SWCT/NY Weather

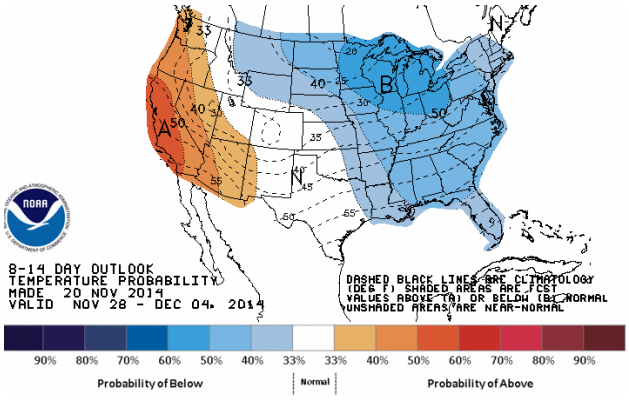
Connecticut and New York Regional Weather Updates from Jacob Meisel

Evidence of an Early December Weather Pattern Digression Lessening Heat and Natural Gas Demand

- Jacob Meisel

Natural gas prices have been especially volatile in the last few weeks. This can mainly be attributed to the wild fluctuations in temperatures that we have seen; in New England we will have gone from testing record lows to testing record highs in one week before falling back below average. This volatility leaves the potential to profit if you can accurately forecast the next large swing. What I look to do here is set out the case for a short-term swing in the natural gas market based on some recent trends I have been observing in our atmospheric weather models. Since early this week I have been advising my clients on **swctweather.com** that short is better than long in the current natural gas market for any short-term traders, and with the recent spike I believe that natural gas could be a good short opportunity going into the weekend and potentially through the next couple of weeks.

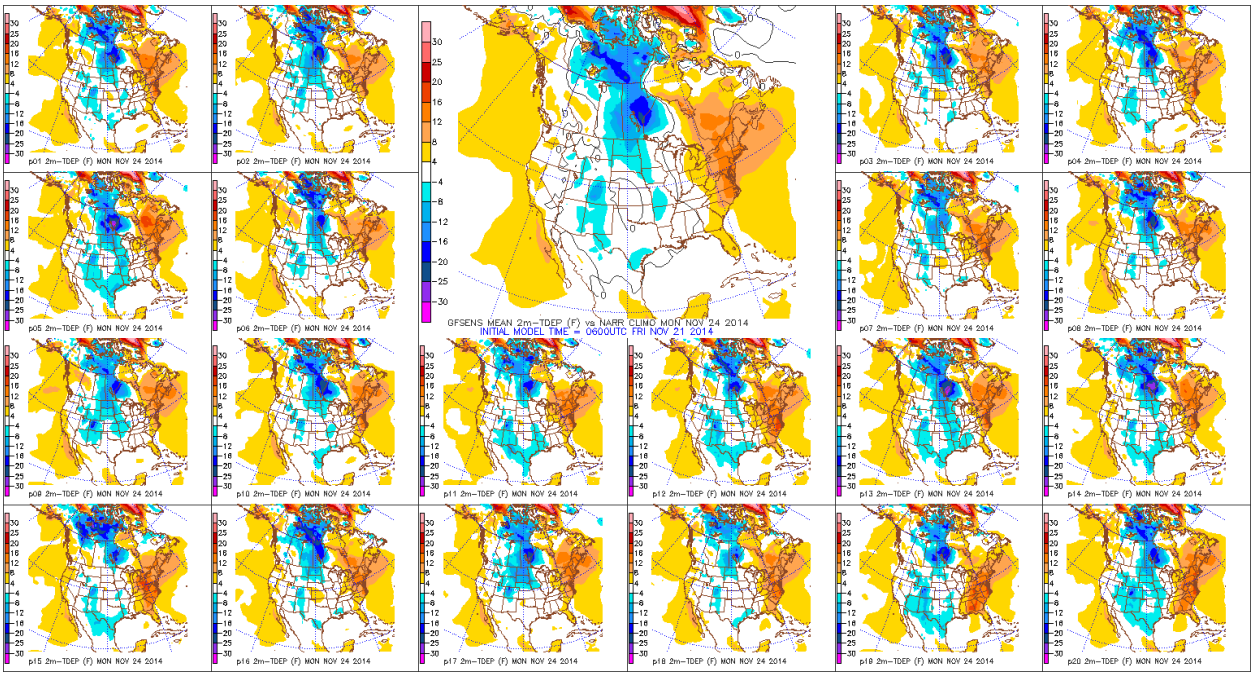
First, the history: In late October to early November, most of our computer weather models completely flipped from showing a mild November to showing one fairly significantly below average. The natural gas market reacted by swinging upwards over 30%, which was likely warranted due to the extent of the cold that we have seen thus far. The sell-off in mid November showed that without sustained below-average temperatures forecast, natural gas prices would revert back to close to $4/mmbtu. Then in the past week, prices have spiked on worries that December would be just as cold as November. If you look at the 8-14 day forecast from the Climate Prediction Center (map at right) that seems to be a convincing case to base a short-term trade on. Plus, as we saw last year during the infamous "polar vortex," natural gas prices can spike beyond what anyone may expect when speculators see cold in the future.



