



Stamford Amateur Radio Association

<http://www.ctsara.org/>

**I'm Going To Be A Meteorologist, Because It's The Only Job Where I Can
Be Wrong Every Day And Not Get Fired**

How To Be More Effective at Using Weather Information

Presented to Stamford Amateur Radio Association

By
Jon Perelstein, WB2RYV

Myths about weather

- The weatherman is always/mostly/usually wrong
 - Accuracy rates typically above 90%
 - Inaccuracy more often in intensity/timing rather than type of weather
- Private weather services (e.g., Accuweather, The Weather Channel) are more accurate than government (National Weather Service)
 - Nope, about the same
 - Provide higher precision and more localized estimates
 - Same
 - Observational data
 - Mathematical models
 - Same base forecasts
- The weather can change dramatically in a few minutes
 - No, it takes hours; you just weren't paying attention
 - Reeeeaaly ***fast*** weather events move about 30 mph

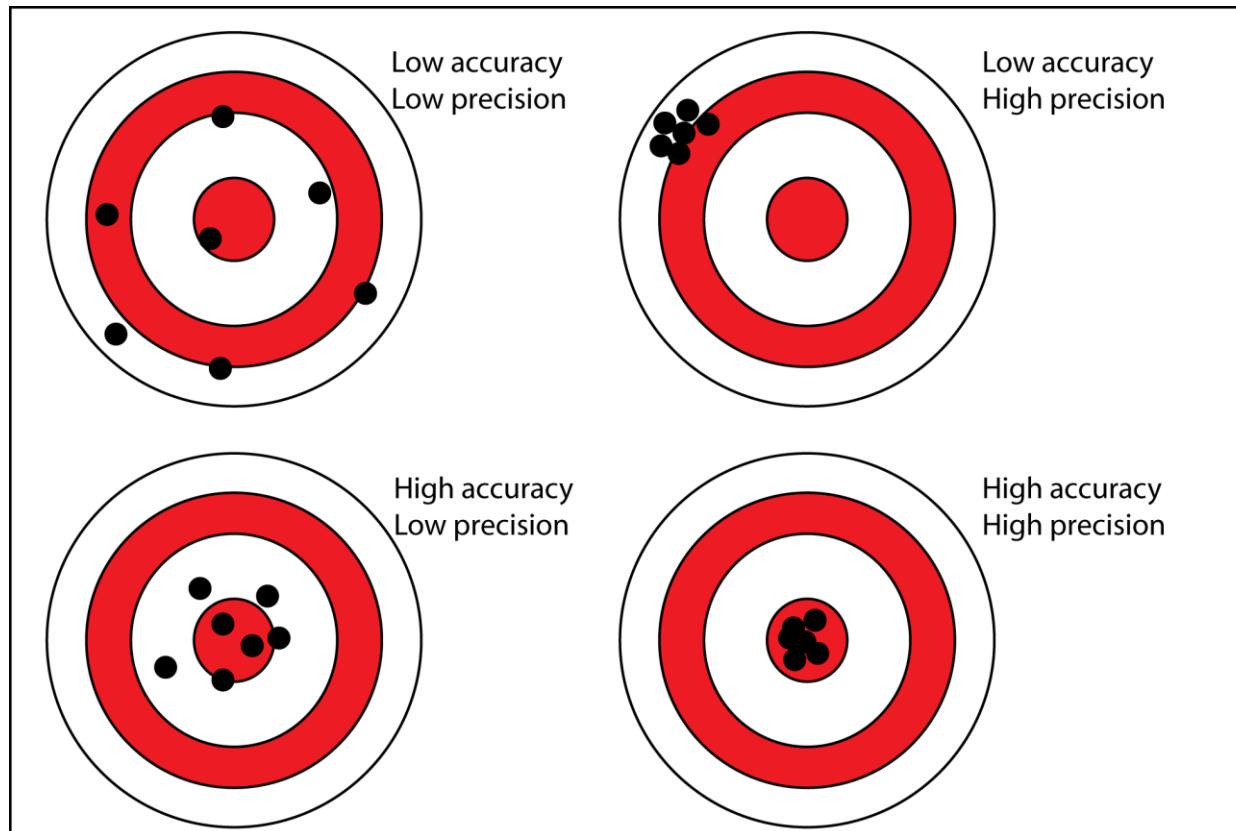
Not myths about weather

- Media overhype
 - The “Jim Cantore Effect”
- Focus on precision instead of accuracy
- Public does not want to deal in nuances or uncertainty
- “Bad weather” is literally chaos
 - Very difficult/impossible to accurately predict chaos



Media goes for **PRECISION** but ignores **UNCERTAINTY**, thus is often **INACCURATE**

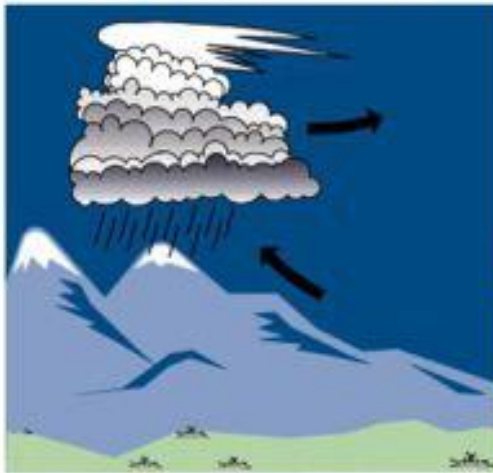
- Precision: Holyoke will get 33.321 inches of snow
- Uncertainty: 40% chance storm will pass further north than expected
- Accuracy: Holyoke got about 10 inches of snow



