Your Guide to Constructing a Weather Briefing

A forecast discussion has six fundamental components (Bosart 2003)...

1. What happened?
2. Why did it happen?
3. What is happening?
4. Why is it happening?
5. What is going to happen?
6. Why is it going to happen?

Many people focus only on number 5, and do so only from the perspective of numerical model forecasts. Far too often, a forecaster picks a *model du jour* ("it just seemed like it had a better handle on things") and then presents only this model forecast! That's not a rigorous forecast process, and it is especially harmful when it comes to convective and mesoscale meteorology (where the devil is in the details). A "5–only" approach eliminates any insight that could be gained from the events leading up to the present, and fails to teach us about the physical processes that are key to the day's forecast. A complete briefing must touch on all six categories above. We are seeking *understanding*, so we will especially emphasize items 2, 4, and 6. Our focus is on the phenomena and processes, and their governing dynamical principles.

If you make a handwavy claim, expect to be asked to explain and justify it. This is not a class about memorizing rules of thumb: it is a class about *understanding physical processes*. The true meteorologist is a scientist, not a look–up table. Along with the above, be wary of "map room lingo", because it sometimes short–circuits the thoughtful application of concepts: say what you mean, and make sure you understand what you're saying.

The forecast funnel

We begin at the largest scales (i.e. hemispheric), and progress down through the synoptic scale, mesoscale, and convective scale. It is insufficient to immediately jump to the convective scale, especially when looking forward in time. Many mesoscale details are slaved to synoptic scale processes. If you haven't looked for those synoptic scale processes, how will you know whether things are evolving/progged to evolve in a consistent way? It is also insufficient to stop at the synoptic scale without considering mesoscale and convective scale developments. What could complicate the forecast? Lake effects? Convection? Slope flows? Cold air damming? On all scales, the emphasis should be on identifying and explaining the key forecast problems, while excluding irrelevant or marginally relevant information.

Short–term forecasting (nowcasting) must be obs–centric

Especially when it comes to convective forecasting, we are often looking out hours, not days. The atmosphere has a fair amount of memory on these time scales. Old boundaries, mesoscale vortices, precipitation systems, and cloud decks do not disappear instantaneously, and models often exclude them from their initial conditions (do you understand why?). A human who is aware of the observations can synthesize them into a 4D conceptual model of the atmosphere and pick up on many important cues that are missing or misrepresented in the models. Especially for the purposes of convection forecasting, models do not forecast mixed layer thermodynamic properties particularly well. As well, cloudiness that is readily apparent to the human observer may be poorly represented in models, and make substantial differences to surface temperatures

and dewpoints. Convective initiation in most operational models is also often counter–intuitive because it is parameterized. A thoughtful use of observations is the key to rising above these model limitations.

Try this approach

What has happened?

· Last 5 days' 500 mb heights and surface analyses
· Last 24 hours' water vapor, infrared, and radar imagery

What is happening?

· Current heights and winds at jet level
· Current heights, winds, vorticity, and temperature at 500 mb
· Current heights, winds, temperatures, and RH at 700 and 850 mb
· Current surface T, Td, MSLP, and winds
· Last 3–6 hours' water vapor, infrared, visible, and radar imagery (encore)
· Observed soundings within and upstream from areas of interest

After viewing the above, construct a brief narrative (mentally or in writing) of what you expect to happen: identify regions of CVA/NVA and WAA/CAA... pattern evolution, regions of ascent and descent, tendencies in surface cyclones/anticyclones based upon QG theory; identify regions of enhanced moisture/RH (think vertically as well as horizontally)... likely cloudiness, likely conditional instability, likely precipitation; identify regions possessing ingredients needed for mesoscale/convective weather.

ONLY NOW is it time to begin looking at the model forecasts!

What will happen?

· General survey of GFS, NAM, and RUC 500mb and surface forecasts
· Assess credibility given analysis of past and present weather
· Find consistencies and inconsistencies among models and assess them
· Use the forecast funnel