Source: NOAA

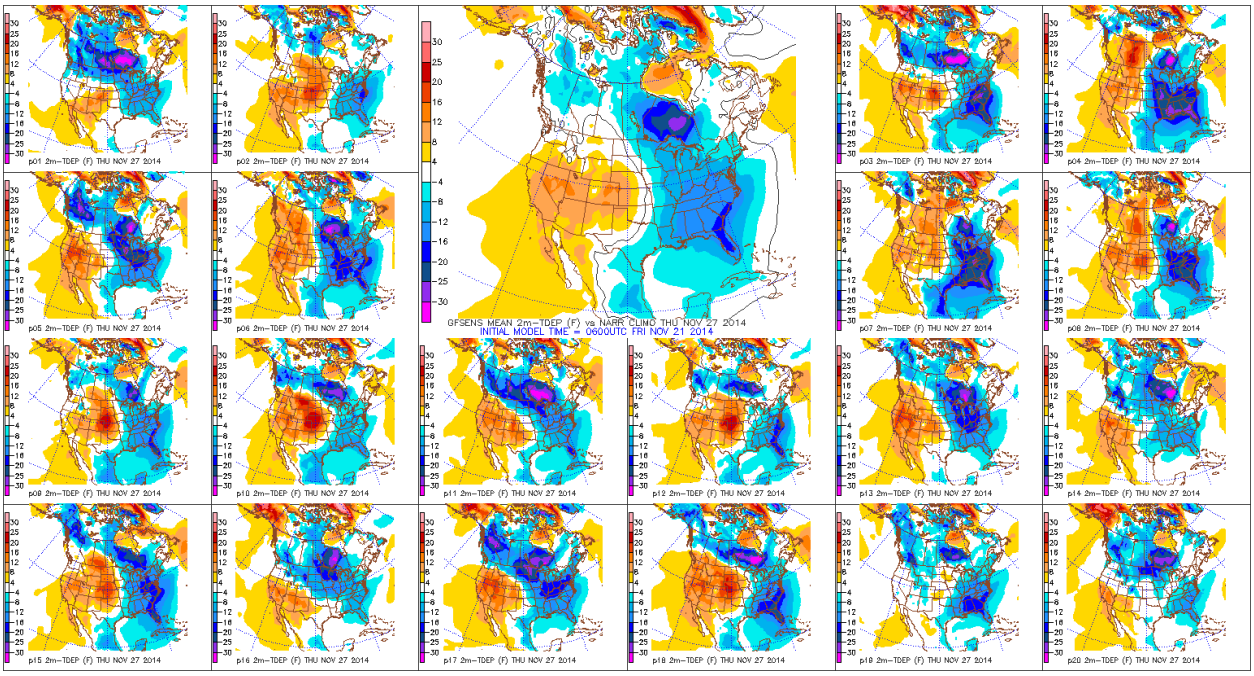
However, we are seeing evidence that weather models may be backing off some of the extreme cold. All week our models have shown the cold easing into December, then yesterday a couple came out with an individual run showing extreme cold, bolstering the entire natural gas market late yesterday. Today, those models have again all backed off, and that is due to a number of medium-range pattern indicators I want to go through here that indicate a change from the cold pattern that dominated November. First, though, I want to emphasize that we should not discount the warmth coming next week. The image below is the 6z run of the GEFS ensemble weather model, with the larger image an average of all the individual ensemble weather models.

This is a simple surface temperature anomaly map, and as can be seen, a large swatch of the east coast will be way above average next Monday (11/24), with a decent amount of that area being 12-16 degrees above average. This is a very significant swing from the cold that we have observed this week.