Three types of weather events

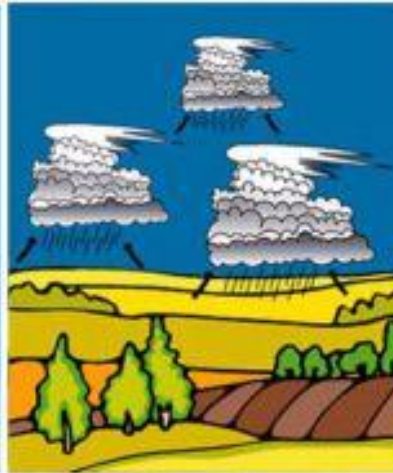
- Orographic – “Local”
- Air Mass – “Local”
- Frontal – “Weather System”

Orographic Thunderstorm



Orographic thunderstorms are caused by air that is forced up by a mountain or hillside.

Air mass Thunderstorm



Air mass thunderstorms are the result of localized convection in an unstable air mass.

Frontal Thunderstorm



Frontal thunderstorms occur along the boundaries of weather fronts (e.g. cold front).

Frontal Weather – a/k/a Weather System

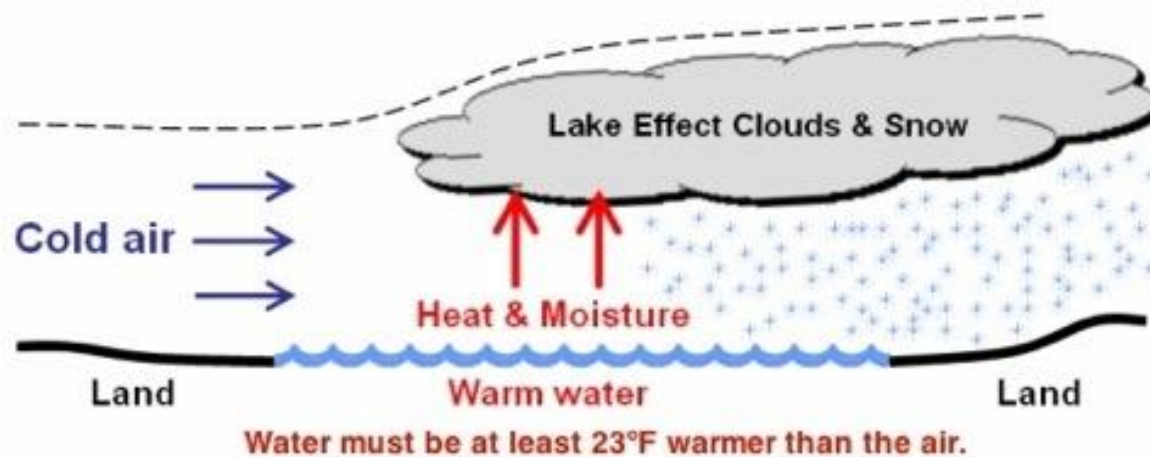
- Bad weather is associated with LOW pressure areas
 - Pulls air masses in, bad weather develops as those air masses combine
 - How bad depends on how deep the low, contents of the air mass, location of other high and low pressure areas
- Develop over days, forecasted days in advance



Local Weather

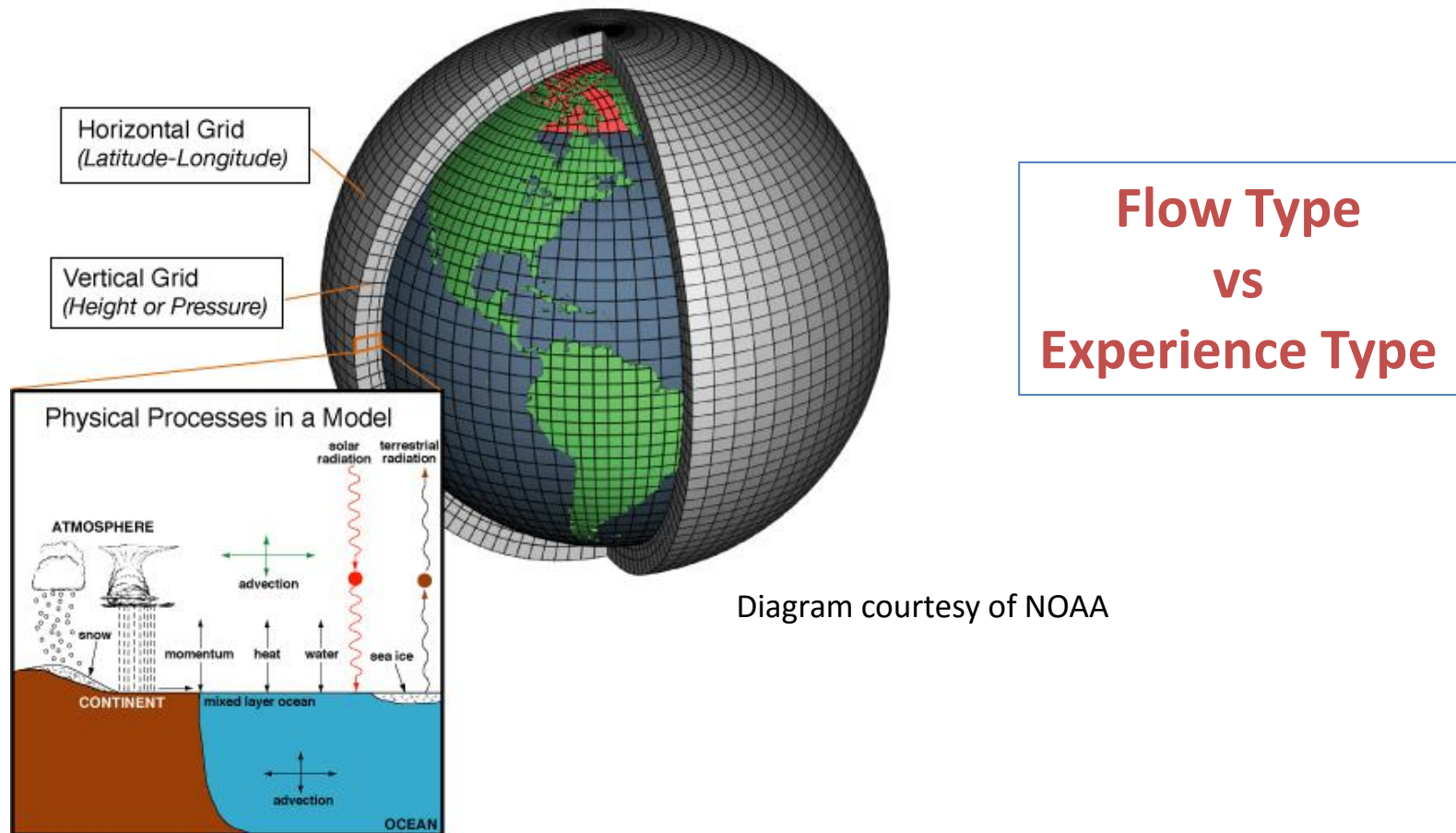
- Local weather events are not part of a weather system
- Caused by local terrain and heating/cooling
- Difficult to predict – can only say that “conditions favor” or “conditions are suitable”

