

From: "Bosart, Lance F" <lbosart@albany.edu>
Subject: Re: Post-blizzard navel gazing Take 3: On the use of forecast scenarios to communicate uncertainty
Date: 28 January, 2015 at 13:51:51 GMT
To: "James Correia, Jr" <jimmyc42@GMAIL.COM>
Cc: "MAP@LISTSERV.ALBANY.EDU" <MAP@LISTSERV.ALBANY.EDU>, "Bosart, Lance F" <lbosart@albany.edu>

Hi Jimmy, Anton, all

Excellent points, Jimmy.....and thanks for posting Greg's violin plot for LGA. I have always said that forecasts should come with "strings" attached, but until now I had never seen a real world example!

I also liked Anton's perspective on cluster forecasts because it provides another way to visualize the dangers of using the ensemble mean sight unseen in such situations.

And now for a philosophical question. Where does meteorology end and politics begin in bad weather situations? As recent low-amount snow disasters in Atlanta (and elsewhere) have taught us, the politicians would want to be held blameless for making decisions to close or not to close (fill in the blank) in bad weather situations because no matter what decision they make they will be roundly criticized (and possibly unelected in the next election) by the citizenry. If they opt for better safe than sorry and nothing happens they will be criticized roundly for running a "nanny state" and being wimps. If they opt for business as usual and a crippling storm occurs they will be criticized brutally for being clueless and incompetent. It's a no win situation. I don't know what the answer is, but it is not the responsibility of the meteorologists to make decisions that elected leaders should make. It is the responsibility of meteorologists, however, to communicate better what we know and don't know, and the overall uncertainty involved. The discussion in various threads on the map listserv before, during, and after the recent storm has identified numerous ways that we can digest, synthesize, and communicate information needed by politicians and decision makers to make decisions.

Lance

On 28 Jan, 2015, at 03:38, James Correia, Jr <jimmyc42@GMAIL.COM> wrote:

Great points Anton.

We are odds with ourselves using probabilistic products but dont address scenarios in our text versions of those products. This goes back to Roebber et al. (2004) who wrote eloquently about the notion of scientific forecasting. Identifying the scenarios, in some way exemplified by the forecast sensitivity discussions and examples by Colle and many many others, suggest we can get to some understanding quickly and thus use them to anchor the communication (in products and in communication strategies).

Its not always easy to express the true expert judgments of the forecasters in some products. Even in probabilistic forecasts the SPC has to make judgment calls on an event. Its capped (high probability of non-occurrence) but IF it breaks we could have a 10% tor probability. What do you depict graphically? Its a judgment that is left off the graphic and described

probabilistically as something less than 10%. Its not easy to create a product with that level of nuance. But it is totally worthwhile to improve our communication tactics.

In the end our probabilistic products are only worth using if we can assess their reliability, and skill. We CANT do that with one month parallel testing runs. Now that we have the Cliff's supercomputer upgrade, we have room to run. Lets talk strategy about that while we continue playing in physics no-mans land.

I am attaching the violin plot I made from the SREF (with NAM) for LGA derived from Greg Carbins' SREF Plumes web page at SPC. I wouldnt use the ensemble mean in any of these distributions! But it does emphasize a point about how many scenarios are present - tri modal distributions == 3 scenarios.

The other issue I spotted by looking at these distributions, illustrated in the "parallel coordinate" plot, is the ARW (red) members totally changed their tune and went from among the highest to the lowest snowfall producing members.

Thanks for reading.

On Tue, Jan 27, 2015 at 9:04 PM, Anton Seimon <anton.seimon@gmail.com> wrote:
Hi Neil, MAP and all,

Thanks to all for many excellent postings today. I have a slightly different take on communicating uncertainty in forecasts for high-impact storm events. Since I first began using email I have been sending out bulletins to an ever increasing group of non-meteorologist storm enthusiasts when major events threaten the New York City region.

Over time, my communication strategies have evolved; meanwhile, the revolutionary improvements in modeling skill and resolution have come to provide a now-overwhelming quantity of numerical guidance.

The strategy I have come to employ is to present forecast uncertainty in readily understandable scenarios. I then offer odds of each scenario's relative likelihood based on my subjective assessment, which blends guidance from operational models, insights I might gain from postings to MAP and various other sources, and past experience from several decades of tracking synoptic weather systems on a daily basis. To offer an example from the departing blizzard, here is how I presented my outlook to my New York City-area readers at about T-24 hours:

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Here is how things look to me as of Sunday night. I recognize three basic scenarios for the New York metropolitan region that differ only slightly meteorologically, but enormously in outcomes.

Scenario A: The most extreme scenario, which interestingly enough is now fully embraced by the Weather Service, and calls for 2 feet or more of snow to blanket the area, and pile much higher in enormous drifts, before the storms exits on Tuesday night. For this to occur, we would need a near perfect balance of storm intensification and placement of the track, allowing bands of heavy snow to pivot into our area from the southeast for hours on end

from late Monday night through Tuesday afternoon.

Scenario B: A high-end but somewhat less extreme scenario, whereby the storm center intensifies so much that it hooks westward, drawing a corridor of dry air all the way around the north side of the cyclone, which would end heavy snowfall prematurely and divert the intense snow bands to north-south oriented axis situated west of our area. This is not shown by any model guidance I have seen, but I think it should be included among possible outcomes since this has been an important factor robbing us of large snowfall in a few storms over the past several decades.

Scenario C: A much more moderate snowfall scenario, such as outlined last night in the NAM model's output. This model has since vacillated in its successive runs, wavering between giving us very large and quite moderate snow totals. The latest run from this evening is actually quite similar to last night's pessimistic forecast, shunting the heavy snow axis well to our east across New England, with totals mostly in the 6-inch range for the NYC metro region.

I give 40% odds for Scenario A to verify, 20% to Scenario B and 40% to Scenario C. So, an even split for a high-end 2-foot plus blizzard and the near-miss not-quite-blizzard.

Given that such uncertainty remains, I suggest that snow lovers be guarded in their expectations while hoping for the best. We could easily end up with a fine snowfall yet a deep sense of disappointment over what could have been....

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Then as the storm was getting underway on Monday afternoon, I updated these numbers as follows: a 70% likelihood for Scenario A, 10% for B and 20% for C.

This turns out to have been a poor choice, of course, since Scenario C, the near-miss, was the one that ultimately verified in New York. However, I was at least able to communicate the continued uncertainty even as the snowfall was getting underway.

My positive experience with this approach leads me to wonder: Could scenario building possibly serve as a practical communication strategy for potentially high-impact events in an operational forecast setting? Where I find an advantage over purely probabilistic forecasting is the intermediate step of translating hugely complex information into distinct outcomes presented in common language, and only then weighting each scenario with percentages. No doubt such methods are already employed in various quarters, including by some people on MAP. And as with other ideas posted today, some degree of enculturation of users is required, but I suspect that the general public and decision makers alike would quickly come up to speed if this approach became common practice.

Anton