= Outflow (meteorology) =

Outflow , in meteorology , is air that flows outwards from a storm system . It is associated with ridging , or anticyclonic flow . In the low levels of the troposphere , outflow radiates from thunderstorms in the form of a wedge of rain @-@ cooled air , which is visible as a thin rope @-@ like cloud on weather satellite imagery or a fine line on weather radar imagery . Low @-@ level outflow boundaries can disrupt the center of small tropical cyclones . However , outflow aloft is essential for the strengthening of a tropical cyclone . If this outflow is undercut , the tropical cyclone weakens . If two tropical cyclones are in proximity , the upper level outflow from the system to the west can limit the development of the system to the east .

= = Thunderstorms = =

For thunderstorms , outflow tends to indicate the development of a system . Large quantities of outflow at the upper levels of a thunderstorm indicate its development . Too much outflow in the lower levels of a thunderstorm , however , can choke off the low @-@ level inflow which fuels it . Squall lines typically bow out the most , or bend the most convex outward , at the leading edge of low level outflow due to the formation of a mesoscale high @-@ pressure area which forms within the stratiform rain area behind the initial line . This high pressure area is formed due to strong descending motion behind the squall line , and could come in the form of a downburst .

The " edge " of the outflow boundary can often be detected by Doppler radar (especially in clear air mode) . Convergence occurs along the leading edge of the downdraft . Convergence of dust , aerosols , and bugs at the leading edge will lead to a higher clear air signature . Insects and arthropods are swept along by the prevailing winds , making them good indicators of the presence of outflow boundaries . The signature of the leading edge is also influenced by the density change between the cooler air from the downdraft and the warmer environmental air . This density boundary will increase the number of echo returns from the leading edge . Clouds and new thunderstorms also develop along the outflow 's leading edge . This makes it possible to locate the outflow boundary when using precipitation mode on a weather radar . Also , it makes outflow boundaries findable within visible satellite imagery as a thin line of cumuliform clouds which is known as an arcus , or arc , cloud . The image to the right depicts a particularly strong ouflow boundary ahead of a line of storms . Often , the outflow boundary will bow in the direction it is moving the quickest .

= = Tropical cyclones = =

The development of a significant mesoscale convective complex can send out a large enough outflow boundary to weaken the cyclone as the tropical cyclone center moves into the more stable air mass behind the leading edge of thunderstorm outflow , or outflow boundary . Moderate vertical wind shear can lead to the initial development of the convective complex and surface low similar to the mid @-@ latitudes , but it must relax to allow tropical cyclogenesis to continue .

While the most obvious motion of clouds is toward the center , tropical cyclones also develop an upper @-@ level (high @-@ altitude) outward flow of clouds . These originate from air that has released its moisture and is expelled at high altitude through the " chimney " of the storm engine . This outflow produces high , thin cirrus clouds that spiral away from the center . The clouds are thin enough for the sun to be visible through them . These high cirrus clouds may be the first signs of an approaching tropical cyclone . As air parcels are lifted within the eye of the storm the vorticity is reduced , causing the outflow from a tropical cyclone to have anticyclonic motion . If two tropical cyclones are in proximity to one another , the outflow from the system downstream (normally to the west) can hinder the development of the system upstream (normally to the east) .

= = Local effects = =

Low @-@ level outflow boundaries from thunderstorms are cooler and more moist than the air

mass the thunderstorm originally formed within due to its wet bulbing by rain , forming a wedge of denser air which spreads out from the base of the parent thunderstorm . If wind speeds are high enough , such as during microburst events , dust and sand can be carried into the troposphere , reducing visibility . This type of weather event is known as a haboob , and is most common in the late spring within Sudan . Upper @-@ level outflow can consist of thick cirrus clouds which would then obscure the sun and reduce solar insolation around the outermost edge of tropical cyclones .