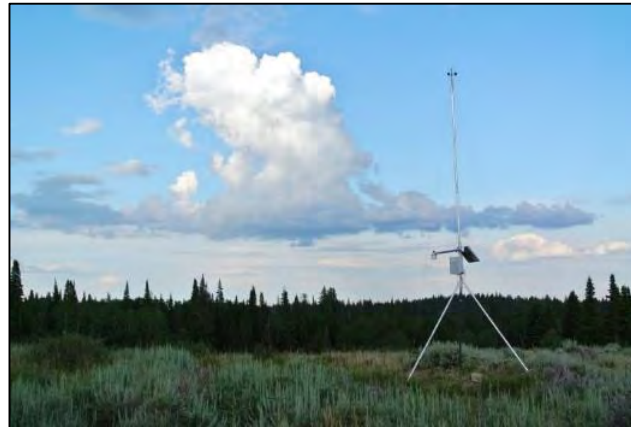


A Guide to Practical Weather and Climate Information for Loggers



Drew Ellis, VT Geography

Virginia Loggers Association Conference
Virginia Tech, Skelton Conference Center
August 18, 2017

Weather v. Climate

Weather is the state or condition of the atmosphere at a particular time and location...a “snapshot”.

Blacksburg (VT Airport) – Friday, August 18

	Ta	Td	Cloud	Wdir	Wspd
1 pm Observation:	84°F	70°F	PCldy	SW	12 mph

Meteorology is the study of the physics and dynamics of the atmosphere for the purpose of predicting **weather** over short time periods (hours-to-days).

Climate is the statistical representation of the variation in the weather of a location over a “long” time interval - 30 years establishes the climate baseline (means, deviations, extremes).

Blacksburg, August 18

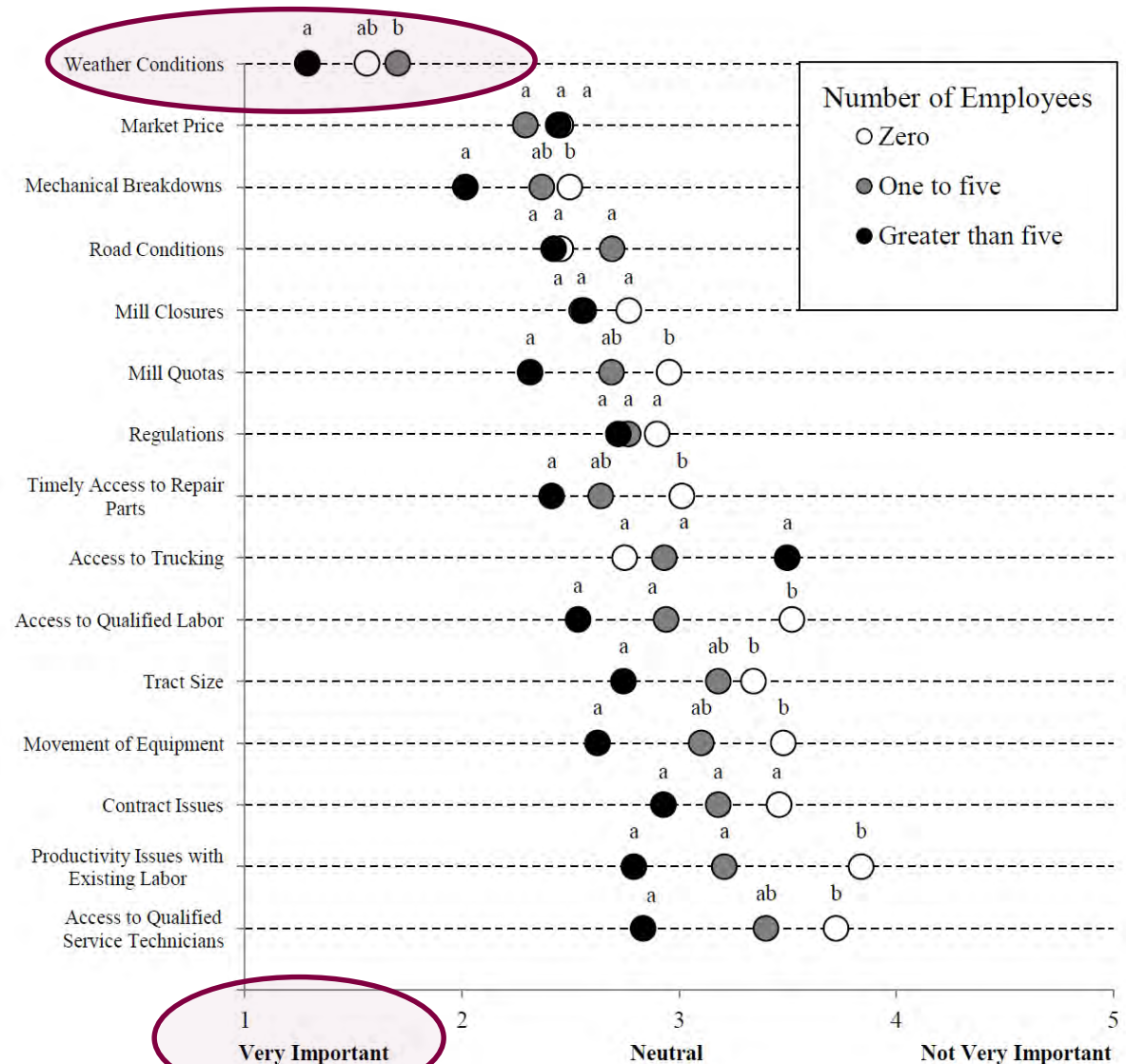
	MaxT	MinT	Precip
1981-2010 Climate Normals:	82°F	59°F	0.11 in
1952-2017 Climate Records:	94°F	46°F	1.99 in
	(1988)	(1979)	(1994)

Loggers: “Weather Is Important”

**“Limitations to
attaining maximum
production based on
size of logging
business”**

Northern Forest
Logging Industry
(ME, NH, VT, NY)

Leon BH, Benjamin JG. 2012: *A Survey of Business Attributes, Harvest Capacity and Equipment Infrastructure of Logging Businesses in the Northern Forest*. Univ of Maine



Weather and Logging

Too wet, too dry, too hot, too cold.

- Impacts site/road conditions – adjustments for rain/mud, snow/ice, severe weather
- Affects production, costs, safety



Climate and Logging

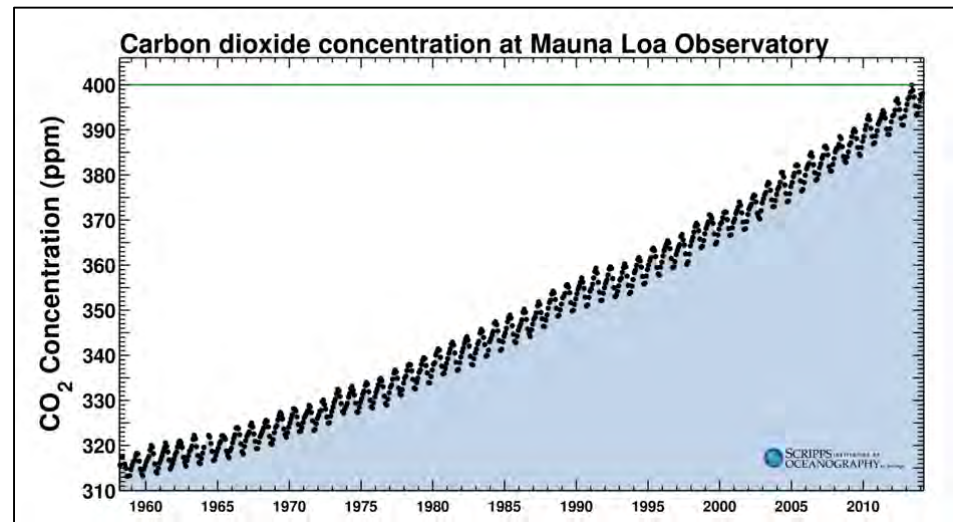
Weekly-monthly-seasonally too wet,
too dry...soil moisture.

Drought:

- wildfire risk
- disease
- infestation

Long-term:

- warmer
- wetter?