Lake Effect Snow Conceptual Model



Weather Models – a/k/a Numerical Weather Prediction

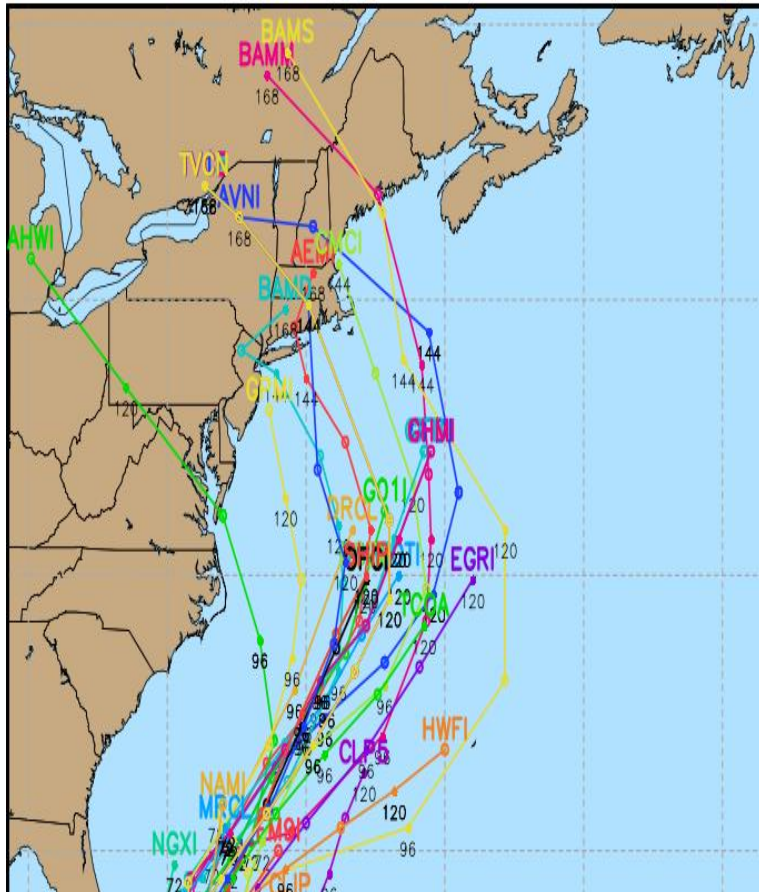
- Use mathematical models of the atmosphere to simulate future weather based on observed weather across the globe