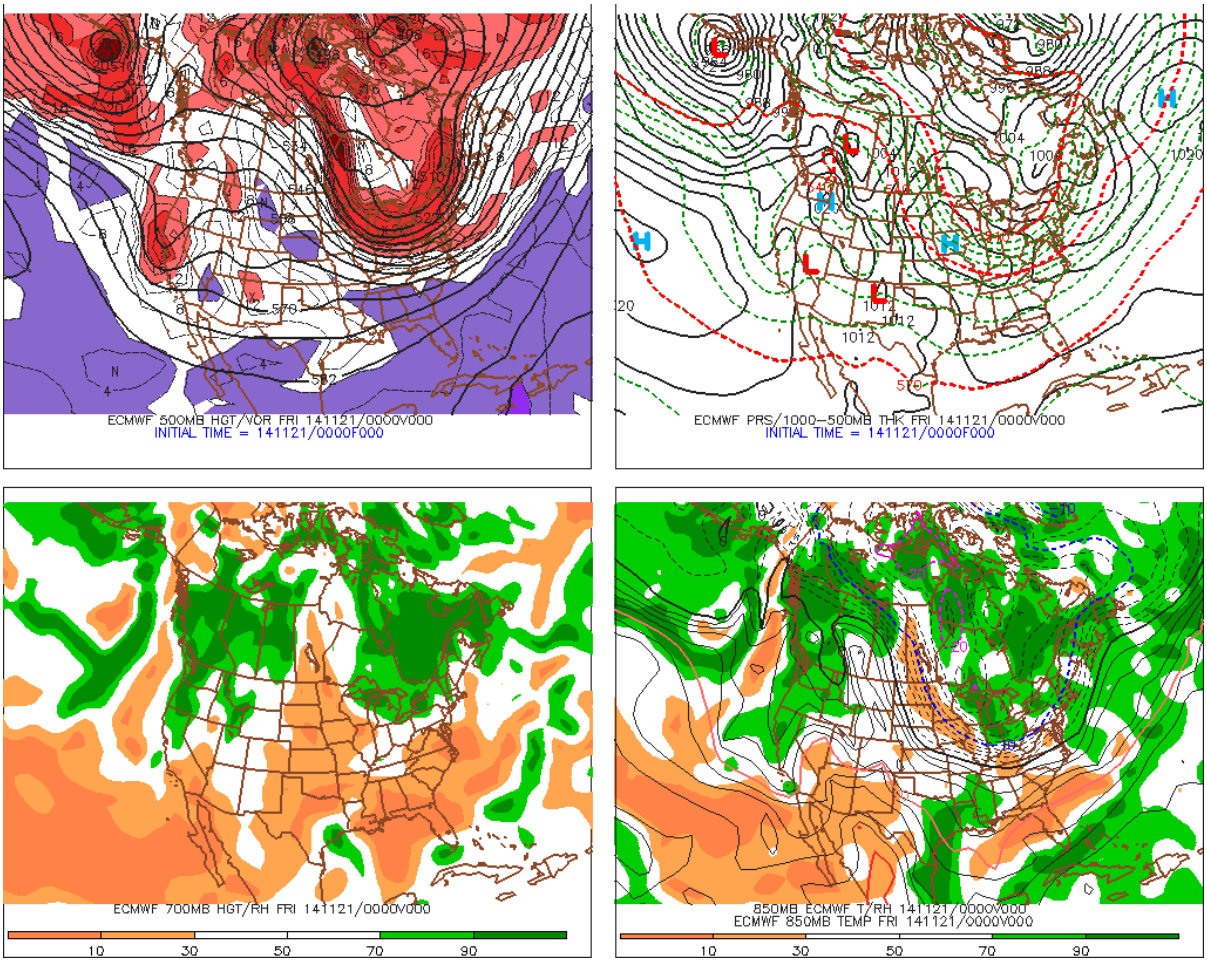
Source: PSU.edu

Tuesday into Wednesday this warmth gets displaced, and by Thursday and Friday we see images like the one below. Though the Northeast is spared most of the cold, the Southeast is seeing temperatures up to 20 degrees below average for this time of year around and right after Thanksgiving. It is this cold snap that has spiked the natural gas market the second time around, and has many speculators wondering where the peak is if the cold continues. I even read an article today saying prices could get to $5, $6, or $7 if cold like this continues. Sadly for those long, there is increasing evidence that, at least in the short term, this cold will not be continuing.



