

Severe notes



Severe Notes 4/25/13 When ML AND UL flow reach an updraft and that midlevel and upper level flow tends to be subsaturated, so there are 3 options with this upward rotating flow can go left right or down. Can't go up because air tends to be denser than the updraft air. So if that air goes down it gains downward momentum. Bc that air gains downward momentum which will evap cool it will continue to gain neg buoyancy. Once at the surface you have your RFD. Large precip surrounding the updraft which you are talking about HP'S. Dry air in midlevels you could be talking about any type of supercell. - Compressional warming will reduce processes. Another reason why HP's tend to help in the strength of the RFD because those parcels tend to be saturated so they have to evap that liquid as they fall. - Because precip is most sig in RFD of HPS the RFDS of HPS tend to be strongest because adiabatic compression is opposed most efficiently by evap cooling in HP supercells. *** - Process of adiabatic compression is opposed by evap cooling in Hp supercells - If objective is to develop tornadoes what do you want? What kind of RFD'S: You want warm RFD's which are relatively weak RFD's. They all have RFD'S. - Tornadoes require at least neutrally buoyant air. If air in the RFD remains sufficiently buoyant, at least somewhat buoyant, caape is non zero. You can get a tornado. TORNADOES: -Tornadoes derive most of their energy (virtually all of it) from helicity. - Tornadoes generally require small amounts of CAPE. What is relatively small CAPE? You can observe tornadoes in a non zero enviro but they need some but it does not take much. - total derivative of vertical vorticity with respect to time is the stretching term Δ is divergence and ζ is vertical vorticity. This is the mathematical version of instability. Stretching term is dominant in Tornadoes. $DZ/DT = -dz \zeta$ is exponential. Stretching is strong in tornadoes

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have small radii and they rotate very fast (strong rotation). - Why do supercells exist? Why do tornadoes exist? They are a response to instability, some say tornadoes are getting rid of helical instability. -How do we get tornadoes? They require RFD and the RFD gust front. This creates horizontal vorticity because of the density gradients this being the higher density in the pool and being the lower density in the cold pool. Our objective is to have a low level mesocyclone. So now we need to lower the mesocyclone. The RFD has to be present to generate your low level mesocyclone so from there vorticity stretching occurs. There appears to be a contributing factor Baroclinic generation of low level mesocyclones. Another issue is that most tornadic supercells have warm RFD's which means there is relatively little density gradient with the storms that produce at the largest propensity