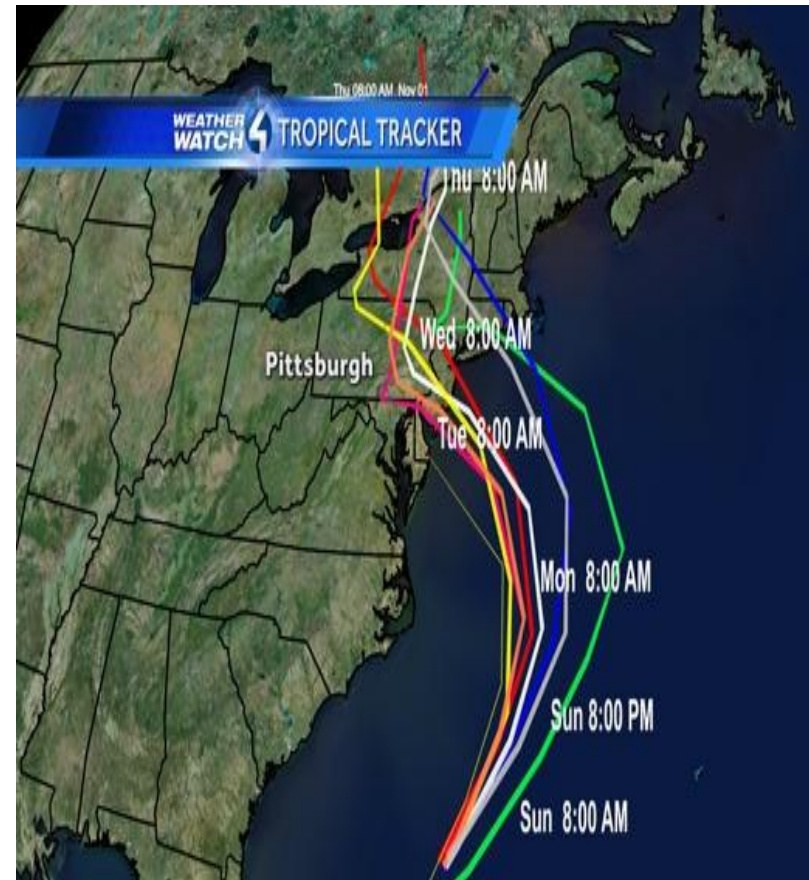
Flow Type
VS
Experience Type

Diagram courtesy of NOAA

Ensemble of models – Hurricane Sandy



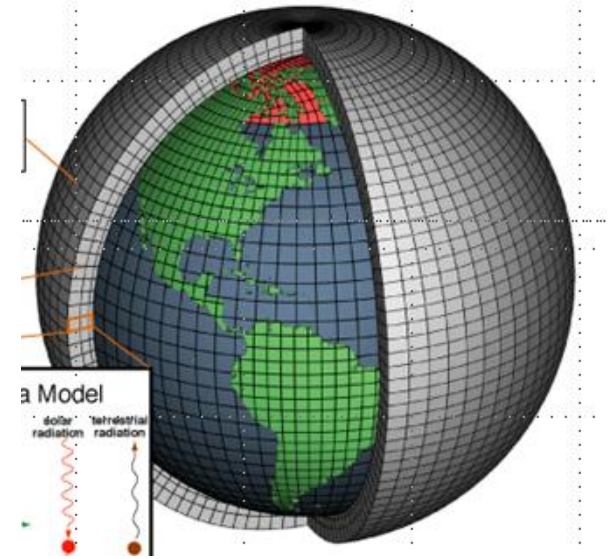
6 Days Out



3 Days Out

So why can't they be more accurate?

- Not enough sensors
- Models not yet perfect
 - Limited understanding mid-to-upper atmosphere, mid-to-lower ocean depths, Arctic, Antarctica
 - Limited prior experience of every possible combination of weather
 - No perfect agreement as to how to weigh different factors
- Don't have the computer horsepower to process the full models
- Models may not have been updated for changes in the earth's surface
 - e.g., increased heat generation in densely populated areas, loss of forest or grasslands



- Key is to look at an ensemble of models and appreciate the uncertainty
 - Look for agreement and patterns between them (“alignment”)
- Find really good forecasters

Interesting weather sites

- WeatherSpark (www.weatherspark.com)
- Weather Underground (Wunderground/Wundermap)
 - www.wunderground.com / www.wunderground.com/wundermap
- Intellicast (www.intellicast.com)
- The Weather Channel (www.weather.com)
- AccuWeather (www.accuweather.com)
- WeatherBug (weather.weatherbug.com)
- National Hurricane Center (www.nhc.noaa.gov)

Most, *but not all*, have iPhone/Android apps

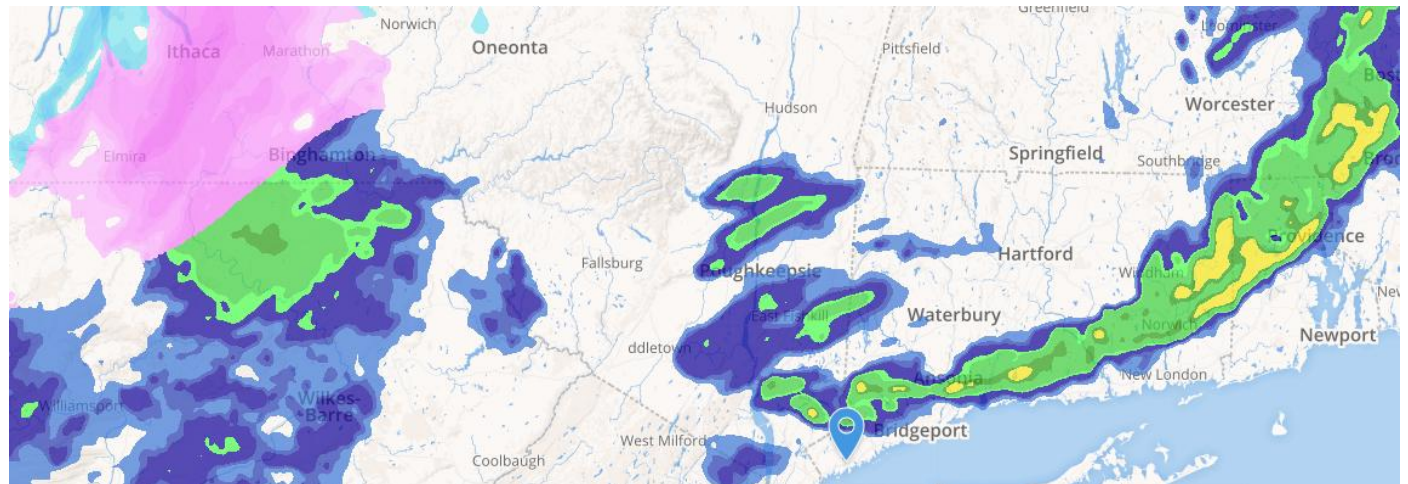
Different sites may show very different results – best to check two or more, especially for radar