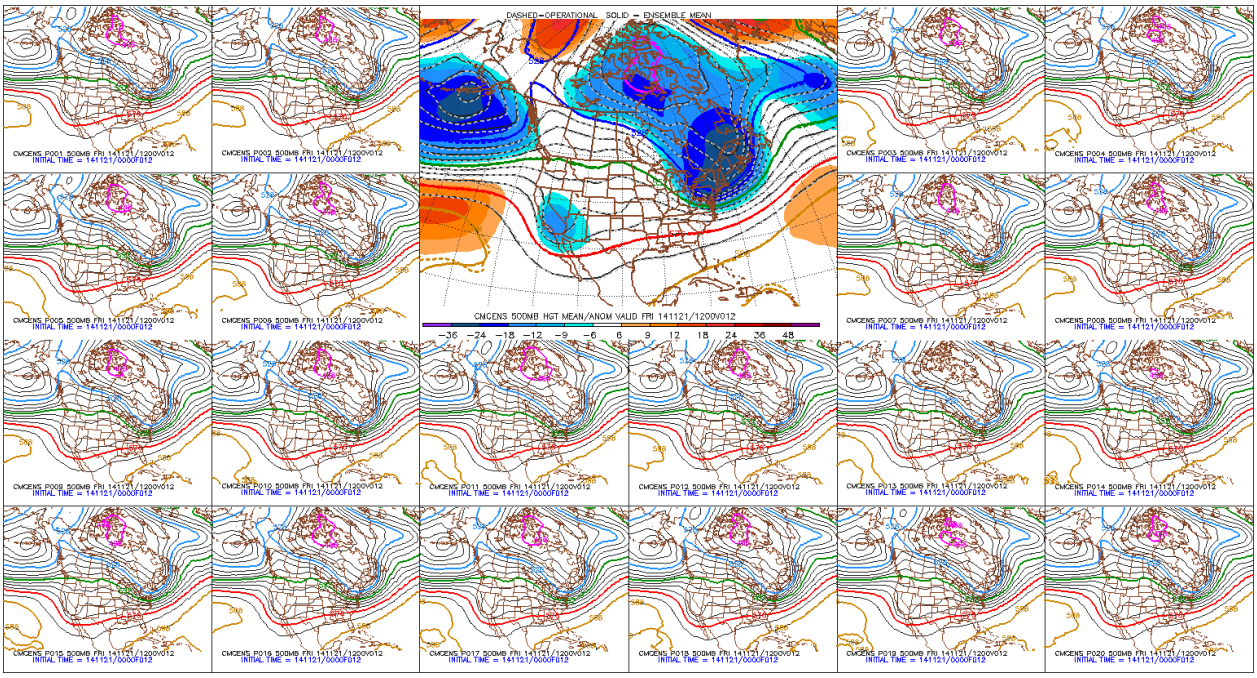
Source: PSU.edu

The GEFS ensemble weather model shows that by December 2nd or 3rd the below average temperatures that were dominating the region will move out. And yet, of the ensemble weather models (an ensemble is the same weather model run up to 20-30 times under slightly different conditions to account for various variables in the atmospheres), the GEFS are some of the coldest in the longer runs. In order to properly forecast the longer-term patterns in the atmosphere, we have to go much further up, to 500mb (around 18,000 feet), where most of the pattern drivers are. The image below was the initialization for the 0z ECMWF last night (0z stands for 7 PM, being on GMT means we subtract 5 hours from model initialization), meaning that we are looking at the weather at 7 PM last night. On the top left frame, you see a defined "U" shape over the eastern United States, which is called an "upper level trough." It is this U shape that, effectively, allows colder air to funnel down, and it stems down from the "polar vortex" which is the circle at the top of that top left frame. This is a very cold pattern, and can explain why we are seeing this cold.