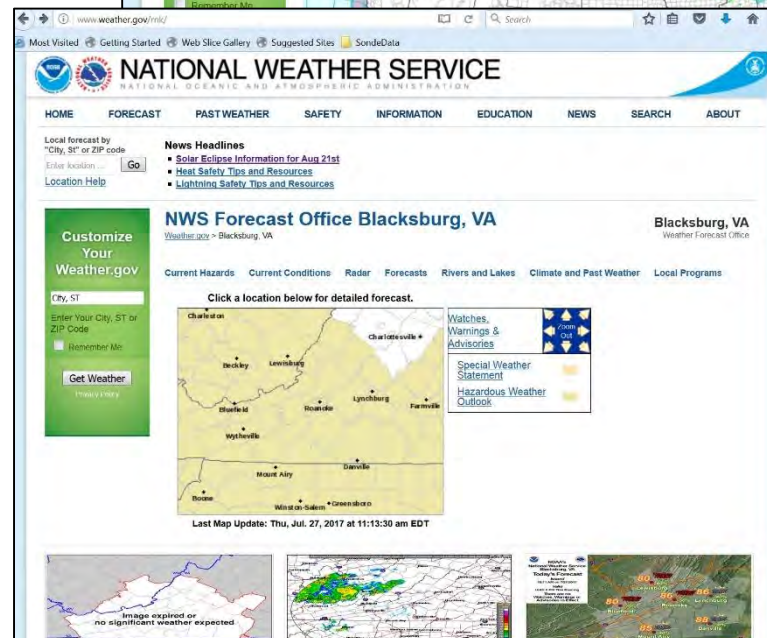
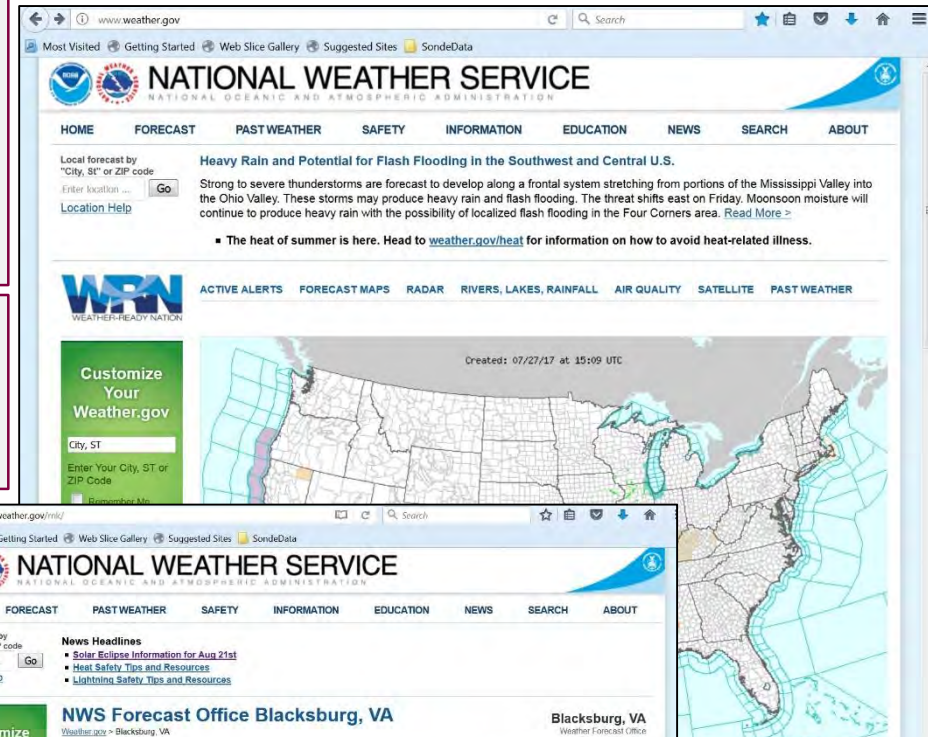


Real-Time Weather – “Nowcasting”

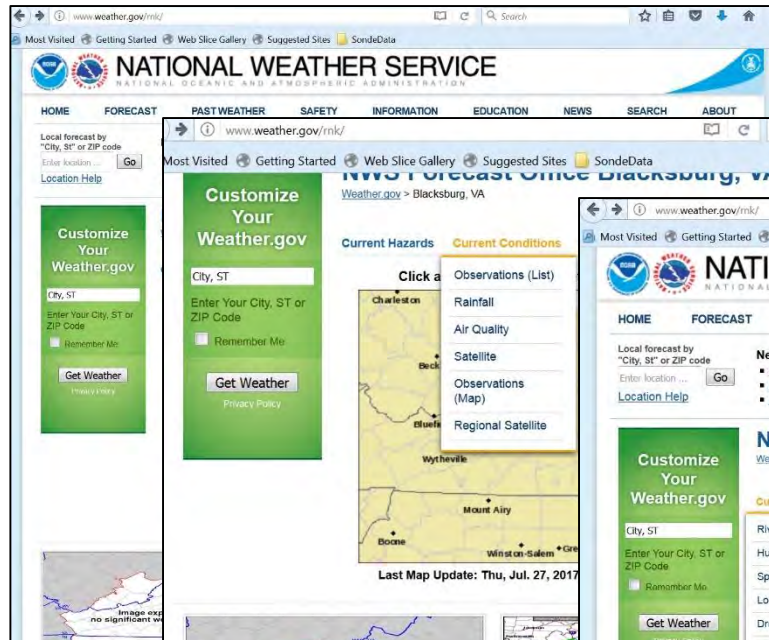
Nowcasting – minutes-to-hours based on current conditions/recent trends; useful for immediate decisions

National Weather Service (NWS)
(www.weather.gov)

local NWS Forecast Office (NWSFO);
area of responsibility – County Warning
Area (CWA)

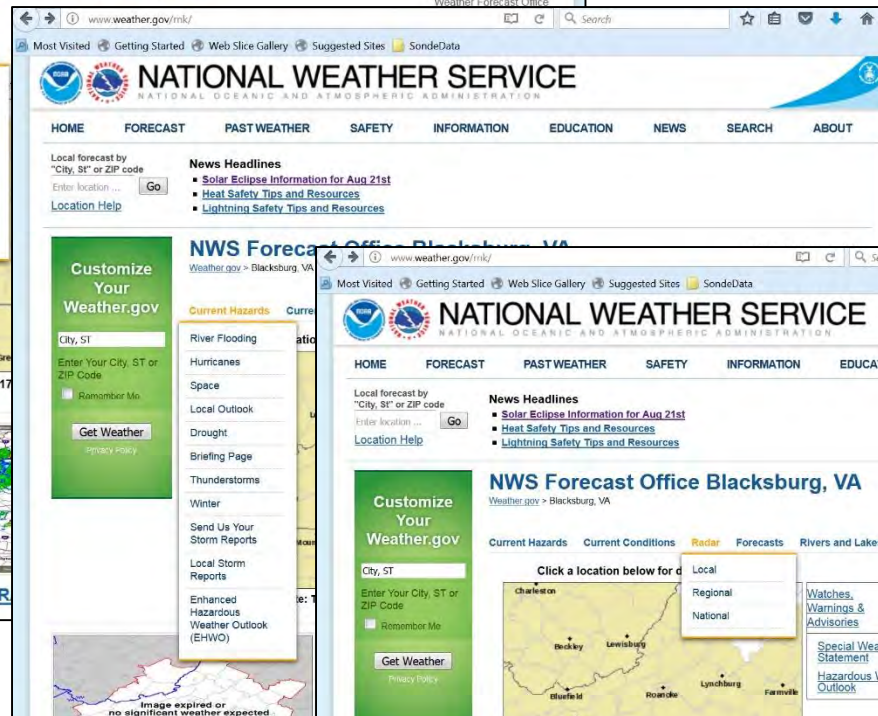


Real-Time Weather – “Nowcasting”



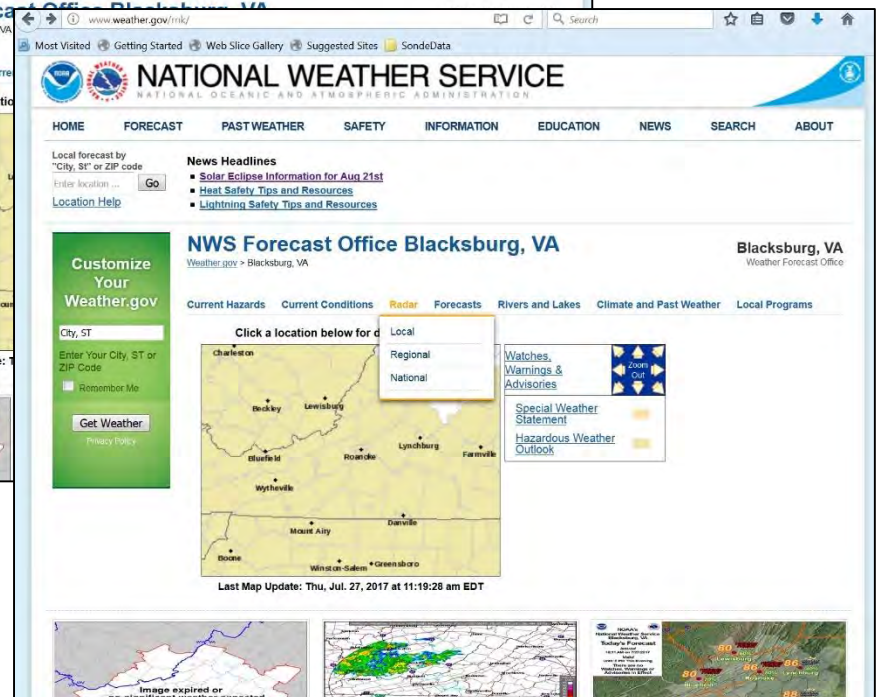
Mapped Data – Poor Delivery

NWS Enhanced Data Display



No Lightning Data

NWS using private-sourced and satellite-derived data.



