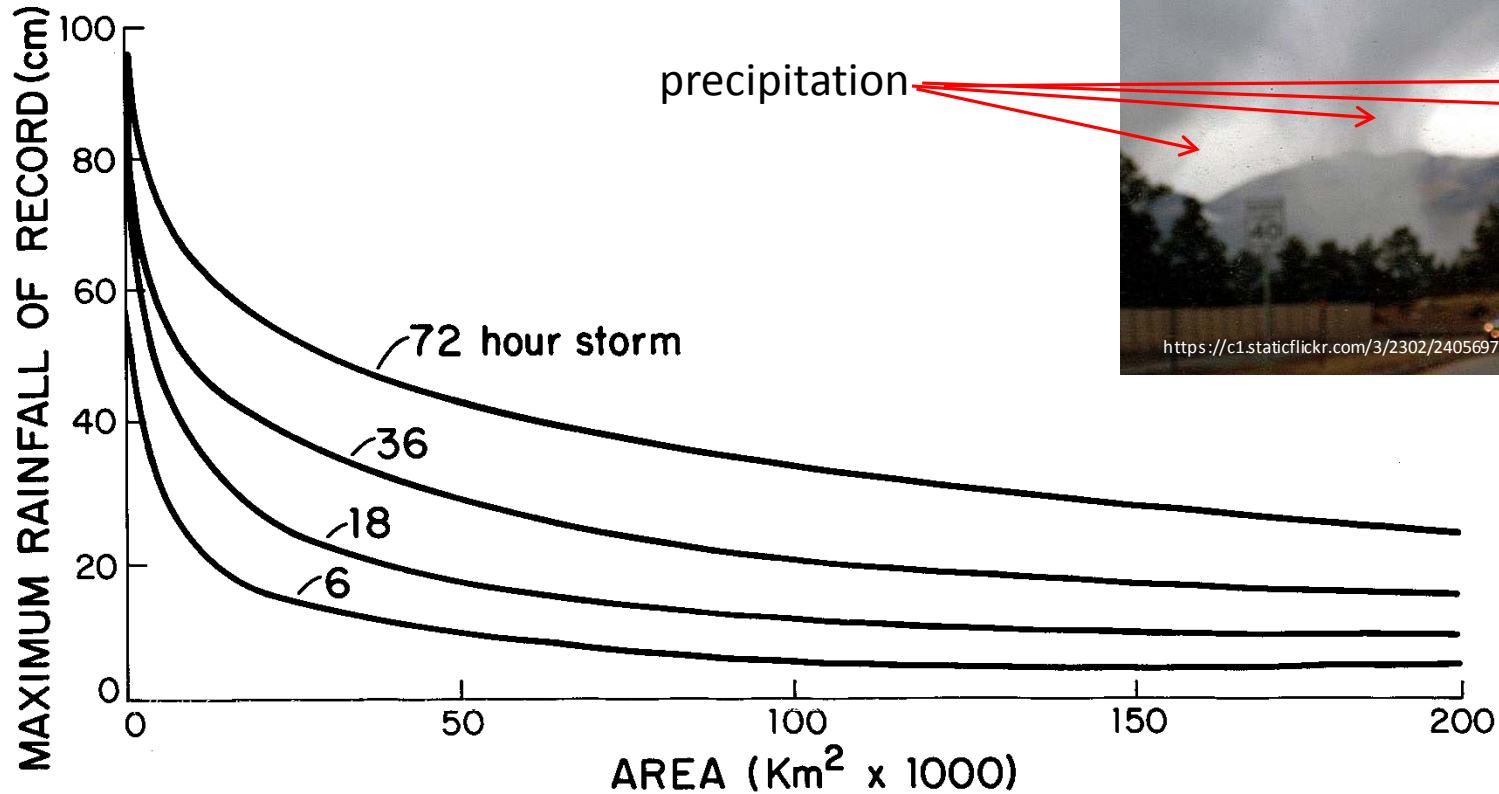
Effect of area on maximum precipitation



precipitation



Effect of area on maximum precipitation



SKY WATCHER CHART

High Clouds: cloud bases 16,000 - 50,000ft (5-15km)