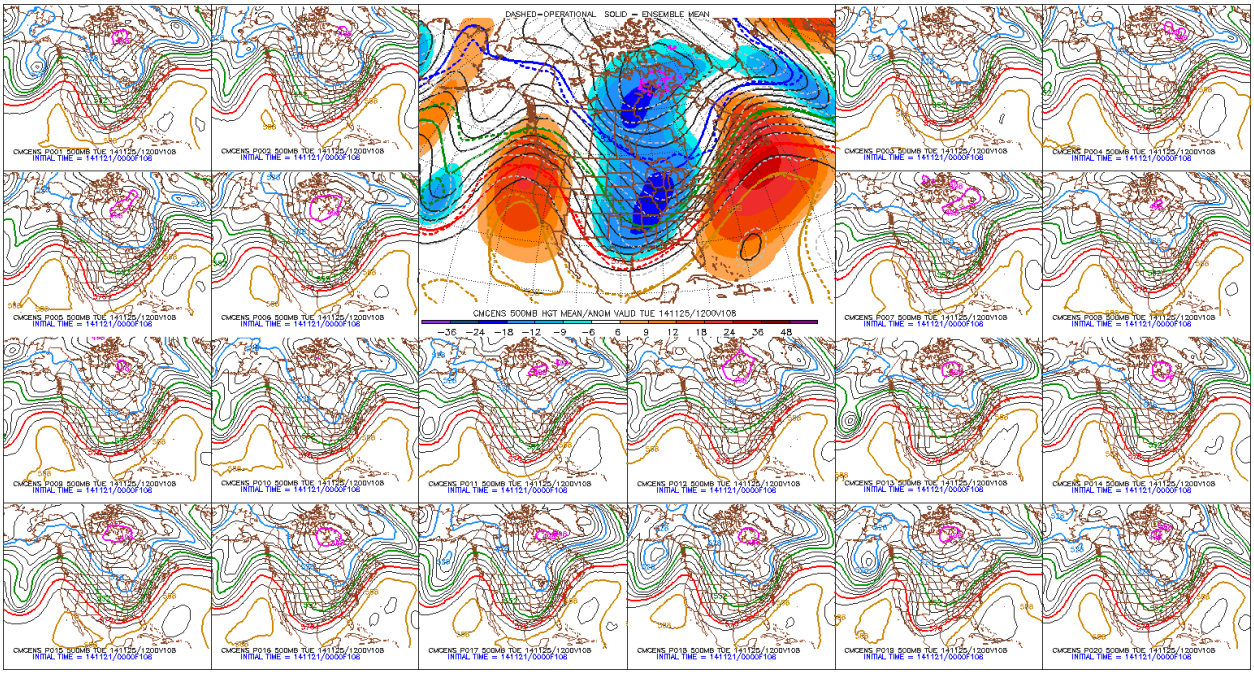
Source: PSU.edu

So what is changing? First, I want to go through the 500mb pattern in the atmosphere through the next 15 days. I also want to detail the latest run of the Canadian weather model and its ensembles, a model that gets less publicity than many others but has proven itself fairly accurate in wintertime (when properly understood). Below is an image of this morning, and be sure to focus on the big panel with the orange/blue shading. What you see is a significant amount of blue over the east coast, bringing in the cold. What is also important, however, is the blur just south of Alaska, which signals that there is a larger upper level low pressure center moving into that region. I'll explain momentarily why that's important.



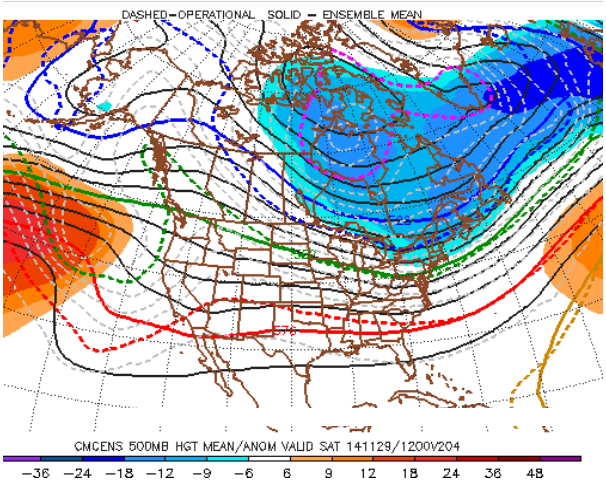
Source: PSU.edu

The next model run I want to show is this image for Tuesday, November 25th. Here, we see orange in the west (what is called an upper level ridge, allowing warm air to get pumped up north) with a trough in the middle of the country and swinging east, and another ridge out over the Atlantic. That ridge to our east will be sitting over the region on Monday, which is why the east will have such warm temperatures then. This is a perfect setup for a brief cold snap, with cold moving across the country, and a ridge in the west to support that cold by pumping warm air up north into western Canada and allowing a transport for cold air from Canada to the east. Also of importance, though, is that "U" shape very weak trough we see just south of Alaska. That is a large signal that this is not a long-term cold snap, as you would want additional ridging up in that region to show that cold would be sustained. Instead, without that there, and with a large trough in the middle of the US, this could be a signal for a strong storm along the east coast briefly bringing in cold air before milder weather returns. Now let's play this model out.



