

3.) The January 2010 winter storm resulted in significant accumulations of ice and snow in central NC (Figs. 3.a, 3b). Soil temperatures were above freezing during this event (Fig. 3.c), and were significantly above freezing in southern NC. An overlay of the radar mosaic with the RUC-analyzed sea level pressure (Fig. 3d) demonstrates that a strong CAD event was underway (12Z 30th).

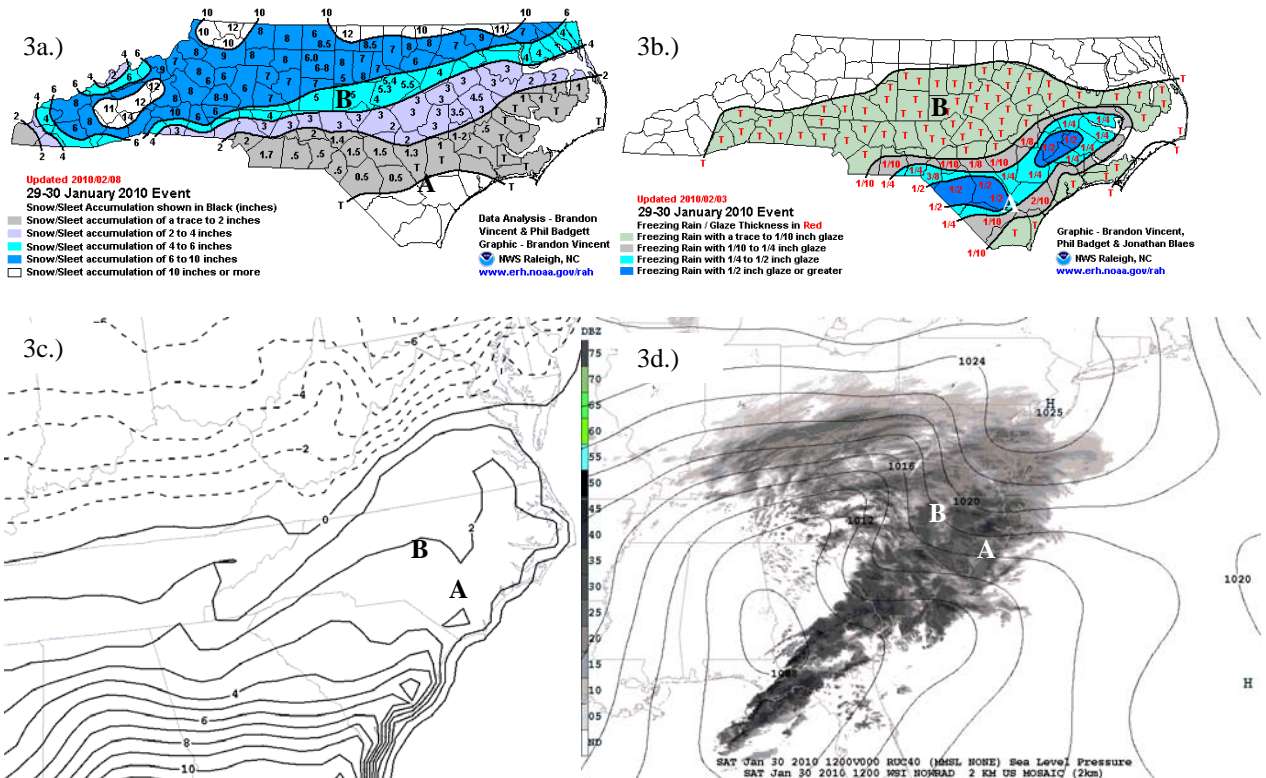


Fig. 3. (a) NWS spotter summary for snowfall (inches, shaded), and (b) ice accretion (inches, shaded). (c) shows NAM-analyzed soil temperature for the 0-10 cm soil layer ($^{\circ}\text{C}$), and (d) shows radar mosaic (shaded) and RUC-analyzed sea level pressure (contour interval 2 hPa) for 12 UTC 30 January 2010.

___ a.) Which of the following most likely summarizes the role of *soil temperature* during this event at the point marked “A” in southeastern NC in the figure above?

- (i) The cold soil temperatures would have prolonged the icing event by absorbing some of the heat released by the freezing rain.
- (ii) The snow cover in this area, which fell before freezing rain began, effectively insulated the cold air from the warm soil, so it did not play a role.
- (iii) The above-freezing soil temperature would have favored ice accretion on grassy surfaces, elevated roadways, trees, and powerlines.

___ b.) Which of the choices above would be most appropriate for location “B” in Fig. 3?

4.) Briefly explain why freezing rain is a “self-limiting processes”.

