

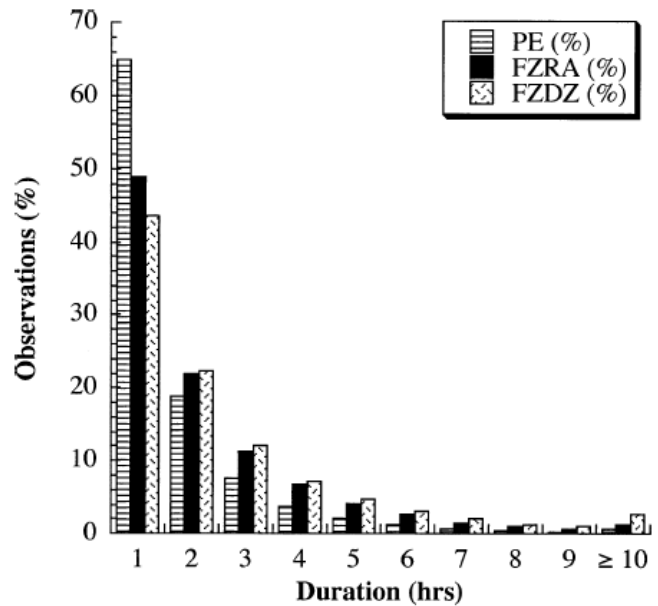
Name: _____

MEA 443 WEATHER ANALYSIS AND FORECASTING, FALL 2011
Quiz 12, Thursday 11/18/2011

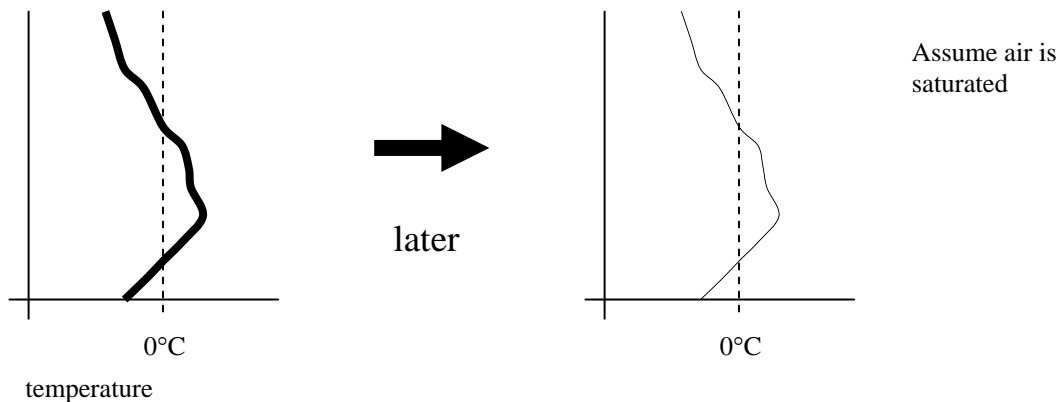
1.) The graph below shows a histogram of the average duration of ice pellets (PE), freezing rain (FZRA), and freezing drizzle (FZDZ) as compiled by Cortinas et al. (2004). From this graph, we see that the vast majority of freezing rain events last less than 5 hours.

a.) Explain why the majority of FZRA events are so short lived.

b.) Explain what conditions are needed for the small subset of FZRA events that are *not* short lived.



2.) Consider the vertical temperature profile shown below. Suppose that the temperature advection is weak and heavy precipitation is falling, meaning that freezing and melting precipitation could exert a significant influence on the local temperature profile. *Sketch a modified (approximate) temperature profile at right below that accounts for latent heat exchange via freezing and melting.* [The original profile is included for reference.]



3.) Coastal front true/false:

- a.) Coastal fronts are easily monitored in the southeastern U.S. thanks to a network of moored buoys in the Gulf Stream.
- b.) Shearing frontogenesis can accompany coastal fronts, especially during a CAD event.
- c.) Differential diabatic heating tends to weaken coastal fronts.
- d.) The main mechanisms of coastal frontogenesis are shearing and confluence, and the differential diabatic term often opposes these processes.