<http://www.weather.gov/oa/brochures/cloudchart.pdf>

Typical Types: Cirrus (Ci), Cirrostratus (Cs), Cirrocumulus (Cc)



Ci Cirrus
In the form of streams, bands, or tufts



Cc Cirrostratus
Clouds in patches or layers, not increasing, or with halos



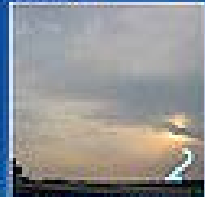
Cs Cirrus
Other small shaped patches of a cirrostratus



Ci Cirrus
In layers of streams, increasing, becoming denser



Cc Cirrocumulus
Cirrus tufts, increasing, lower Ci' overtop



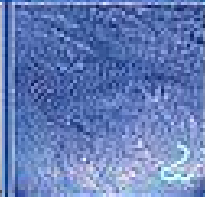
Cc Cirrocumulus
Cirrus patches, increasing, not above Ci' overtop



Cs Cirrostratus
Translucent, completely covering the sky



Cs Cirrostratus
Not increasing, not covering the whole sky



Cc Cirrocumulus
Clouds in wavy lines over cirrostratus

Middle Clouds: cloud bases 6,500 - 23,000ft (2-7km)

Typical Types: Altostratus (As), Alto cumulus (Ac), Nimbostratus (Ns)



As Altostratus
Barely seen transparent, sun or moon may be dimly visible



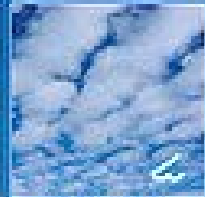
Ac Altostratus of lenticularis
Dense enough to hide the sun or moon



As Altostratus
Barely transparent, one level, cloud elements change slowly



Ac Altonimbus
Lens-shaped, in continually changing shape and size



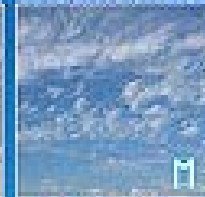
Ac Altonimbus
One or more bands or layers, spreading, following



Ac Altonimbus
From the spreading of tufts or of cirrocumulus



As Altostratus
One or more spatial types, or altostratus of cirrocumulus



Ac Altonimbus
With a comma-like tail or funnel



Ns Nimbostratus
Clouds in several layers

Low Clouds: cloud bases Up to 6,500 ft (0-2km)

Typical Types: Stratus (St), Stratocumulus (Sc), Cumulus (Cu), Cumulonimbus (Cb)



St Stratus
Consists of the weather with featureless appearance



St Stratus
Moderately vertical extent, or lowering remains



St Stratus
Type not Stratus, surface not completely clear, or none



St Stratus
From the spreading and following of nimbus



St Stratus
Not from the spreading and following of nimbus



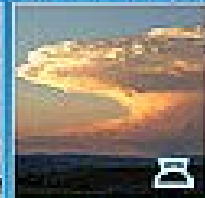
St Stratus
In a continuous layer under ragged clouds



St Stratus
Under Cumulus Fractus clouds with rain or snow



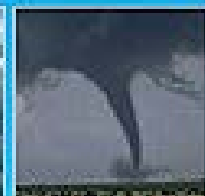
St Stratus
Not spreading, some at different levels



St Stratus
With dense top, white with an oval



Altostratus
Developing lower ends of heavy rain saturated clouds



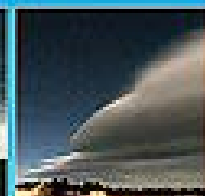
Cumulus
Rapidly rotating columns with a comma-like tail that touches the ground



High Clouds
Layering of the rain the head of a cumulonimbus, often prior to imminent turbulence



Low Clouds
Represents the leading edge of strong winds in surface or 2' disturbances



Storm Clouds
Formed by strong horizontal winds over surface fronts

Special photo credit thanks to Jim W. Lee, Eric Kurb, Brian Kilmowski, and Eric Helgeson