Real-Time Weather – “Nowcasting”

https://forecast.weather.gov/product.php?site=RNK&product=RWR&issuedby=AKQ

Most Visited Getting Started Web Slice Gallery Suggested Sites SondeData

Local forecast by "City, St" or Zip Code
City, St Go

XML RSS Feeds

Warnings
Current
By State/County...
UV Alerts
more....

Observations
Radar
Satellite
Snow Cover
Surface Weather...
Observed Precip
more....

Forecasts
Local
Graphical
Aviation
Marine
Hurricanes
Severe Weather
Fire Weather
more....

Text Messages
By State
By Message Type
National

Forecast Models
Numerical Models
MOS Prod Statistical Model
GFS-LAMP Prod Statistical Model
more....

Climate
Past Weather
Predictions

Weather Safety
Weather Radio
Hazard Assmt...
StormReady
TsunamiReady
Skywarn™
more....

Education/Outreach
Information
Information Center

Regional Weather Roundup

Issued by NWS Wakefield, VA

Home | Current Version | Previous Version | Text Only | Print | Product List | Glossary On Versions: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 40 41 42 43 44 45 46 47 48 49 50

934
ASUS41 KAKQ 271515
RWRKQ

REGIONAL WEATHER ROUNDUP
NATIONAL WEATHER SERVICE WAKEFIELD VA
1100 AM EDT THU JUL 27 2017

Note: "fair" indicates few or no clouds below 12,000 feet with no significant weather and/or obstructions to visibility. * = Denotes station may not report precipitation (e.g., rain, snow, etc.), thunder or fog.

VAZ042-051-052>054-056-271600-
NORTHERN VIRGINIA

CITY	SKY/WX	TMP	DP	RH	WIND	PRES	REMARKS
WASH NATIONAL	CLOUDY	79	72	79	S10	29.99F	
DULLES	PTSUNNY	78	69	73	SW8	29.99F	
FORT BELVOIR	MOSUNNY	80	69	71	S8	29.99F	
QUANTICO	PTSUNNY	80	73	79	S9	30.00F	
FREDERICKSBURG*	MOSUNNY	81	72	72	S8	29.99F	
STAFFORD*	MOSUNNY	79	72	77	S3	30.03F	
WARRENTON	MOSUNNY	81	68	64	S6	29.99F	
CULPEPER*	PTSUNNY	81	72	73	S6	30.00F	
MANASSAS*	MOSUNNY	80	71	74	VRB5	29.99F	
LEESBURG*	PTSUNNY	79	72	78	S7	30.00F	
WINCHESTER	CLOUDY	77	68	73	S3	29.99F	
FRONT ROYAL*	PTSUNNY	82	70	65	SW7	29.98F	
LURAY*	CLOUDY	81	70	69	SW6	30.00F	
\$\$							

VAZ048-049-060>072-079>083-271600-
CENTRAL AND SOUTH CENTRAL VIRGINIA

CITY	SKY/WX	TMP	DP	RH	WIND	PRES	REMARKS
RICHMOND	CLOUDY	81	68	64	SW14	30.02F	
CHESTERFIELD*	FAIR	82	69	64	SW9	30.03	
PETERSBURG*	MOSUNNY	82	63	52	CALM	30.03F	
HANOVER	CLOUDY	81	68	64	SW9	30.02F	
TAPPAHANNOCK*	CLOUDY	82	62	49	S8	30.02F	
QUINTON*	FAIR	80	68	65	SW5	30.02F	
CHARLOTTESVILLE	SUNNY	82	70	66	SW9	30.00F	
GORDONSVILLE*	MOSUNNY	82	72	71	S8	29.99F	
ORANGE*	MOSUNNY	81	70	69	W7	30.00S	
LOUISA*	MOSUNNY	82	70	65	S8	30.00F	
BUMPASS*	FAIR	81	72	73	S3	30.00F	

https://radar.weather.gov/radar_lite.php?product=NCR&rid=FCX&loop=no

Most Visited Getting Started Web Slice Gallery Suggested Sites SondeData

NWS radar Image from Blacksburg, VA

Blacksburg, VA Radar

Go to: Enhanced Version Local weather forecast by "City, St" City, St Go Radar Status Message

Adjacent Radars:

Short Range Images
Reflectivity: Composite Loop Loop
Base Loop Loop
Velocity: Storm Relative Loop Loop
Base Loop Loop
Rainfall: 1-Hour Total Loop Loop
Storm Total Loop Loop

Long Range Images
Reflectivity: Base Loop
U.S. Views
Reflectivity: National Loop Loop Loop
Alaska Loop Loop
Hawaii Loop Loop
Guam Loop Loop
Puerto Rico Loop Loop
Radar Loop Loop

Add'l Radar Down Load Mobil GIS U.S. Doppler Color Cred

Composite Reflectivity

NWS Blacksburg, VA

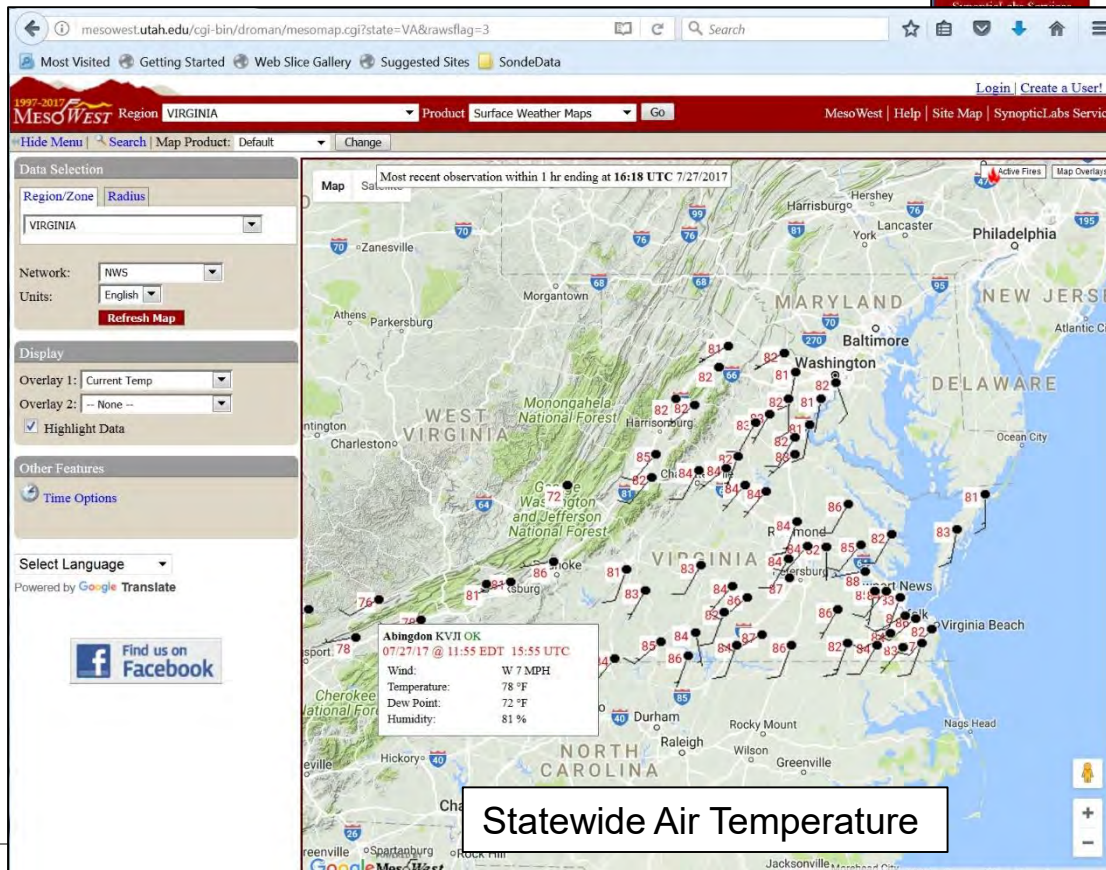
National Weather Service WSR-88D Image from: FCX 07/27/2017 15:55 UTC (11:55 AM EDT)