Southwestern CT, 2010 EDST, April 2, 2016



↑ Weather Spark

Weatherbug ↓

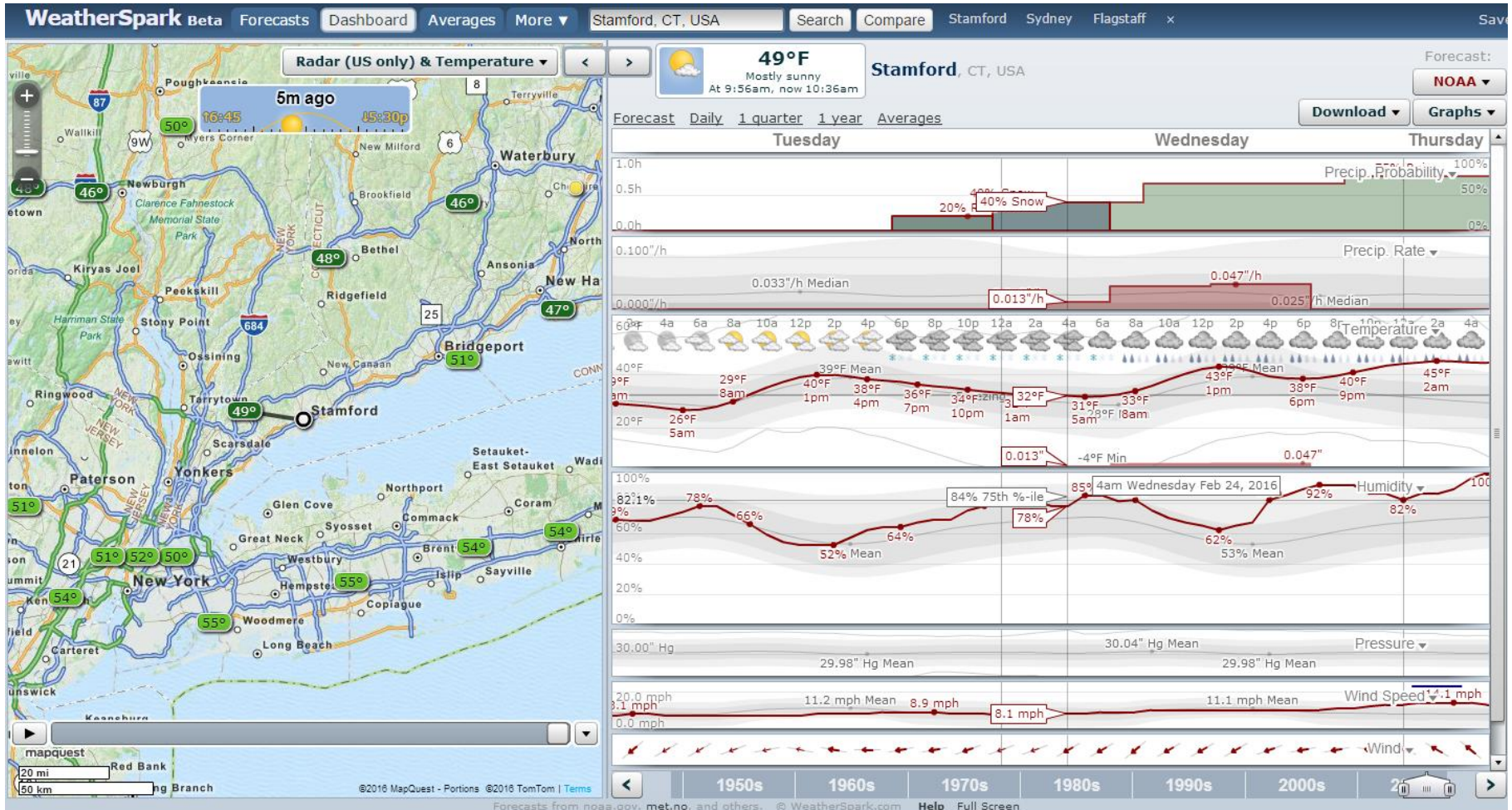


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WeatherSpark (www.weatherspark.com)

Map and Data, no App at this time

Easy to comprehend graphical view options



The Weather Channel (www.weather.com)

Intended for “everyday” users. A lot of precision, but not necessarily a lot of accuracy.
Good app. Good radar.

Stamford, CT Weather
Observed at 8:25 pm EDT

Freeze Watch From 8:00pm EDT, Sun Apr 3 until 10:00am EDT, Mon Apr 4

DAY	TEMP	DESCRIPTION	PRECIP	WIND	HUMIDITY
TONIGHT	35°	Rain/Wind	100%	SW 24 mph	76%
SUN	39°	AM Snow/Wind	70%	WNW 27 mph	38%
SUN NIGHT	32°	Showers Late	50%	N 16 mph	48%

Stamford, CT

47°
MOSTLY CLOUDY
--/33°

RAIN POSSIBLE 10:30 PM

FEELS LIKE 42° F

Parade of Snowmakers Targets Great Lakes, Northeast

Today's Top Stories



Weather Underground

Good app, good radar.

