

= Air @-@ mass thunderstorm =

An air @-@ mass thunderstorm , also called an " ordinary " , " single cell " , or " garden variety " thunderstorm , is a thunderstorm that is generally weak and usually not severe . These storms form in environments where at least some amount of Convective Available Potential Energy ( CAPE ) is present , but very low levels of wind shear and helicity . The lifting source , which is a crucial factor in thunderstorm development , is usually the result of uneven heating of the surface , though they can be induced by weather fronts and other low @-@ level boundaries associated with wind convergence . The energy needed for these storms to form comes in the form of insolation , or solar radiation . Air @-@ mass thunderstorms do not move quickly , last no longer than an hour , and have the threats of lightning , as well as showery light , moderate , or heavy rainfall . Heavy rainfall can interfere with microwave transmissions within the atmosphere .

Lightning characteristics are related to characteristics of the parent thunderstorm , and could induce wildfires near thunderstorms with minimal rainfall . On unusual occasions there could be a weak downburst and small hail . They are common in temperate zones during a summer afternoon . Like all thunderstorms , the mean @-@ layered wind field the storms form within determine motion . When the deep @-@ layered wind flow is light , outflow boundary progression will determine storm movement . Since thunderstorms can be a hazard to aviation , pilots are advised to fly above any haze layers within regions of better visibility and to avoid flying under the anvil of these thunderstorms , which can be regions where hail falls from the parent thunderstorm . Vertical wind shear is also a hazard near the base of thunderstorms which have generated outflow boundaries .

= = Life cycle = =

The trigger for the lift of the initial cumulus cloud can be insolation heating the ground producing thermals , areas where two winds converge forcing air upwards , or where winds blow over terrain of increasing elevation . The moisture rapidly cools into liquid drops of water due to the cooler temperatures at high altitude , which appears as cumulus clouds . As the water vapor condenses into liquid , latent heat is released which warms the air , causing it to become less dense than the surrounding dry air . The air tends to rise in an updraft through the process of convection ( hence the term convective precipitation ) . This creates a low @-@ pressure zone beneath the forming thunderstorm , otherwise known as a cumulonimbus cloud . In a typical thunderstorm , approximately  $5 \times 10^8$  kg of water vapor is lifted into the Earth 's atmosphere . As they form in areas of minimal vertical wind shear , the thunderstorm 's rainfall creates a moist and relatively cool outflow boundary with undercuts the storm 's low level inflow , and quickly causes dissipation . Waterspouts , small hail , and strong wind gusts can occur in association with these thunderstorms .

= = Common locations of appearance = =

Also known as single cell thunderstorms , these are the typical summer thunderstorms in many temperate locales . They also occur in the cool unstable air which often follows the passage of a cold front from the sea during winter . Within a cluster of thunderstorms , the term " cell " refers to each separate principal updraft . Thunderstorm cells occasionally form in isolation , as the occurrence of one thunderstorm can develop an outflow boundary which sets up new thunderstorm development . Such storms are rarely severe and are a result of local atmospheric instability ; hence the term " air mass thunderstorm " . When such storms have a brief period of severe weather associated with them , it is known as a pulse severe storm . Pulse severe storms are poorly organized due to the minimal vertical wind shear in the storm 's environment and occur randomly in time and space , making them difficult to forecast . Between formation and dissipation , single cell thunderstorms normally last 20 ? 30 minutes .

= = Motion = =

The two major ways thunderstorms move are via advection of the wind and propagation along outflow boundaries towards sources of greater heat and moisture . Many thunderstorms move with the mean wind speed through the Earth 's troposphere , or the lowest 8 kilometres ( 5 @. @ 0 mi ) of the Earth 's atmosphere . Younger thunderstorms are steered by winds closer to the Earth 's surface than more mature thunderstorms as they tend not to be as tall . If the gust front , or leading edge of the outflow boundary , moves ahead of the thunderstorm , the thunderstorm 's motion will move in tandem with the gust front . This is more of a factor with thunderstorms with heavy precipitation ( HP ) , such as air @-@ mass thunderstorms . When thunderstorms merge , which is most likely when numerous thunderstorms exist in proximity to each other , the motion of the stronger thunderstorm normally dictates future motion of the merged cell . The stronger the mean wind , the less likely other processes will be involved in storm motion . On weather radar , storms are tracked by using a prominent feature and tracking it from scan to scan .

= = Convective precipitation = =

Convective rain , or showery precipitation , occurs from cumulonimbus clouds . It falls as showers with rapidly changing intensity . Convective precipitation falls over a certain area for a relatively short time , as convective clouds such as thunderstorms have limited horizontal extent . Most precipitation in the tropics appears to be convective . Graupel and hail are good indicators of convective precipitation and thunderstorms . In mid @-@ latitudes , convective precipitation is intermittent and often associated with baroclinic boundaries such as cold fronts , squall lines , and warm fronts . High rainfall rates are associated with thunderstorms with larger raindrops . Heavy rainfall leads to fading of microwave transmissions starting above the frequency of 10 gigahertz ( GHz ) , but is more severe above frequencies of 15 GHz .

= = Lightning = =

Relationships between lightning frequency and the height of precipitation within thunderstorms have been found . Thunderstorms which show radar returns above 14 kilometres ( 8 @. @ 7 mi ) in height are associated with storms which have more than ten lightning flashes per minute . There is also a correlation between the total lightning rate and the size of the thunderstorm , its updraft velocity , and amount of graupel over land . The same relationships fail over tropical oceans , however . Lightning from low precipitation ( LP ) thunderstorms is one of the leading causes of wildfires .

= = Aviation concerns = =

In areas where these thunderstorms form in isolation and horizontal visibility is good , pilots can evade these storms rather easily . In more moist atmospheres which become hazy , pilots navigate above the haze layer in order to get a better vantage point of these storms . Flying under the anvil of thunderstorms is not advised , as hail is more likely to fall in such areas outside the thunderstorm 's main rain shaft . When an outflow boundary forms due to a shallow layer of rain @-@ cooled air spreading out near ground level from the parent thunderstorm , both speed and directional wind shear can result at the leading edge of the three @-@ dimensional boundary . The stronger the outflow boundary is , the stronger the resultant vertical wind shear will become .