Vertical color bar scale (dBZ): 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280, 285, 290, 295, 300, 305, 310, 315, 320, 325, 330, 335, 340, 345, 350, 355, 360, 365, 370, 375, 380, 385, 390, 395, 400, 405, 410, 415, 420, 425, 430, 435, 440, 445, 450, 455, 460, 465, 470, 475, 480, 485, 490, 495, 500, 505, 510, 515, 520, 525, 530, 535, 540, 545, 550, 555, 560, 565, 570, 575, 580, 585, 590, 595, 600, 605, 610, 615, 620, 625, 630, 635, 640, 645, 650, 655, 660, 665, 670, 675, 680, 685, 690, 695, 700, 705, 710, 715, 720, 725, 730, 735, 740, 745, 750, 755, 760, 765, 770, 775, 780, 785, 790, 795, 800, 805, 810, 815, 820, 825, 830, 835, 840, 845, 850, 855, 860, 865, 870, 875, 880, 885, 890, 895, 900, 905, 910, 915, 920, 925, 930, 935, 940, 945, 950, 955, 960, 965, 970, 975, 980, 985, 990, 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5150, 5155, 5160, 5165, 5170, 5175, 5180, 5185, 5190, 5195, 5200, 5205, 5210, 5215, 5220, 5225, 5230, 5235, 5240, 5245, 5250, 5255, 5260, 5265, 5270, 5275, 5280, 5285, 5290, 5295, 5300, 5305, 5310, 5315, 5320, 5325, 5330, 5335, 5340, 5345, 5350, 5355, 5360, 5365, 5370, 5375, 5380, 5385, 5390, 5395, 5400, 5405, 5410, 5415, 5420, 5425, 5430, 5435, 5440, 5445, 5450, 5455, 5460, 5465, 5470, 5475, 5480, 5485, 5490, 5495, 5500, 5505, 5510, 5515, 5520, 5525, 5530, 5535, 5540, 5545, 5550, 5555, 5560, 5565, 5570, 5575, 5580, 5585, 5590, 5595, 5600, 5605, 5610, 5615, 5620, 5625, 5630, 5635, 5640, 5645, 5650, 5655, 5660, 5665, 5670, 5675, 5680, 5685, 5690, 5695, 5700, 5705, 5710, 5715, 5720, 5725, 5730, 5735, 5740, 5745, 5750, 5755, 5760, 5765, 5770, 5775, 5780, 5785, 5790, 5795, 5800, 5805, 5810, 5815, 5820, 5825, 5830, 5835, 5840, 5845, 5850, 5855, 5860, 5865, 5870, 5875, 5880, 5885, 5890, 5895, 5900, 5905, 5910, 5915, 5920, 5925, 5930, 5935, 5940, 5945, 5950, 5955, 5960, 5965, 5970, 5975, 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7640, 7645, 7650, 7655, 7660, 7665, 7670, 7675, 7680, 7685, 7690, 7695, 7700, 7705, 7710, 771

Real-Time Weather – “Nowcasting”

MesoWest – mesoscale data display
(mesowest.utah.edu/index.html)

Select a state of interest:



Statewide Air Temperature

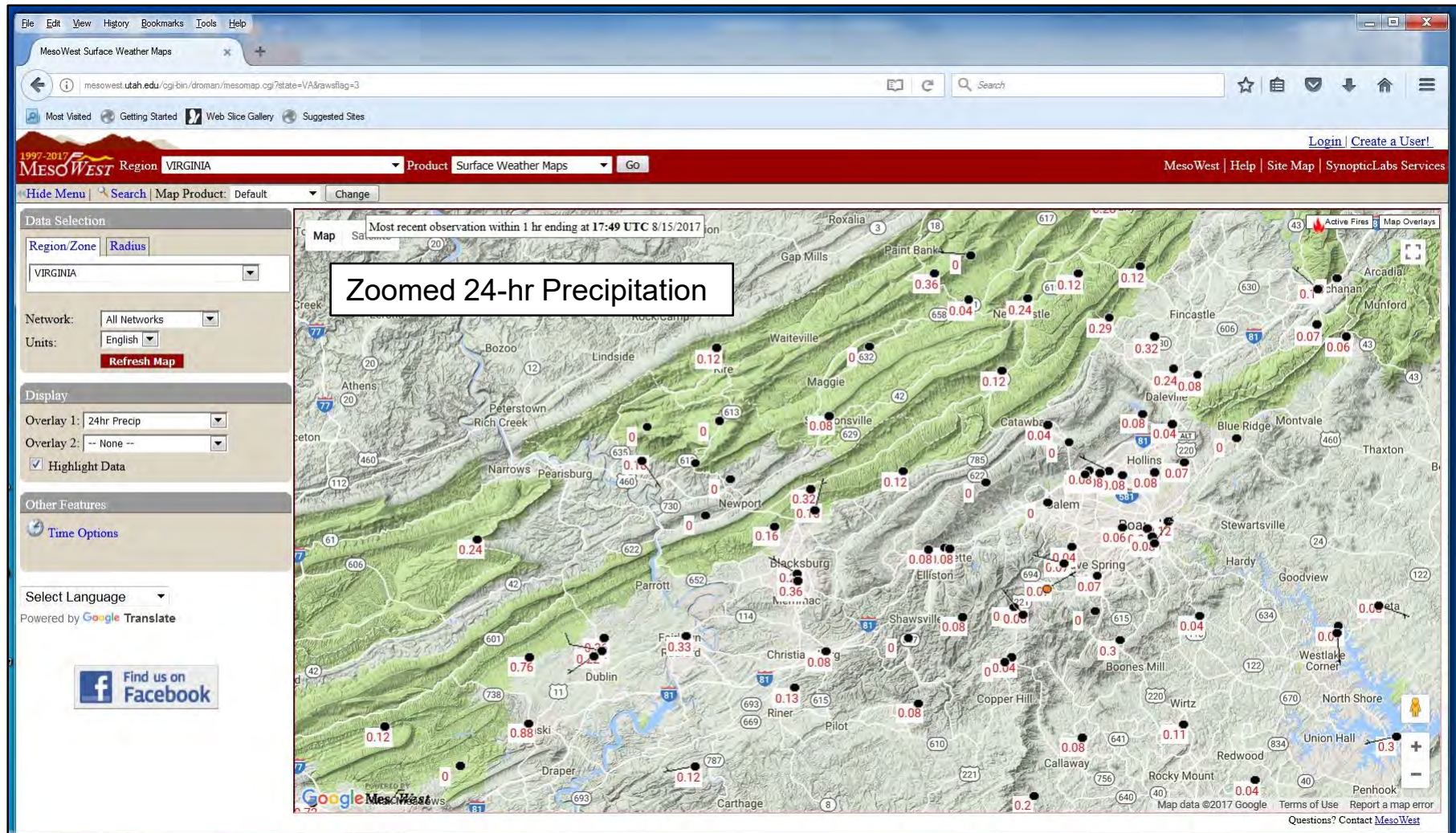


Points to direction from which the wind is coming.

BARB	
	calm
	5 knots
	10 knots
	50 knots

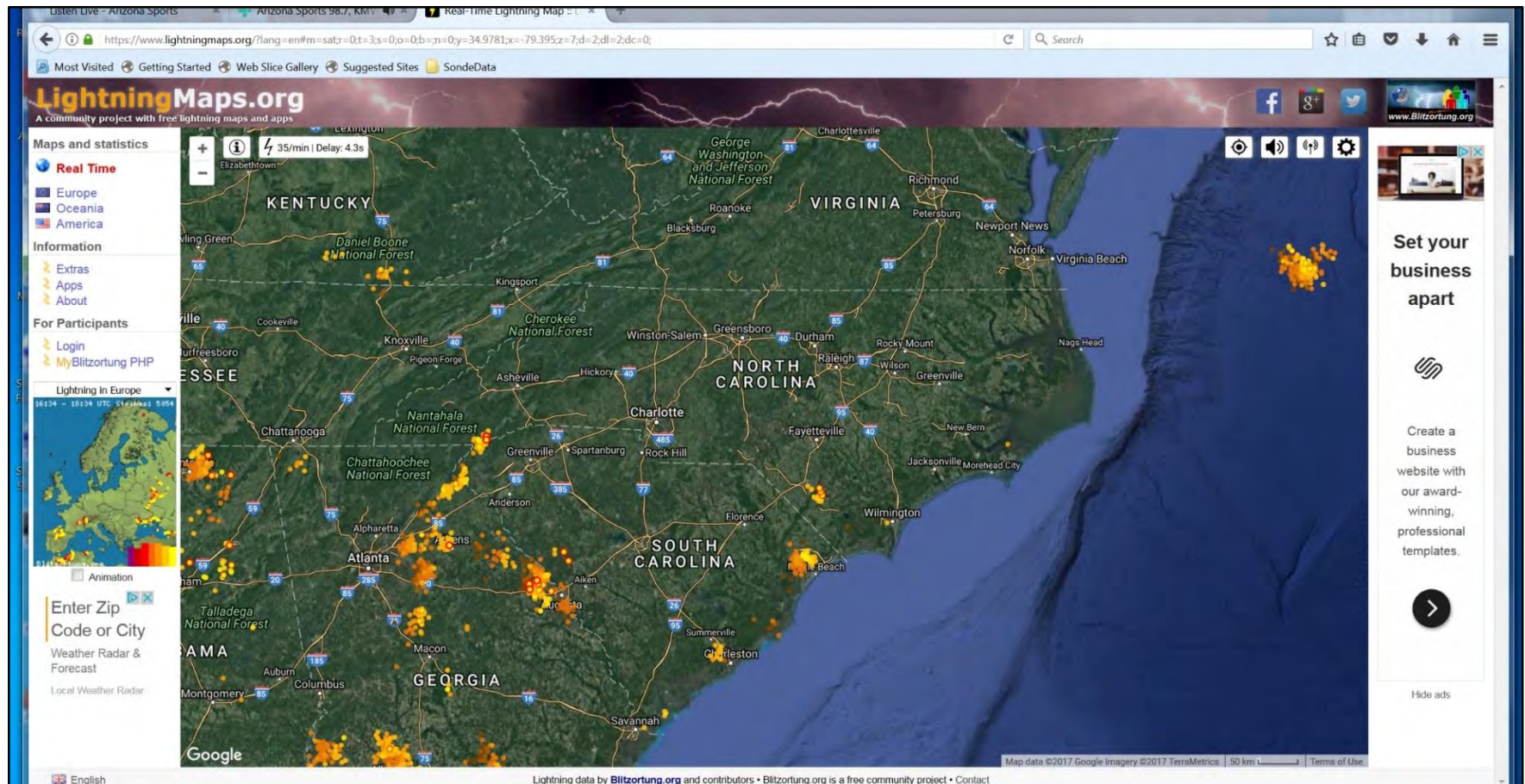
Barb Combination	
	15 knots
	20 knots
	35 knots
	80 knots
	175 knots