Page after page of data – especially readings from personal (“backyard”) stations

The screenshot shows the Weather Underground website. At the top, there's a navigation bar with links for 'Maps & Radar', 'Severe Weather', 'News & Blogs', 'Photos & Video', 'Activities', and 'More'. A search bar for 'Search Locations' is on the right. Below the navigation, a map of the Stamford, CT area is displayed with numerous green circular markers indicating local weather readings. A sidebar on the right provides detailed weather information for Stamford, CT, including the current temperature (47°F), feels like (47°F), and a 90% precipitation chance. Below the map, there are three tiles: 'Regional Radar', 'Regional Severe Weather', and 'Global Temperatures'. A promotional banner for 'Our Heads Up Display app' is also visible.

The screenshot shows the Weather Underground mobile app interface. At the top, there's a green header with a menu icon, a search icon, and a location pin icon. Below the header, there's a banner for Google's spring cleaning tips. The main content area shows the current weather for Stamford, CT, with a large circular temperature display showing 48°F and 'FEELS LIKE 48°'. Below this, there's a 'Mostly Cloudy' status with a checkmark and a plus sign. At the bottom, there are two rows of weather data: 'PRECIP 90%' and 'WIND [MPH] 1 | 5 NNW'. A 'FORECAST' section is partially visible at the very bottom.

Wundermap (Weather Underground) (www.wunderground.com/wundermap)

Radar map has every option you might ever imagine. Also, severe weather display and good hurricane data

The screenshot shows the Wundermap interface in a web browser. The main map displays radar data over Texas, with a color-coded intensity scale from green (light) to red (heavy). A red box highlights a storm detected near Angleton, TX. A pop-up window titled "Radar Detected Storms" provides detailed information about this storm.

Radar Detected Storms	
Location:	Angleton, TX
Lat:	29.16
Lon:	-95.46
Type:	Rotating Thunderstorm (S0)
Max Reflectivity:	63 dBZ
Severe Hail:	60% Chance
Hail:	100% Chance
Max Hail Size:	1.25 in
Echo Top:	43,000 ft.
Vert. Integrated Liquid:	57 kg/m ²
Speed:	12 mph (10 knots)
Direction (from):	W (266)
Radar Site:	HGX

The sidebar on the right contains various display options:

- Display Options: Opacity (75), Animate (1 frames), Frame Delay (25 sec)
- Radar Options: Storm Tracks, Smoothing
- Base Reflectivity: N0R (124 NMI / 0.50")
- Weather Stations: Temperature / Wind, Temperature, Dew Point / Humidity, Precipitation
- Severe Weather, Satellite, USGS River, Model Data, Hurricane, Fire, Tornado, U.S. Storm Reports, U.S. Forecast, Extremes, WunderPhotos

Accuweather (www.accuweather.com)

Intended for “everyday” users. A lot of precision, but not necessarily a lot of accuracy.
Good app, radar

The screenshot shows the AccuWeather website for Stamford, CT. The current temperature is 47°F with a RealFeel of 45°F. The forecast for the next three days is: Tonight (Apr 2) with rain and snow showers, a low of 35°F and RealFeel of 17°F; Tomorrow (Apr 3) with very windy conditions and a bit of snow, a high of 39°F and RealFeel of 23°F; Monday (Apr 4) with warmer weather and periods of rain, a high of 48°F and RealFeel of 42°F. A 'HIGH WIND WARNING' is displayed. The site also features a 'Trending Now' section with articles about a Colorado officer and a skier, and a 'BARNES & NOBLE BOOKSELLERS' advertisement for 'The Blue Tattoo'.

The screenshot shows the AccuWeather mobile app interface for Stamford. The current temperature is 47°F (RealFeel 45°F). The app displays a 'Severe Weather Alerts' section, a 'CURRENT' weather summary, and a 'MINUTECAST®' section stating 'No precipitation for at least 120 min'. The bottom of the screen features an advertisement for the 2016 Chevrolet Silverado All Star Edition.

Weatherbug (www.weatherbug.com)

Localized private weather stations (e.g., schools, hobbyists) for localized reporting
Uses local media for forecasts. Good radar, good app

Now Hourly 10 Day

Stamford, CT Weather
May 6, 2016 9:44 AM
Burning Tree Country Club

48°
Feels Like 45°
Hi 51°F Lo 49°F

30%
30% Chance of Light Rain

LIVE RADAR

SPARK LIGHTNING
Closest strike in the last 30 minutes: 589.8 miles away
No Lightning Nearby

WEATHERBUG HOME
Today's weather indicates a low HVAC energy use day for the average home.