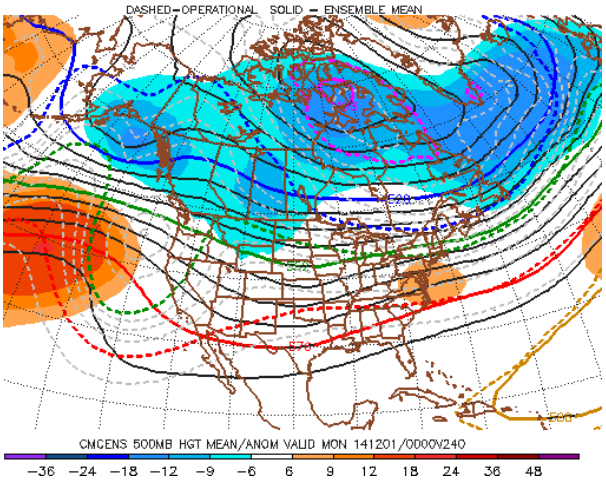
Source: PSU.edu

This image of Saturday November 29th (top right), shows a weak trough bringing just below average temperatures to the east coast. And then by December 1st (second chart), we begin to see the second image appear. This is almost a textbook setup for warming all along the east coast. You can see the blue up in Alaska indicating an upper level trough, which as I explained earlier makes it harder for sustained cold in the eastern US. And we see the orange in the Mid Atlantic, indicating the formation of a ridge in that area, allowing warm air to ride up.



Source: PSU.edu

Two days later (12/3), the trough is still in Canada, and that ridge is still of the east coast, as seen in the lower left chart. Then by December 7th, the model has the ridge covering the entire eastern US, as seen in the chart at the bottom right. Essentially, this ensemble mean (note this is not one model but a mean of a large number) shows a reversal around December 1st that would then lead to warmer weather along the east coast.



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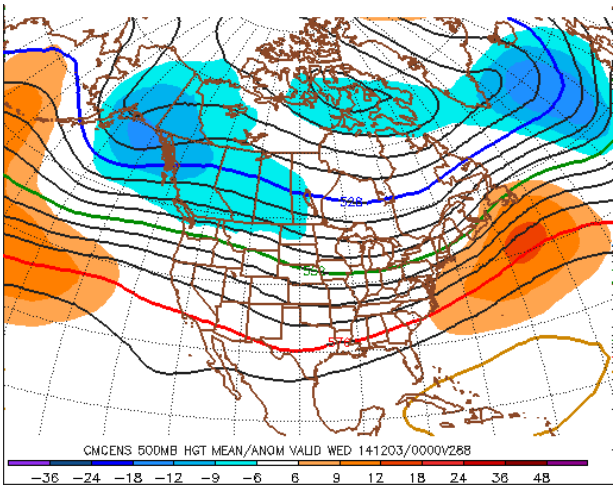

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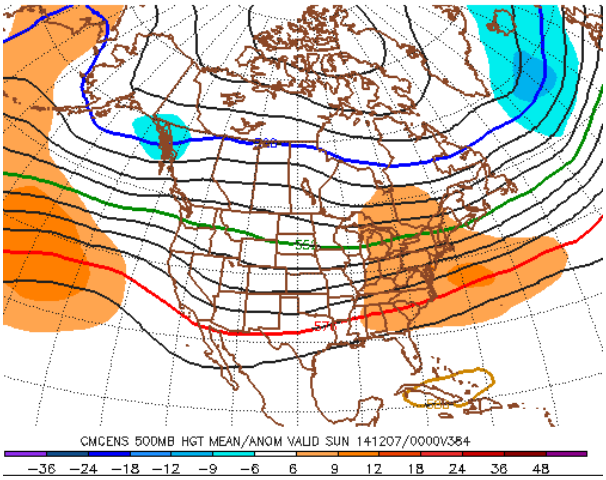
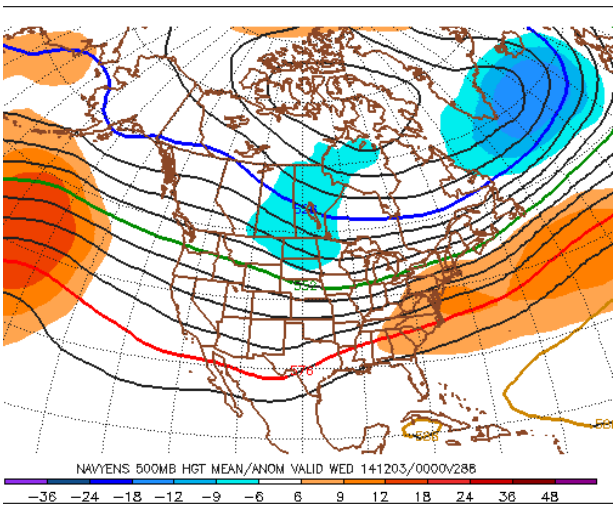