Real-Time Weather – “Nowcasting”



Real-Time Weather – “Nowcasting”

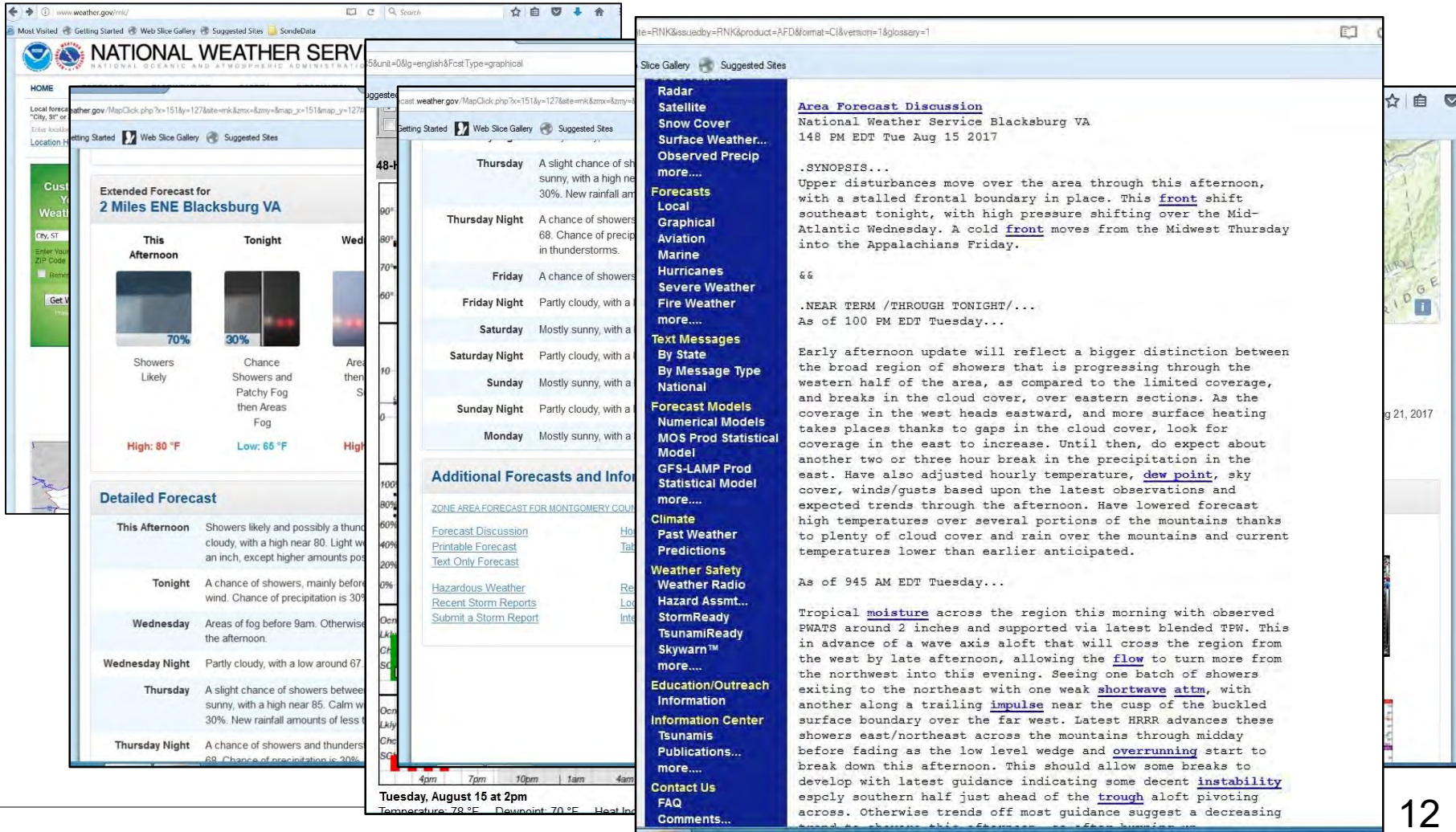
LightningMaps.org – global-to-local real-time cloud-to-ground lightning strike data display (www.lightningmaps.org)



Weather Forecasts – “Near-Term” & “Short-Term”

Near-term: to 12-18 hours / Short-term: 1-3 days

www.weather.gov



The screenshot displays the National Weather Service website for Blacksburg, VA. The main content area shows an extended forecast for the next few days, including a detailed forecast for the current day and night. The forecast discussion section provides a more in-depth analysis of the weather conditions, mentioning a stalled frontal boundary and the potential for showers and thunderstorms. The page also includes a sidebar with various links and a map of the area.

Extended Forecast for 2 Miles ENE Blacksburg VA

Time Period	Forecast	Precipitation	Temperature
This Afternoon	Showers Likely	70%	High: 80 °F
Tonight	Chance Showers and Patchy Fog then Areas Fog	30%	Low: 65 °F
Wednesday	Areas of fog before 9am. Otherwise the afternoon.		High: 80 °F
Wednesday Night	Partly cloudy, with a low around 67.		Low: 65 °F
Thursday	A slight chance of showers between sunny, with a high near 85. Calm with 30% New rainfall amounts of less		High: 85 °F
Thursday Night	A chance of showers and thunders	68	Low: 65 °F

Detailed Forecast

Time Period	Forecast
This Afternoon	Showers likely and possibly a thund cloud, with a high near 80. Light w an inch, except higher amounts pos
Tonight	A chance of showers, mainly before wind. Chance of precipitation is 30%
Wednesday	Areas of fog before 9am. Otherwise the afternoon.
Wednesday Night	Partly cloudy, with a low around 67.
Thursday	A slight chance of showers between sunny, with a high near 85. Calm with 30% New rainfall amounts of less
Thursday Night	A chance of showers and thunders

Forecast Discussion

Upper disturbances move over the area through this afternoon, with a stalled frontal boundary in place. This front shift southeast tonight, with high pressure shifting over the Mid-Atlantic Wednesday. A cold front moves from the Midwest Thursday into the Appalachians Friday.

.NEAR TERM /THROUGH TONIGHT/...
As of 100 PM EDT Tuesday...

Early afternoon update will reflect a bigger distinction between the broad region of showers that is progressing through the western half of the area, as compared to the limited coverage, and breaks in the cloud cover, over eastern sections. As the coverage in the west heads eastward, and more surface heating takes places thanks to gaps in the cloud cover, look for coverage in the east to increase. Until then, do expect about another two or three hour break in the precipitation in the east. Have also adjusted hourly temperature, dew point, sky cover, winds/gusts based upon the latest observations and expected trends through the afternoon. Have lowered forecast high temperatures over several portions of the mountains thanks to plenty of cloud cover and rain over the mountains and current temperatures lower than earlier anticipated.