4.) Briefly define each of the following terms:

i.) Riming

ii.) Aggregation

iii.) Freezing nucleus

iv.) Contact nucleation

v.) Deposition

vi.) Supercooled cloud

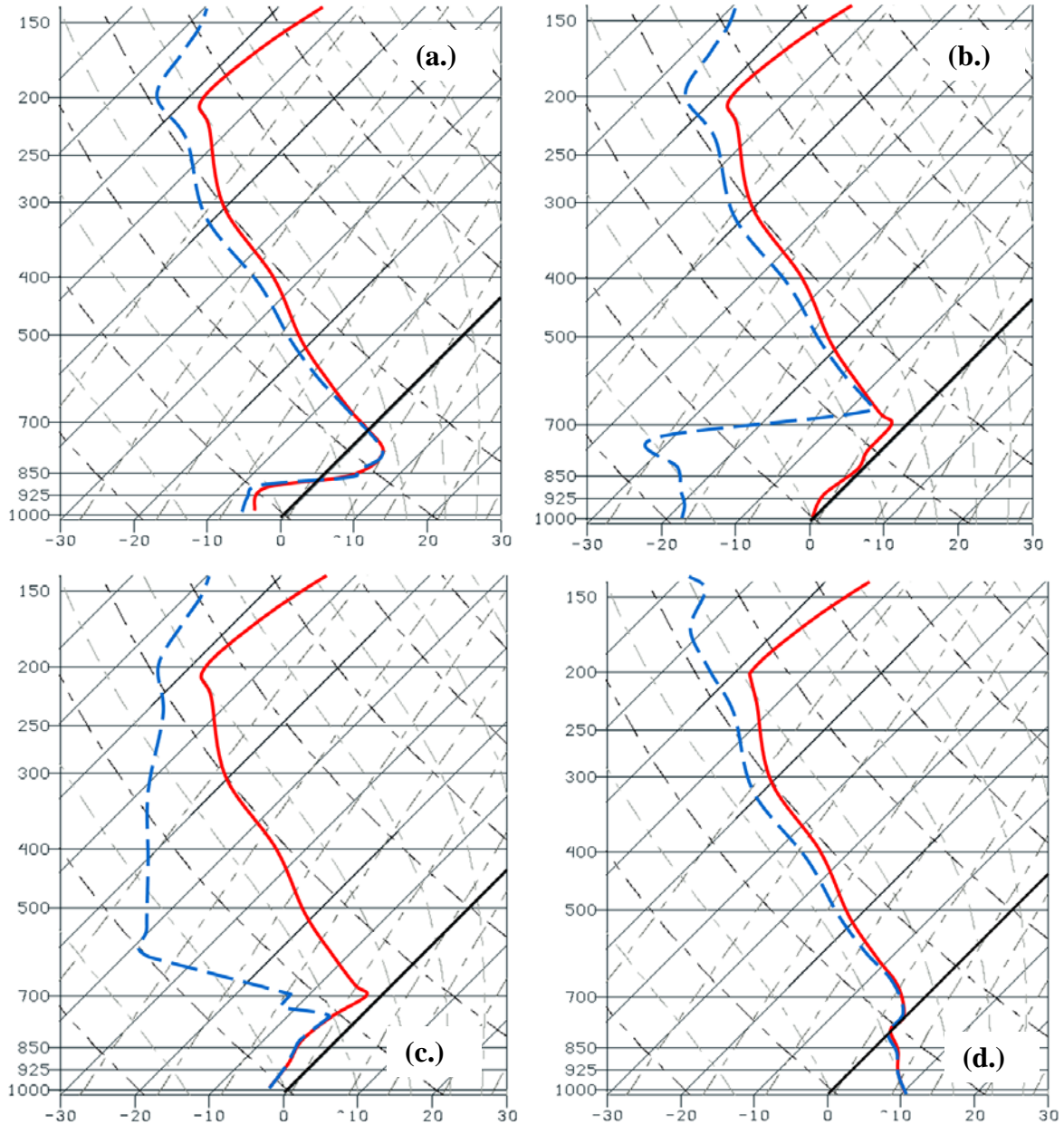
5.) Match the skew-T log-p diagrams on the following page (a-d) to the following situations.

Heavy rain is falling at the surface.

Heavy ice pellets are falling at the surface.

Snow is falling aloft, but is sublimating before reaching the surface.

Freezing drizzle is falling at the surface.



___ 6.) For profile d.) above, which best explains how *phase changes of water* would be affecting the temperature profile?

- a.) Freezing at the surface releases latent heat, which is why the surface is warm.
- b.) Melting of falling snow is likely resulting in cooling around the freezing level.
- c.) Melting and re-freezing cancel each other out in this sounding, giving no net effect.
- d.) Condensation and deposition would tend to cancel each other, giving no net effect.