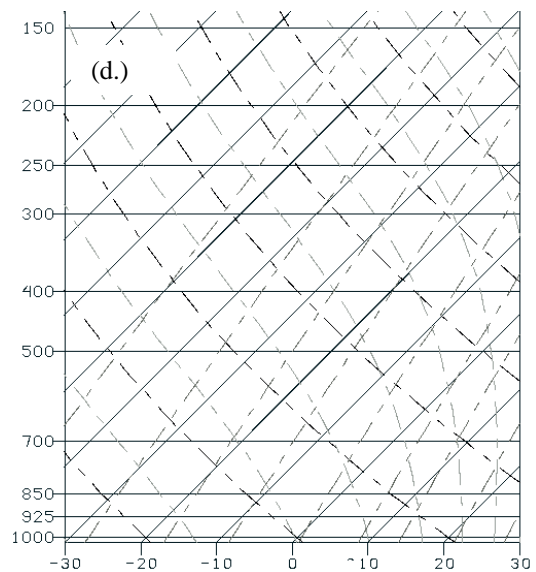
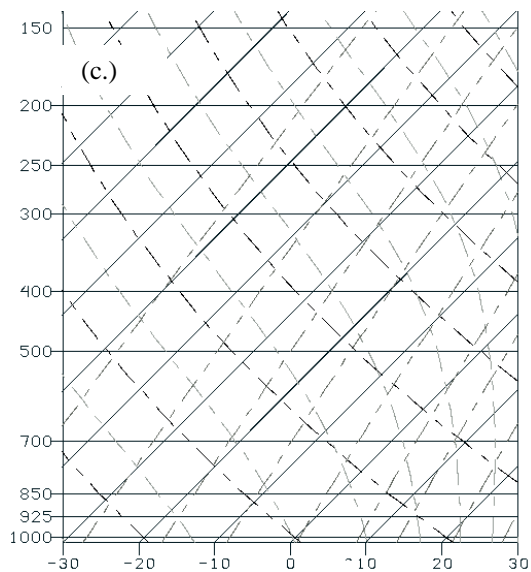
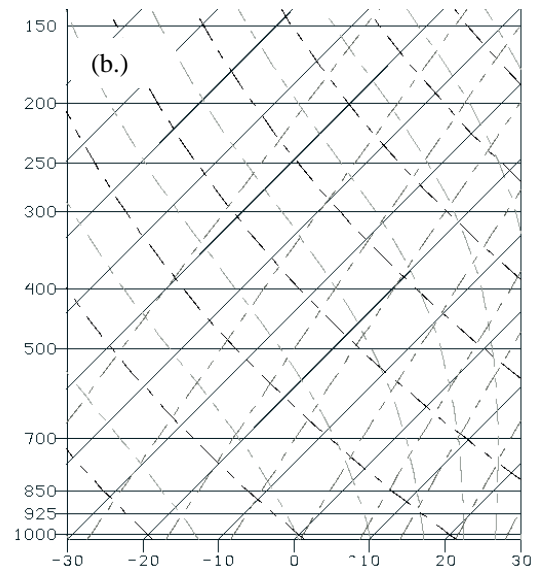
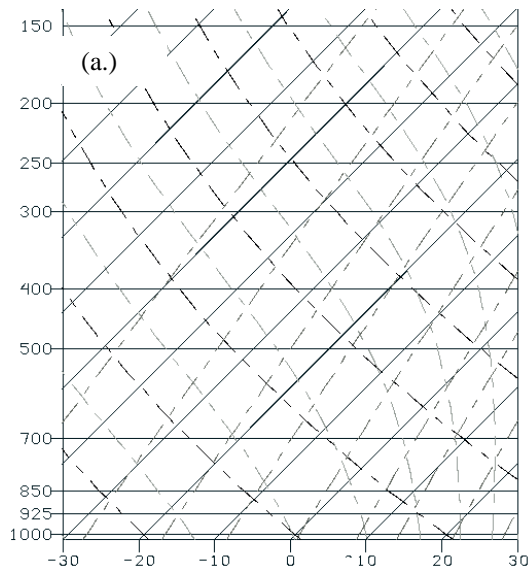
5.) Use the blank skew-T log-p diagrams below to sketch soundings that correspond to the following situations. For each, sketch T, T_d , and a plausible wind profile to the right.

(a.) Heavy rain is falling at the surface, with a *deep mixed-phase cloud* extending to the tropopause, which is near the 200-mb level. The freezing level is near 850 mb.

(b.) Heavy ice pellets are falling, with a classical CAD event underway.

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

(d.) Freezing drizzle is falling, with surface temperatures near -3°C .



- 6.) True/False regarding *convective precipitation* generated in a model such as the NAM.
- a.) The model forecast sounding must be saturated (with respect to ice or water) before convective precipitation can be generated by the model.
 - b.) Model convective precipitation requires some degree of instability before it is triggered.
 - c.) Even though it is representing smaller-scale convection that is not resolved by the model, the convective precipitation is spread evenly over each model grid cell.
 - d.) Forecasters should interpret model convective and non-convective precipitation in the same way.

7.) Which of the following mechanisms typically contribute to the development of coastal fronts? Check all that apply.

- a.) Confluence
- b.) Shearing
- c.) Differential diabatic heating
- d.) Tilting

8.) On the blank map below, sketch a hypothetical but representative synoptic pattern that would be characterized by a well-developed coastal front. Include sea-level isobars, some isotherms, some wind barbs, and an indication of the location of the coastal front with correct symbols and notation.