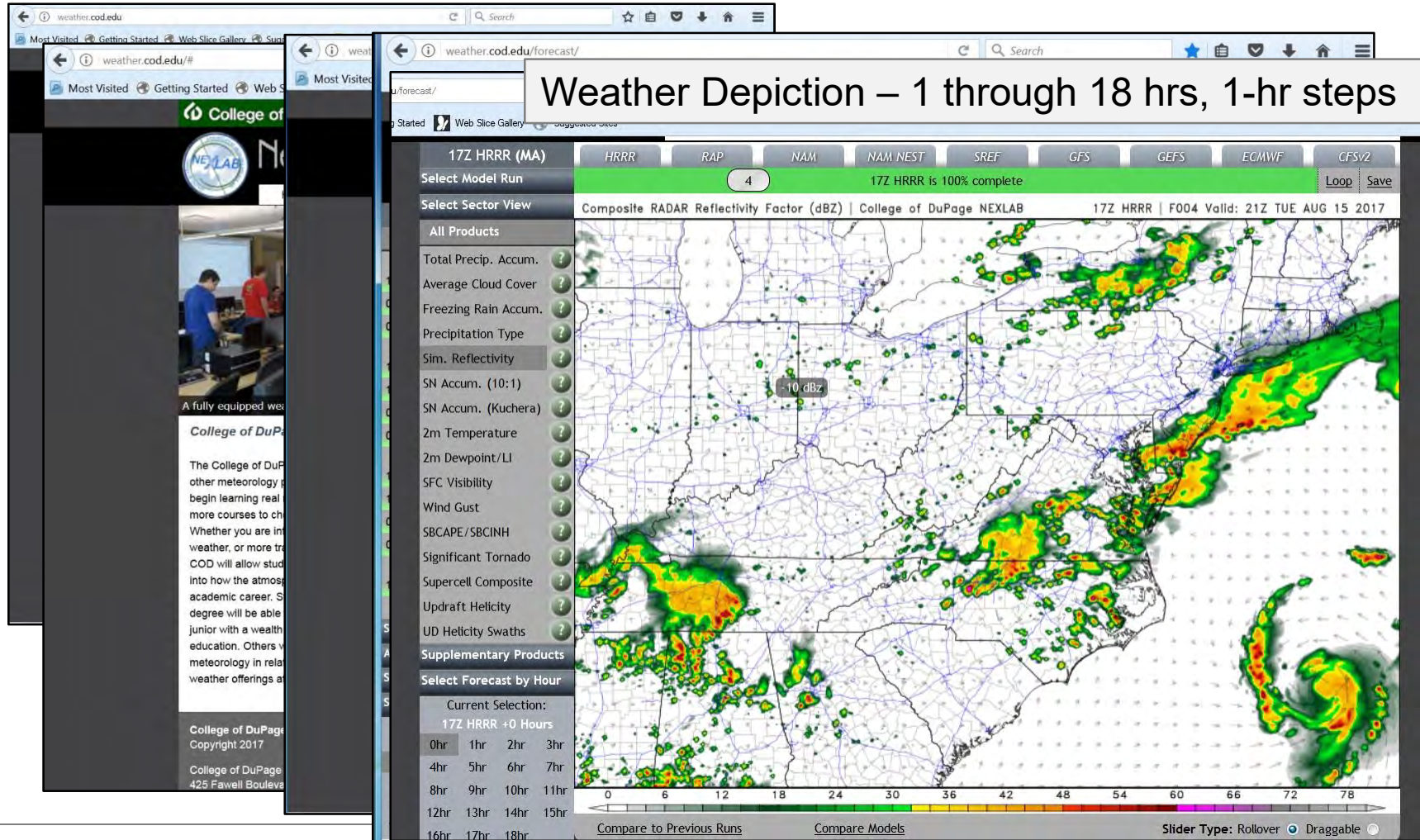
As of 945 AM EDT Tuesday...

Tropical moisture across the region this morning with observed PWATS around 2 inches and supported via latest blended TPW. This in advance of a wave axis aloft that will cross the region from the west by late afternoon, allowing the flow to turn more from the northwest into this evening. Seeing one batch of showers exiting to the northeast with one weak shortwave atm, with another along a trailing impulse near the cusp of the buckled surface boundary over the far west. Latest HRRR advances these showers east/northeast across the mountains through midday before fading as the low level wedge and overrunning start to break down this afternoon. This should allow some breaks to develop with latest guidance indicating some decent instability espclly southern half just ahead of the trough aloft pivoting across. Otherwise trends off most guidance suggest a decreasing

Weather Forecasts – “Near-Term”

High Resolution Rapid Refresh (HRRR) Model

College of DuPage (weather.cod.edu)



Weather Forecasts – “Short-Term”

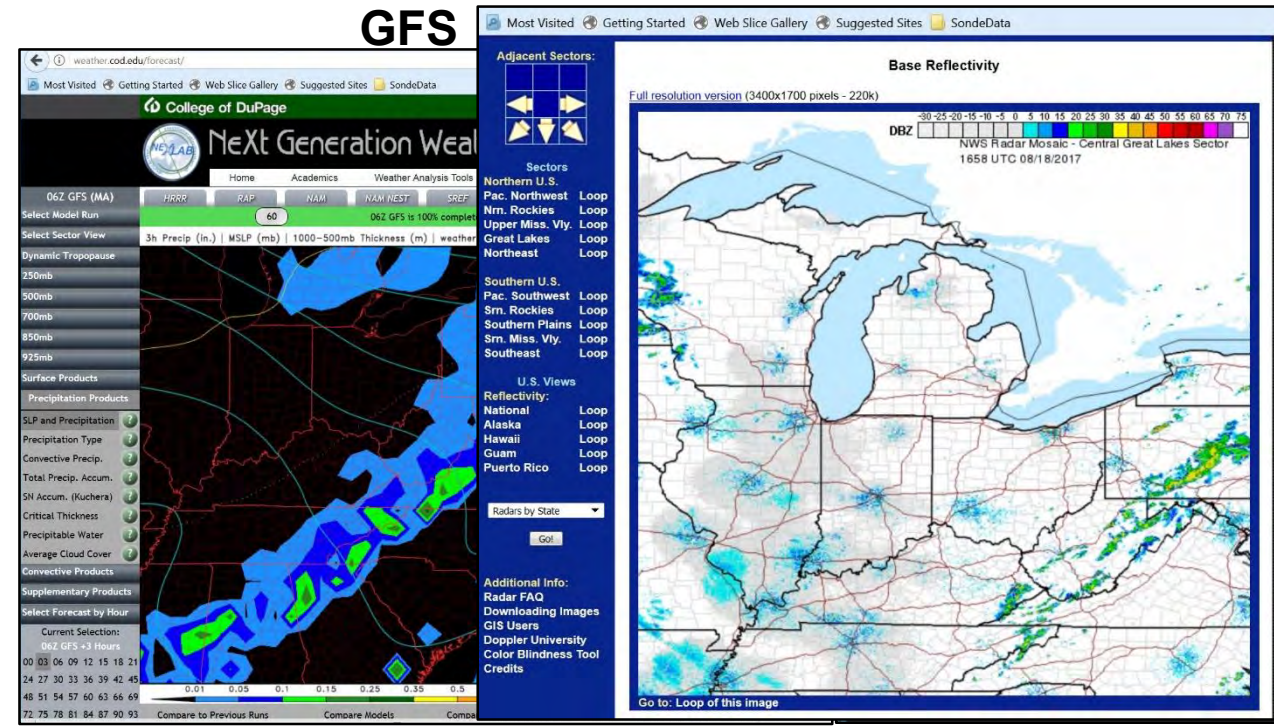
North American Mesoscale (NAM) Model
(1-84 hrs, 3-hr steps)

Global Encore System (GFS) Model
“The American” (0-384 hrs, 3-hr steps)

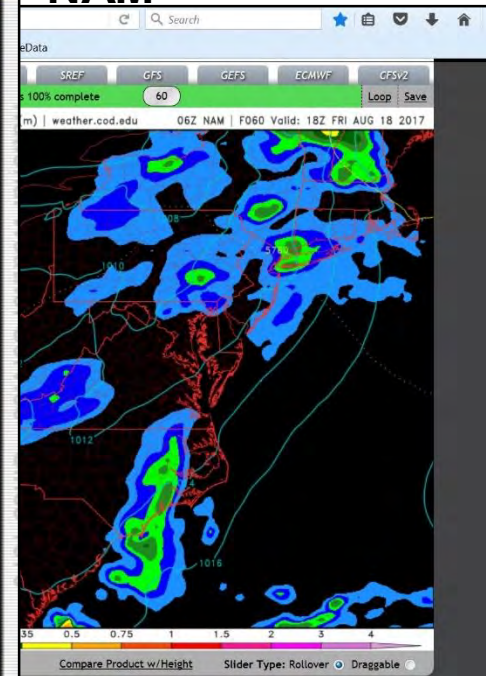
European Centre for Mid-Range Weather Forecasts (ECMWF) Model
“The Euro” (0-168 hrs, 24-hr steps)