WEATHER DETAILS - STAMFORD, CT

Windchill 45°	Daily Rain 0.55"
Dewpoint 48°	Monthly Rain 1.69"
Humidity 100%	Avg. Wind NE 4.6 mph
Pressure 29.7"	Wind Gust ENE 15.1 mph
Sunrise 5:45 AM	Moon New
Sunset 7:57 PM	UV Index 2 (Low)

STAMFORD, CT WEATHER FORECAST

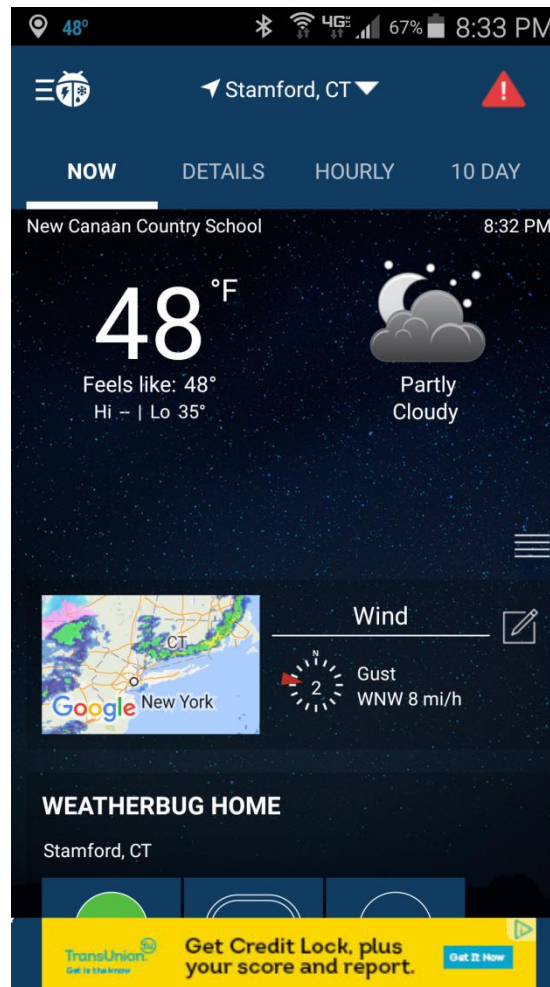
Today Hi 51°F
A slight chance of thunderstorms. Rain. Highs in the lower 50s. Northeast winds 10 to 15 mph with gusts up to 30 mph. Chance of rain near 100 percent.

Tonight Lo 49°F
Cloudy with a 50 percent chance of showers. Patchy fog after midnight. Lows in the upper 40s. East winds 10 to 15 mph. Gusts up to 25 mph in the evening.

Endless Summer COLLECTION
THE HYDRANGEA THAT blooms all summer long
FIND A RETAILER

Weatherbug (www.weatherbug.com)

Localized private weather stations (e.g., schools, hobbyists) for localized reporting
Uses local media for forecasts. Good radar, good app



Intellicast (www.intellicast.com)

Part of The Weather Channel and intended for “expert” users.
App, driving conditions, weather map

eather.aspx?location=USCT0218

Suggested Sites Web Slice Gallery Subscribe... Auction Sniper: eBa...

intellicast.com The Authority in Expert Weather

56°F Stamford, Connecticut

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Weather Report Home » Local » Weather Report

Stamford, Connecticut

Weather Report | Interactive Weather Map | Extended Forecast | Hourly Forecast | Past Observations | Historic Averages | Related

Current Conditions - °F | °C As of 3:56 PM on Thursday 05 Apr 2012 (Local Time) from KHPN Reporting Station

Overcast 56°F Feels Like: 56° Wind Chill: 56° Heat Index: 56° Dew Point: 26° Humidity: 32% Pressure: 29.78" Report Text: KHPN 051956Z 30012KT 10SM OVC070 13/M03 A2978 RMK AO2 SLP085 T01331033	Today's Forecast 5 PM Sunny 55° 6 PM Sunny 53° 7 PM P Cloudy 51°	Local Information Severe Weather Alert View current alerts » Command View Interactive Weather Map Pan & Zoom with Real-Time Radar & Satellite
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View Detailed Observations for the last 48 Hours · 14 Days

View Complete Hourly Forecast » Radar · Satellite · Surface Analysis

New Forecast Map Updates Plan your seasonal activities better [Click here to learn more...](#)

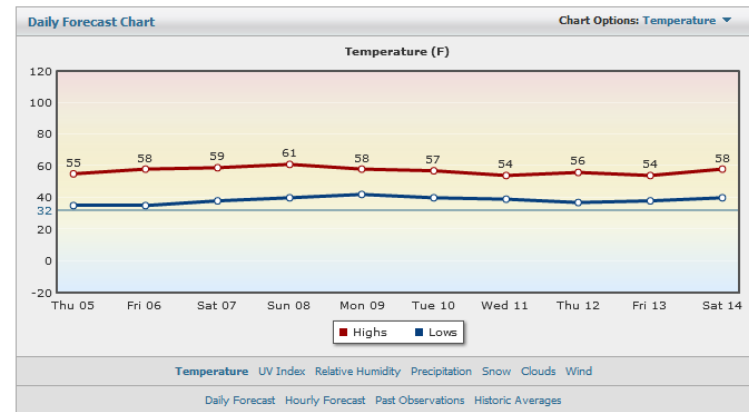
10 Day Forecast - °F | °C View the Detailed Extended Forecast »

thu	fri	sat	sun	mon	tue	wed	thu	fri	sat
apr 05	apr 06	apr 07	apr 08	apr 09	apr 10	apr 11	apr 12	apr 13	apr 14
55° 35°	58° 35°	59° 38°	61° 40°	58° 42°	57° 40°	54° 39°	56° 37°	54° 38°	58° 40°

Details for Thursday, April 05 (Evening)
 Evening: Partly cloudy skies. Low around 35F. Winds NNW at 5 to 10 mph.