Source: PSU.edu

Other weather models show the same thing. One of our lesser used American models, the NAVGEM, shows the exact same thing. On its latest run in the map to the right, you can see the eastern ridge on December 3rd. And the most famous weather model, the Global Forecasting System (GFS) ensembles, in the second map to the right, shows a similar weak ridge on December 3rd. Note that they all have that trough up in Alaska preventing colder weather from being transported directly into the eastern US. Though I cannot show the European weather model's ensembles here for copyright reasons, rest assured that it shows a similar pattern, and in my belief is one of the most accurate models that we have out there. Thus, we see this stark agreement that around December 1st, and likely by December 3rd, we will see yet another mild stretch, and there is not a cold signal that has established in our long-range guidance at this time. This should significantly help to exert downward pressure on the natural gas market, especially as this trend is likely to become clear over the weekend. By Monday we will likely begin to see traders begin to get worried about just how long we can expect cold like we've seen this month to stick around.



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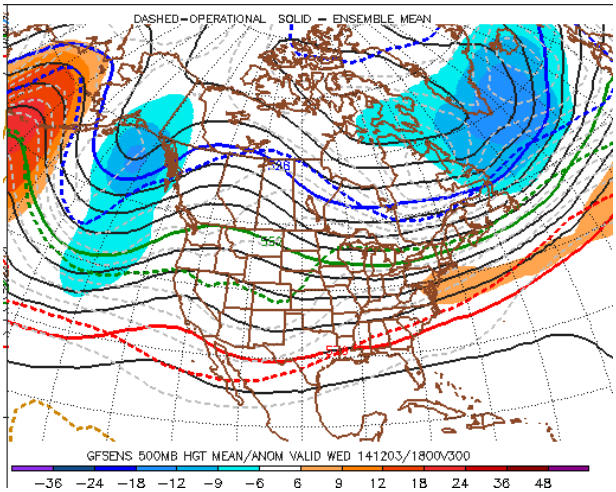
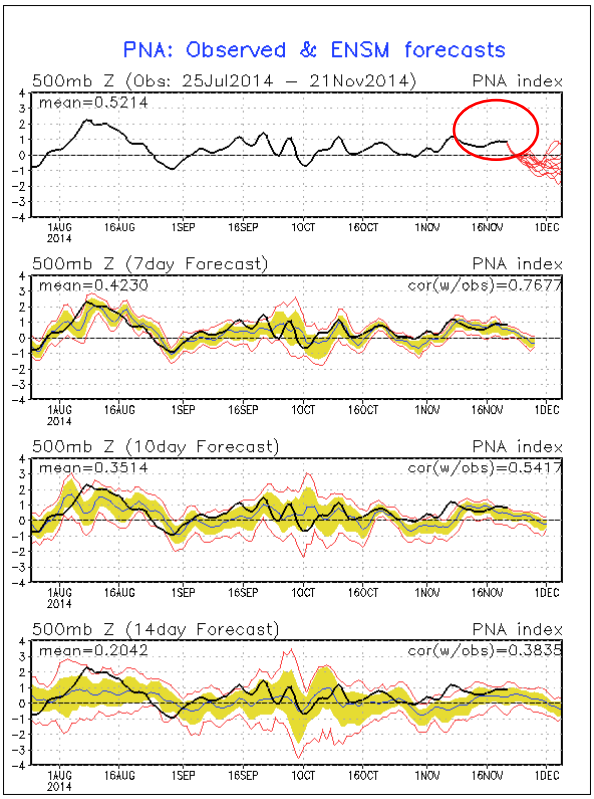


