= Rainband =

A rainband is a cloud and precipitation structure associated with an area of rainfall which is significantly elongated . Rainbands can be stratiform or convective , and are generated by differences in temperature . When noted on weather radar imagery , this precipitation elongation is referred to as banded structure . Rainbands within tropical cyclones are curved in orientation . Tropical cyclone rainbands contain showers and thunderstorms that , together with the eyewall and the eye , constitute a hurricane or tropical storm . The extent of rainbands around a tropical cyclone can help determine the cyclone 's intensity .

Rainbands spawned near and ahead of cold fronts can be squall lines which are able to produce tornadoes . Rainbands associated with cold fronts can be warped by mountain barriers perpendicular to the front 's orientation due to the formation of a low @-@ level barrier jet . Bands of thunderstorms can form with sea breeze and land breeze boundaries , if enough moisture is present . If sea breeze rainbands become active enough just ahead of a cold front , they can mask the location of the cold front itself . Banding within the comma head precipitation pattern of an extratropical cyclone can yield significant amounts of rain or snow . Behind extratropical cyclones , rainbands can form downwind of relative warm bodies of water such as the Great Lakes . If the atmosphere is cold enough , these rainbands can yield heavy snow .

= = Extratropical cyclones = =

Rainbands in advance of warm occluded fronts and warm fronts are associated with weak upward motion , and tend to be wide and stratiform in nature . In an atmosphere with rich low level moisture and vertical wind shear , narrow , convective rainbands known as squall lines generally in the cyclone 's warm sector , ahead of strong cold fronts associated with extratropical cyclones . Wider rain bands can occur behind cold fronts , which tend to have more stratiform , and less convective , precipitation . Within the cold sector north to northwest of a cyclone center , in colder cyclones , small scale , or mesoscale , bands of heavy snow can occur within a cyclone 's comma head precipitation pattern with a width of 32 kilometres (20 mi) to 80 kilometres (50 mi) . These bands in the comma head are associated with areas of frontogensis , or zones of strengthening temperature contrast . Southwest of extratropical cyclones , curved flow bringing cold air across the relatively warm Great Lakes can lead to narrow lake effect snow bands which bring significant localized snowfall .

= = Tropical cyclones = =

Rainbands exist in the periphery of tropical cyclones , which point towards the cyclone 's center of low pressure . Rainbands within tropical cyclones require ample moisture and a low level pool of cooler air . Bands located 80 kilometres (50 mi) to 150 kilometres (93 mi) from a cyclone 's center migrate outward . They are capable of producing heavy rains and squalls of wind , as well as tornadoes , particularly in the storm 's right @-@ front quadrant .

Some rainbands move closer to the center , forming a secondary , or outer , eyewall within intense hurricanes . Spiral rainbands are such a basic structure to a tropical cyclone that in most tropical cyclone basins , use of the satellite @-@ based Dvorak technique is the primary method used to determine a tropical cyclone 's maximum sustained winds . Within this method , the extent of spiral banding and difference in temperature between the eye and eyewall is used to assign a maximum sustained wind and a central pressure . Central pressure values for their centers of low pressure derived from this technique are approximate .

Different programs have been studying these rainbands , including RAINEX .

= = Forced by geography = =

Convective rainbands can form parallel to terrain on its windward side , due to lee waves triggered

by hills just upstream of the cloud 's formation . Their spacing is normally 5 kilometres (3 @.@ 1 mi) to 10 kilometres (6 @.@ 2 mi) apart . When bands of precipitation near frontal zones approach steep topography , a low @-@ level barrier jet stream forms parallel to and just prior to the mountain ridge , which slows down the frontal rainband just prior to the mountain barrier . If enough moisture is present , sea breeze and land breeze fronts can form convective rainbands . Sea breeze front thunderstorm lines can become strong enough to mask the location of an approaching cold front by evening . The edge of ocean currents can lead to the development of thunderstorm bands due to heat differential at this interface . Downwind of islands , bands of showers and thunderstorms can develop due to low level wind convergence downwind of the island edges . Offshore California , this has been noted in the wake of cold fronts .