UV Index: 6 (High) Relative Humidity: 46% Precipitation: 0% Snow: 0% Cloud Coverage: 13%

Sunrise: 6:30 AM **Sunset:** 7:24 PM **Moonrise:** 6:26 PM **Moonset:** 5:25 AM **Moonphase:** Waxing Gibbous **Direction:** NNW (348°) **Speed:** 9MPH(14Km, 7Kts)



More from Intellicast

Articles

- Local Weather Maps
- US Weather Maps
- US Current Weather
- Global Weather Maps
- Weather Analysis Charts
- Active Storm Track
- Weather Tools

Weather Center

Weather Alerts
 Current National Weather Service Watches and Warnings by type and state throughout the United States.

Ski & Snow
 The Ski & Snow Section is where you can get the latest ski resort conditions and snow forecasts.

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Weather forecasters on social media are some of the best

- Facebook and Twitter
- Talented amateurs and pros
- Willing to:
 - Deal with uncertainties
 - Warn in advance and then adjust warnings
 - Apply experience
- To name a few
 - Tri-State Weather
 - Southern New England Weather Coverage
 - DC to Boston Metro Weather
 - Meteorologist Joe Cioffi
 - US National Weather Service Boston MA



Tri-State Weather

January 20 at 1:45pm · 🌐

Both the 12z Canadian and Euro are in and they both continue to show a major snow storm and blizzard conditions for most. The bullseye is just south of the NYC area with up to two feet toward the Maryland region. Long Island and NYC still see major snow with a foot or more possible. Coastal flooding will be a big issue for New Jersey, Delaware and Long Island as a full moon, high tide and hurricane force winds combine. Stay with us for updates through the evening. Nws launching special weather balloons you get better data for tonight's model runs.



Tri-State Weather

January 21 at 11:22am · 🌐

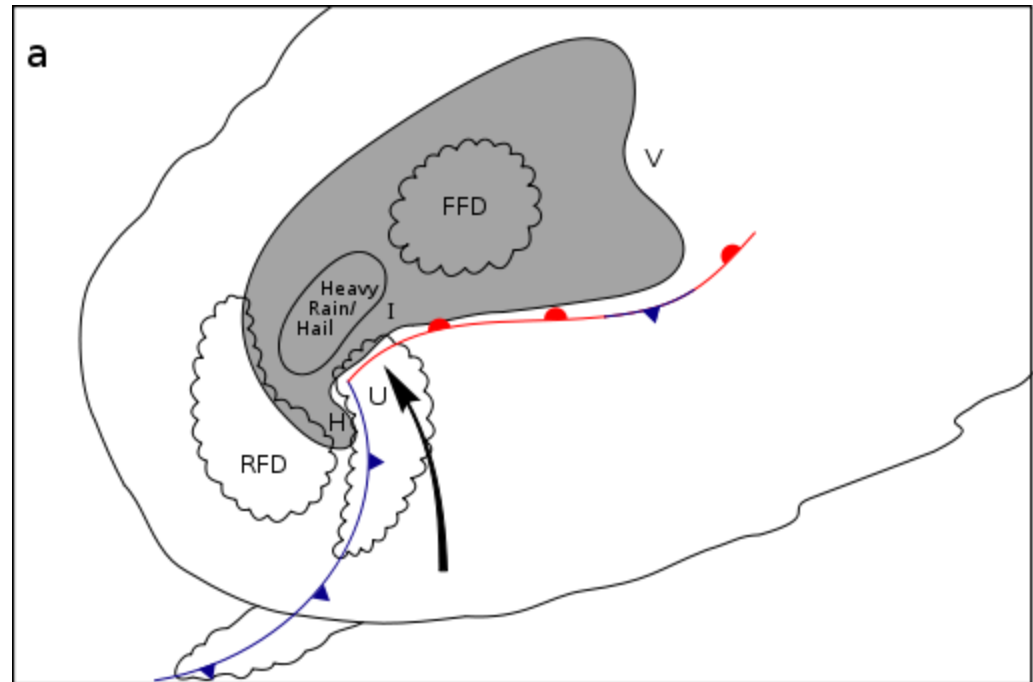
The 12z GFS is in and it essentially "cancels" the storm for the NY area and points east/north giving only a few inches. It keeps the blizzard across the Philly area including southern NJ, Maryland, Washington DC, Delaware and Virginia. They would all see one to two feet of wind driven snow based on this model. Look on the map to see what it projects for your area. Next up will be the Canadian model. Remember this is just this models projection. See earlier post for NAM model.

Things to watch out for

Supercell – the biggest, baddest thunderstorms
Tornados usually from supercells



Hook Pattern on radar –
tornados usually associated
with a hook pattern in the
radar echo



Things to watch out for (cont'd)

Wall Cloud – often associated with tornados. Looks like a wall hanging down vertically from the clouds



Shelf Cloud – not the same as a Wall Cloud. Usually not associated with tornados. Looks like a shelf extending horizontally from the clouds



Things to watch out for (cont'd)

Mammatocumulus Cloud –
almost always associated
with tornados and other
violent winds

See those planes near the
clouds? Really really really
stupid



Things to watch out for (cont'd)

Flash Floods

MINUTES, not hours

You don't know how deep it is

Currents at 60mph or more are likely, will sweep you right off your feet

Easy to get caught under a low overpass (e.g., Metro North overpasses)



Things to watch out for (cont'd)

Lightning

30,000 - 300,000 amps

500 megajoules

Does prefer taller objects, but perfectly willing to destroy lower objects

Disconnect your antennas. Blitz bug/lightning arrestors may not protect against a direct hit

Can hit as much as 10 miles from the actual storm