Source: PSU.edu

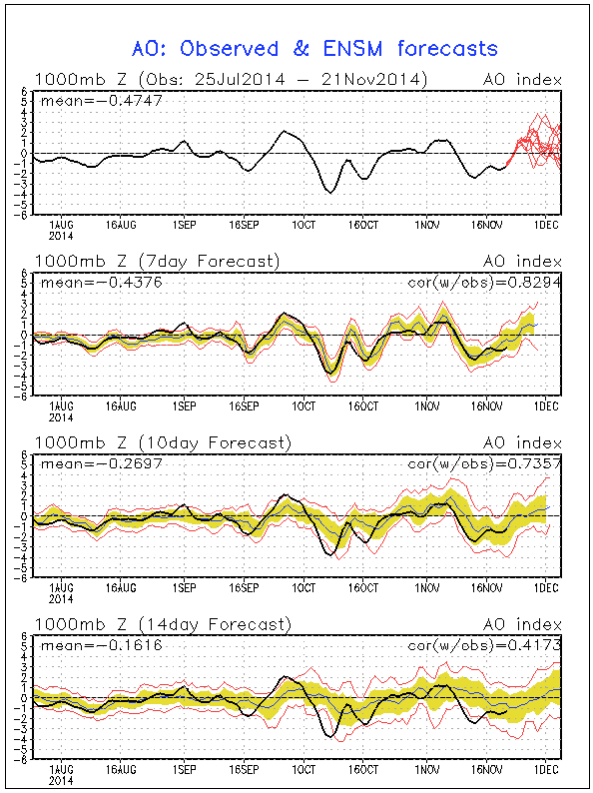
Finally, before concluding, I want to just make one more point about another measure for cold that we use. They are called teleconnections. At that same 500mb/18,000 foot level they help us measure what the overall weather pattern looks like. You may have heard of something called the NAO, or the North Atlantic Oscillation, and that is one of our teleconnections. However, I want to focus on another one, the Pacific/North American Pattern (PNA). When the PNA is positive, it creates a ridge in the west like I showed in the models that helps pump cold air down in a trough to the east. When it is negative, it sets up a trough or zonal flow in the west, and allows more mild air to stream east.

The latest GFS weather model ensemble forecasts for the PNA are to the right. Looking back, you can see how all of November to this point was marked by a positive PNA pattern (red circle in top chart). However, all ensemble members now show the PNA going to a neutral or maybe even slightly negative pattern. At this time, only two members have it returning to positive in December, with the rest having a consensus somewhere between values of 0 and -2. This is a large signal for a reversal in the cold we have been experiencing through November, at least in the short term. A statistical analysis I conducted of winters with similar Pacific Ocean temperatures yielded data showing it is likely this is a short-term change in the PNA value, and that through December it will likely trend back positive, but in the short-term this negative to neutral PNA will certainly favor more mild air across the US.



Source: NOAA

Similarly, we have another teleconnection, the Arctic Oscillation (AO), that measures those troughs in the east, and there is a very strong correlation between a negative value and cold in the east, and a positive value and warmth in the east. The latest forecast is shown to the right. As can be seen, values plummeted during the month of November, leading to the cold of the last week and a half or two. However, there is very strong model agreement that going into December values turn positive, a signal that the cold will slowly be easing. Past then, there is widespread variance in the model, but there are only a few models that have the AO going negative at all; the vast majority show a warmer or at least seasonable pattern continuing into early to maybe mid December. Again, while not a signal of record warmth, this is a signal of easing cold and more seasonable weather.



Source: NOAA

In conclusion, there is increasing meteorological evidence to believe that the cold temperatures that have defined the middle of November, and that many worry will continue to define December, will begin to ease. This, in turn, should place downward pressure in the natural gas market, as demand for the fuel should not reach the peaks that it did earlier this month. I want to emphasize that we should remain cautious trading on meteorological data next Friday, when what looks to be extremely bullish injection data will come out due to the cold this week, but over the next couple of weeks it does look likely that the trend will be downward rather than upward in the natural gas futures market, which could come as a surprise to many advocating continuing cold. Again, this is a shorter-term trade; on my premium service on **swctweather.com** I detail my overall winter forecast and how that ties into monthly variations, along with which winters typically feature the warmest/coldest temperatures in weak El Nino winters like we see this year. Still, I wanted to pass along the message I have been advising my clients for a few days now that the very strong cold, still being felt by millions across the country, looks likely to ease. In anticipation of that it may be worth it to play this easing cold in the natural gas market in the coming week or two.