General chart-analysis conventions (based on training from Steve Weiss):
Remember to use pencils / colored pencils.

925 mb
(a) Identify low-level moisture that does not reach the 850-mb level.
(b) Temperature at 2-°C interval (red except 0 °C isotherm blue).
(c) Dewpoint at 2-°C interval starting at 10 °C (green).
(d) Geopotential height 30-m interval (black).
(e) Fronts, troughs, dry lines optional but encouraged.
(f) Surface is below ground over western U.S.

850 mb
(a) Temperature at 2-°C interval (red except 0 °C isotherm blue).
(b) Dewpoint at 2-°C interval starting at 8 °C (green).
(c) Geopotential height 30-m interval (black).
(d) Fronts, troughs, dry lines optional but encouraged.
(e) Wind maxima, thermal ridges, moisture axes, convergence lines.
(f) Surface is below ground over parts of western U.S.

700 mb
(a) Temperature at 2-°C interval (red except 0-°C isotherm blue).
(b) Dewpoint at 2-°C interval starting at 0 °C warm season and -4 °C cool season (green).
(c) Geopotential height 30-m interval (black).
(d) Trough lines optional but encouraged.
(e) Wind maxima, thermal ridges, moisture axes, dry intrusions, and thermal advection zones.

500 mb

(a) Temperature at 2-°C interval (red).

(b) Geopotential height 60-m interval (black) – may use 30-m interval in warm season to accentuate flow pattern and subtle features when gradients are weak.

(c) 12-hr height changes at 30-m intervals (falls blue and rises orange or red).

(d) Lows, shortwave troughs, cold cores/thermal troughs, jet steaks, difluent zones are important.

(e) Mid-level moisture (defined as T/Td spread < 5 °C) optional.

250 mb

(a) Height and temperature analysis optional.

(b) Temperature at 2-°C interval (red).

(c) Primary interest in identification of jet streams, wind maxima, isotach gradients, and difluent zones.

(d) Isotach analysis threshold seasonally dependent – isotach interval of 20 kt with warm-season threshold of 50 kt and cool season threshold of 70-90 kt.

Surface

(a) Look for *synoptic-scale fronts* (cold front, warm front, quasi-stationary front), *mesoscale fronts* (sea/lake/river breeze fronts, convective outflow boundaries, differential heating boundaries owing to cloud edges / difference in vegetation / terrain), *drylines* (moisture boundaries), *pressure-trough lines* (other non-thermal boundaries such as pre-frontal troughs and orographically induced lee troughs), and *convergence zones* (includes orographically induced features such as the Denver convergence zone and Puget Sound convergence zone).

(b) For detecting thermal / moisture gradients, subjectively analyze isotherms / isodrosotherms at 4-°C intervals. Indicate satellite- / radar-derived boundaries on the chart. Apply conceptual models of fronts and outflow boundaries when analyzing temperature, dewpoint, and pressure fields. Use objective analysis output for temperature, dewpoint, potential temperature, and equivalent potential temperature for identifying gradients associated with boundaries.

(c) After completion of the thermal/moisture analysis, use pressure / wind data to complete the mesoanalysis. The surface pressure pattern often helps confirm the presence of some boundaries, which are often located in pressure troughs. Wind shifts are typically associated with boundaries; but, in unidirectional flow, a decrease in speeds may be associated with a convergence zone. Streamline analysis can help focus areas of convergence. Short-term surface pressure tendencies (1-3-hour intervals) may help identify locations of boundaries (and contain important implications for thermal advection / divergence aloft).

(d) 1-3-hourly pressure changes help identify mesolow / mesohigh couplets and boundaries. Concentrated fall / rise couplet may enhance low-level convergence / shear by backing surface winds (enhancing tornado threat). Clouds associated with surface-pressure falls may be lined to a dynamical feature aloft. Pressure tendencies have implications for thermal advection. Strong rise / fall couplets may indicate severe wind threat in marginal CAPE environments.