Wednesday, 1 am Model Runs: 3-hr Precipitation Ending at 1 pm Friday

GFS



NAM

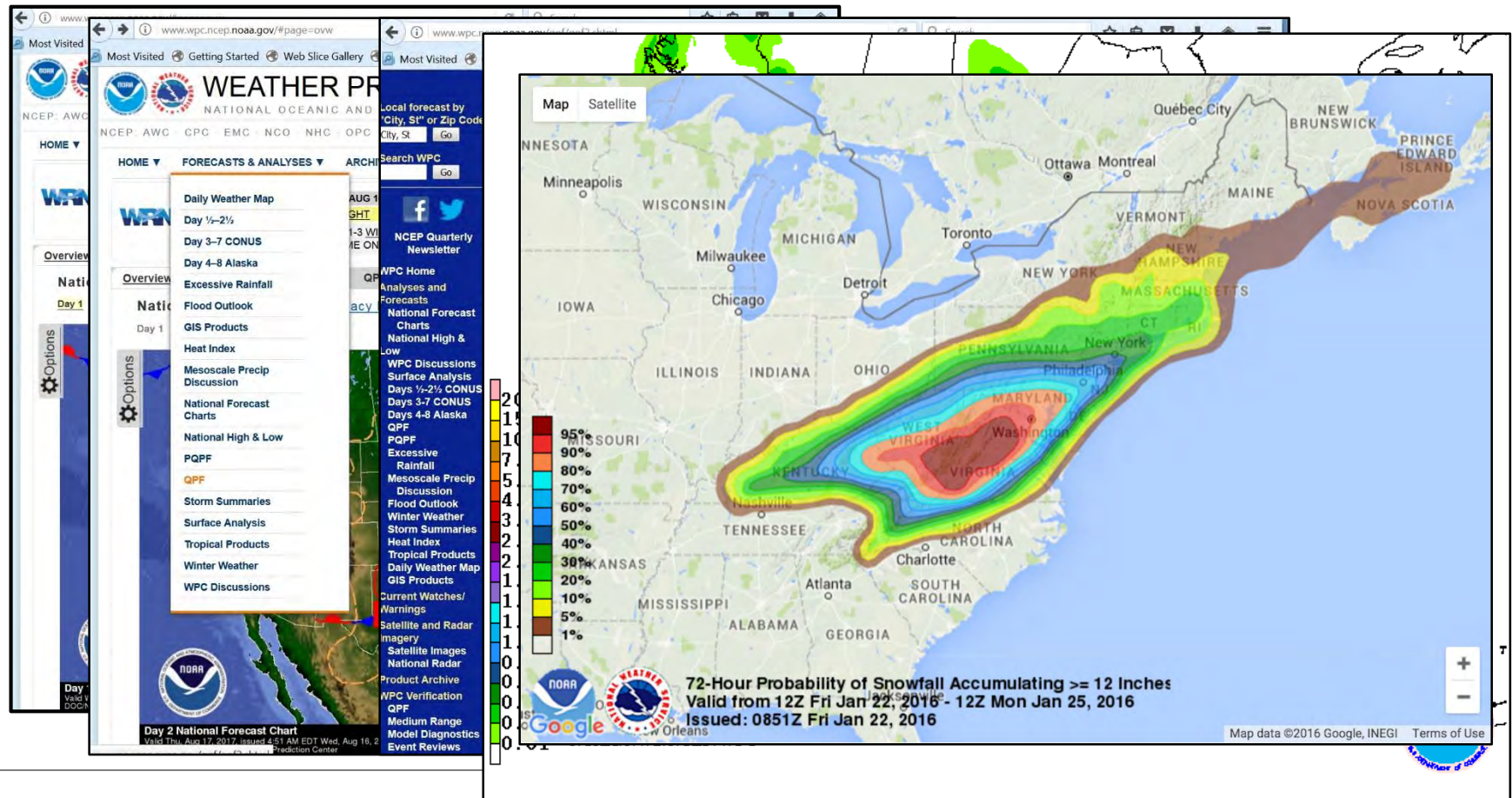


Weather Forecasts – “Short-Term” & “Long-Term”

Long-term: 3-7 days

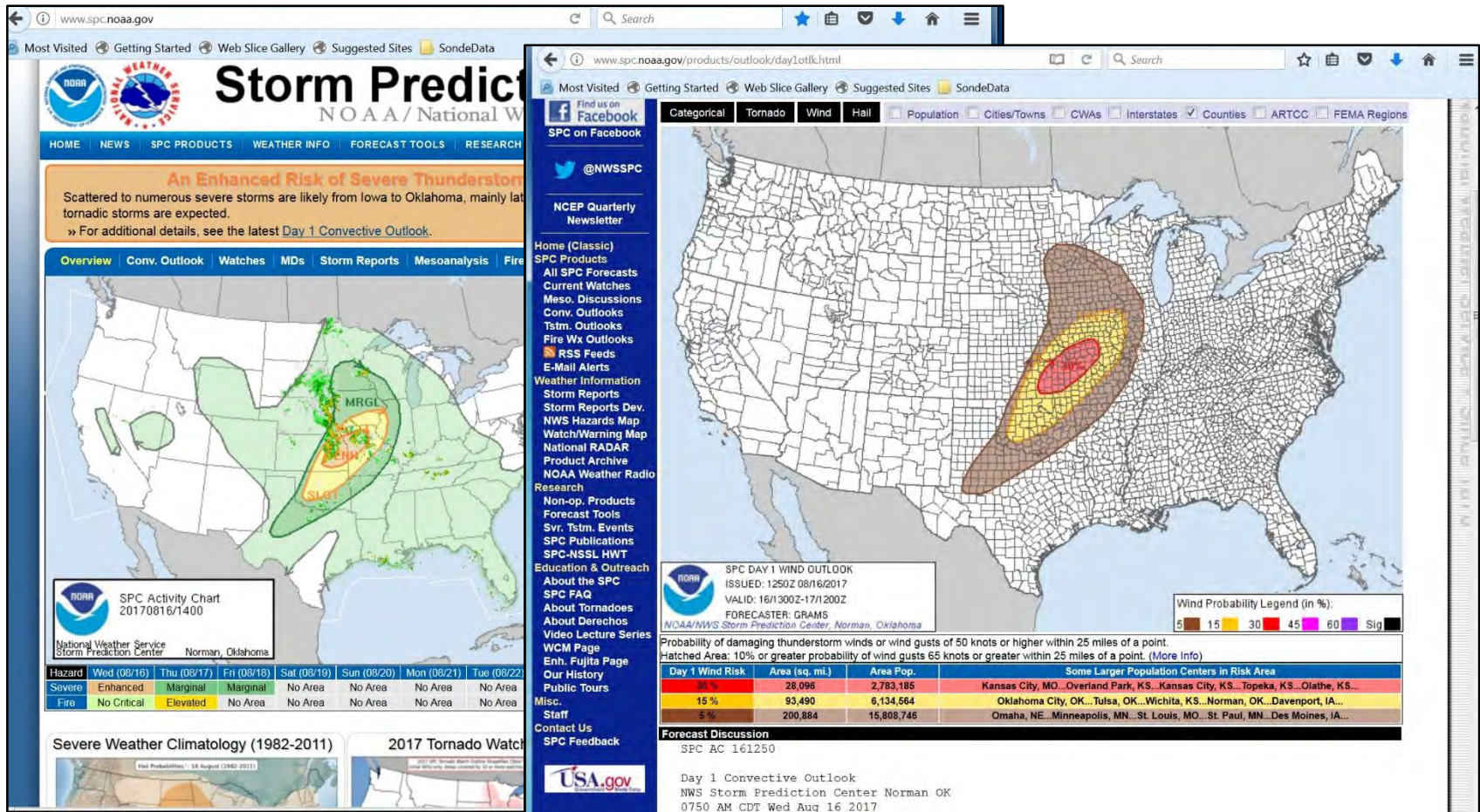
Weather Prediction Center (WPC) (www.wpc.ncep.noaa.gov)

National-level guidance for local FOs (general, excess rain, winter weather)



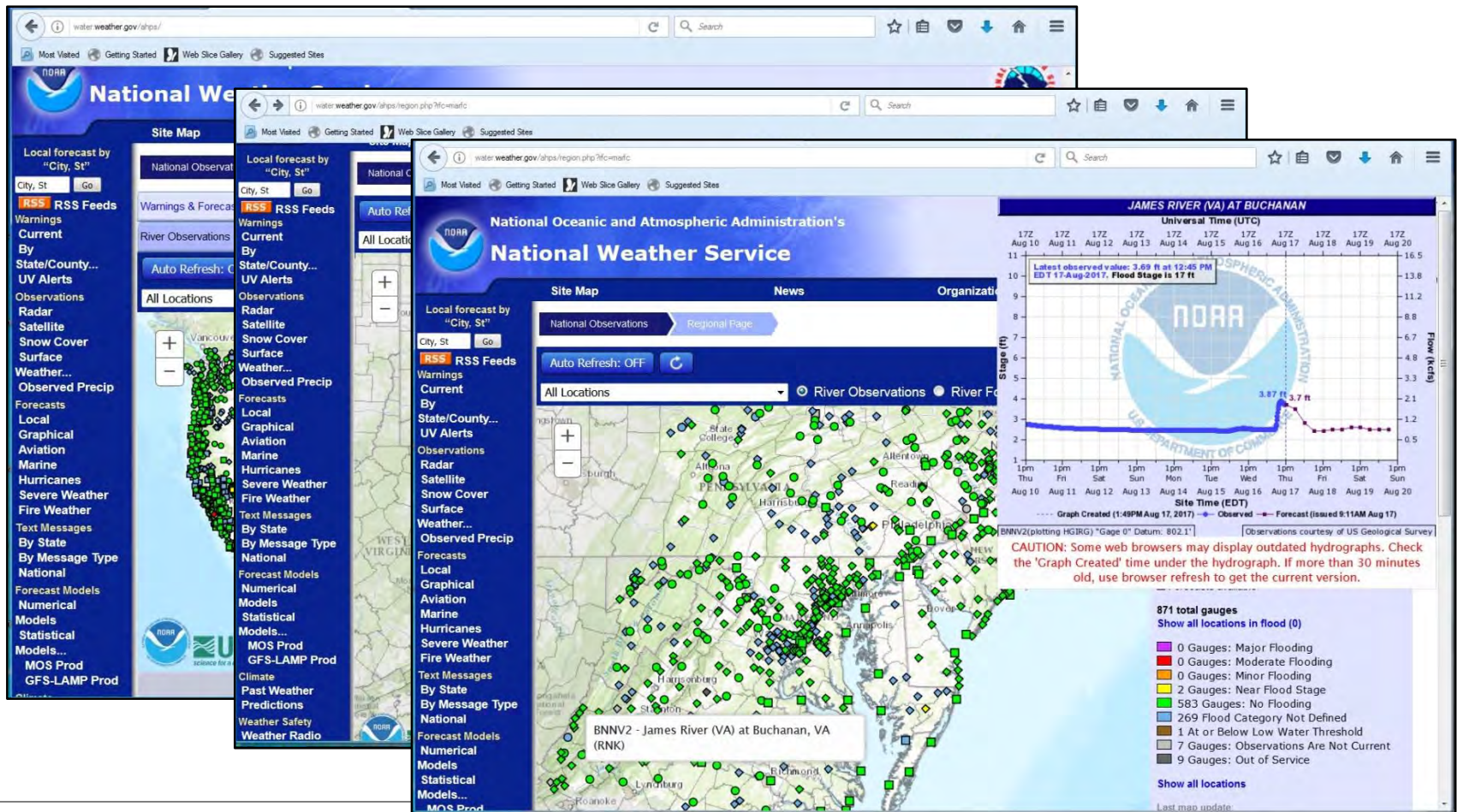
Weather Forecasts – “Short-Term” & “Long-Term”

Storm Prediction Center (SPC) (www.spc.noaa.gov)
National-level guidance for local NWSFOs (severe, fire weather)



Weather Forecasts – “Short-Term” & “Long-Term”

River Forecast Centers (RFCs) (water.weather.gov/ahps)
Regional-level guidance for local NWSFOs; Virginia – Mid-Atlantic, Southeast



Weather Forecasts - Caveats

Weather Forecasts (In general, NWS recommended over derivatives and private forecasts.)

Nowcasts (minutes-hours) – Combining weather data trends with theoretical knowledge and local experience – *very high accuracy* (warnings/advisories)

Near-term (-12/18 hours) – Translating mesoscale numerical weather forecasts (e.g., HRRR) to local gridded forecasts; models begin with current conditions and react to broader atmospheric conditions simulated by coarser models; forecasters consider model biases and local idiosyncrasies – *high accuracy* (caveat – avoid precipitation specifics during convective season of late spring through early fall)

Short-term (1-3 days) – Translating forecasts from mesoscale and global models (e.g., NAM, GFS, ECMWF); mesoscale models benefit from higher resolution but are blind to larger circulation, while global models lack representation of local features; issues compound through time – *high accuracy day 1, good accuracy days 2 and 3* (caveat – focus on general conditions (max/min temperature, precipitation probability) for days 2 and 3, as timing/magnitude of events becomes questionable)

Weather Forecasts – Caveats, Guidance

Long-term (3-7 days) – Translating forecasts from global models (e.g., GFS, ECMWF); model issues compound through time – *high accuracy for generalities, low accuracy for details* (caveat – focus on trends – warmer/cooler and drier/wetter – and generalities of large events (blizzard, severe weather outbreak, dangerous heat/cold))

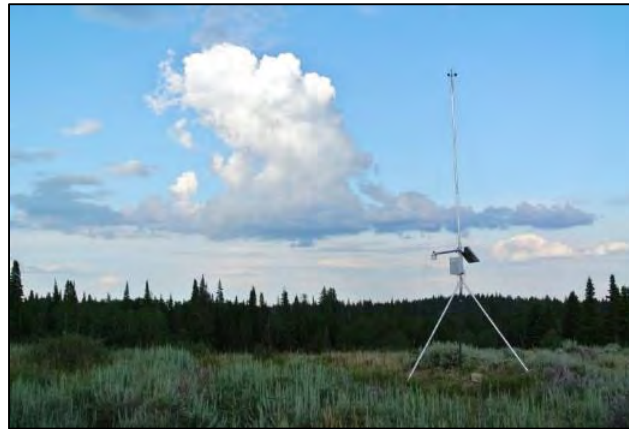
General Guidance

Regularly monitor weather forecasts (sub-daily) – most profound forecast changes occur after new balloon data are fed into models twice daily (12Z and 00Z, or 7 am and 7 pm local early-November to mid-March...8 am and 8 pm during daylight savings time). Fresh model runs late-night (midnight) and midday.

Recognize that forecasters tend to be conservative beyond three days – e.g., high-confidence snowstorms often enter the 7-day forecast period as a 30% chance. Reading the forecast discussion will provide context.

Long-range and climate forecasts are hedged-bets. Safely portrayed as “leans”.

A Guide to Practical Weather and Climate Information for Loggers



Drew Ellis, VT Geography
awellis@vt.edu

Virginia Loggers Association Conference
Virginia Tech, Skelton Conference Center
August 18, 2017

Weather/Climate Forecasts – “Long-Term”/”Long-Range”

Long-Range: 6-14 days (Experimental: 3-4 weeks)

Climate Prediction Center (CPC) (www.cpc.ncep.noaa.gov)

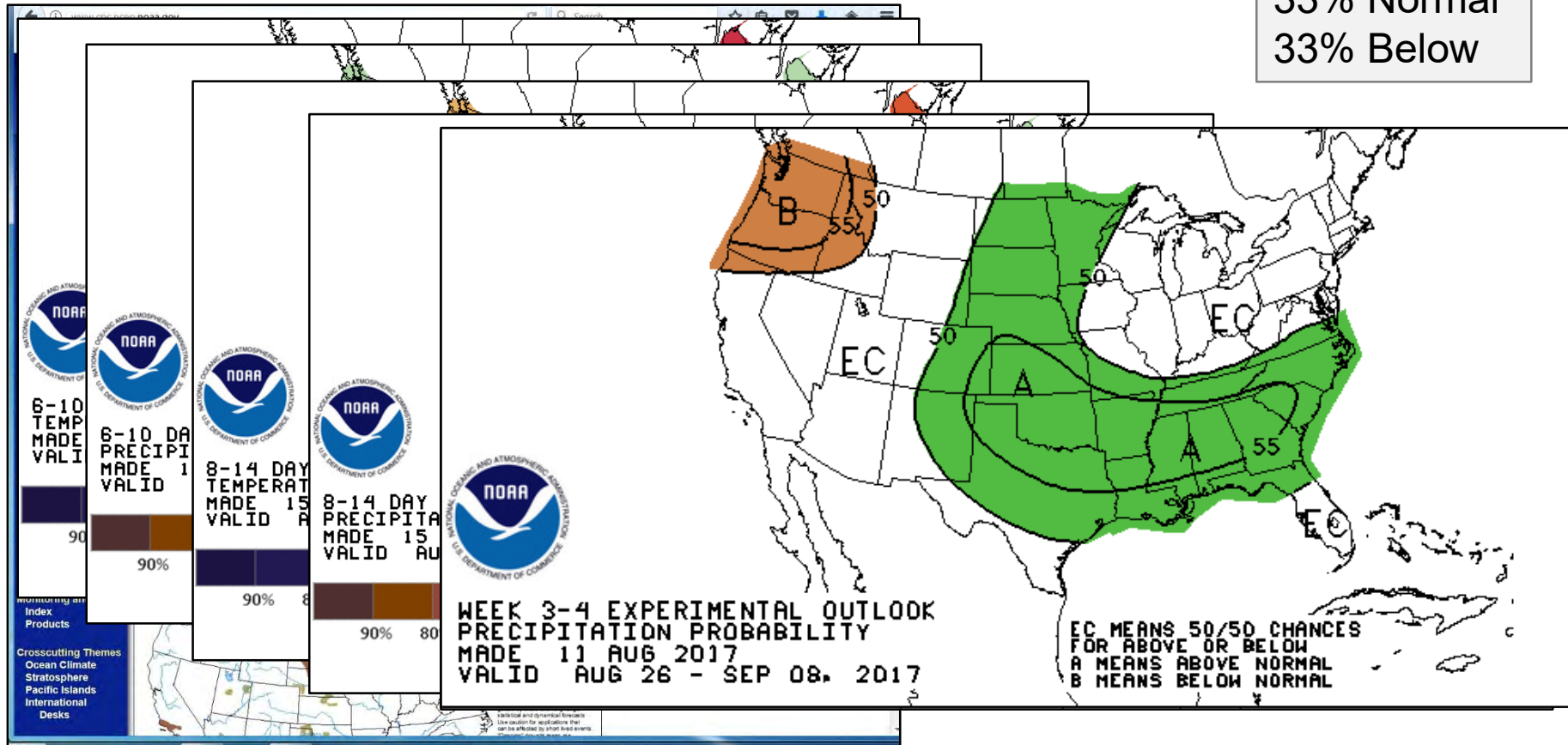
Outlooks – general patterns of temperature and precipitation

Start:

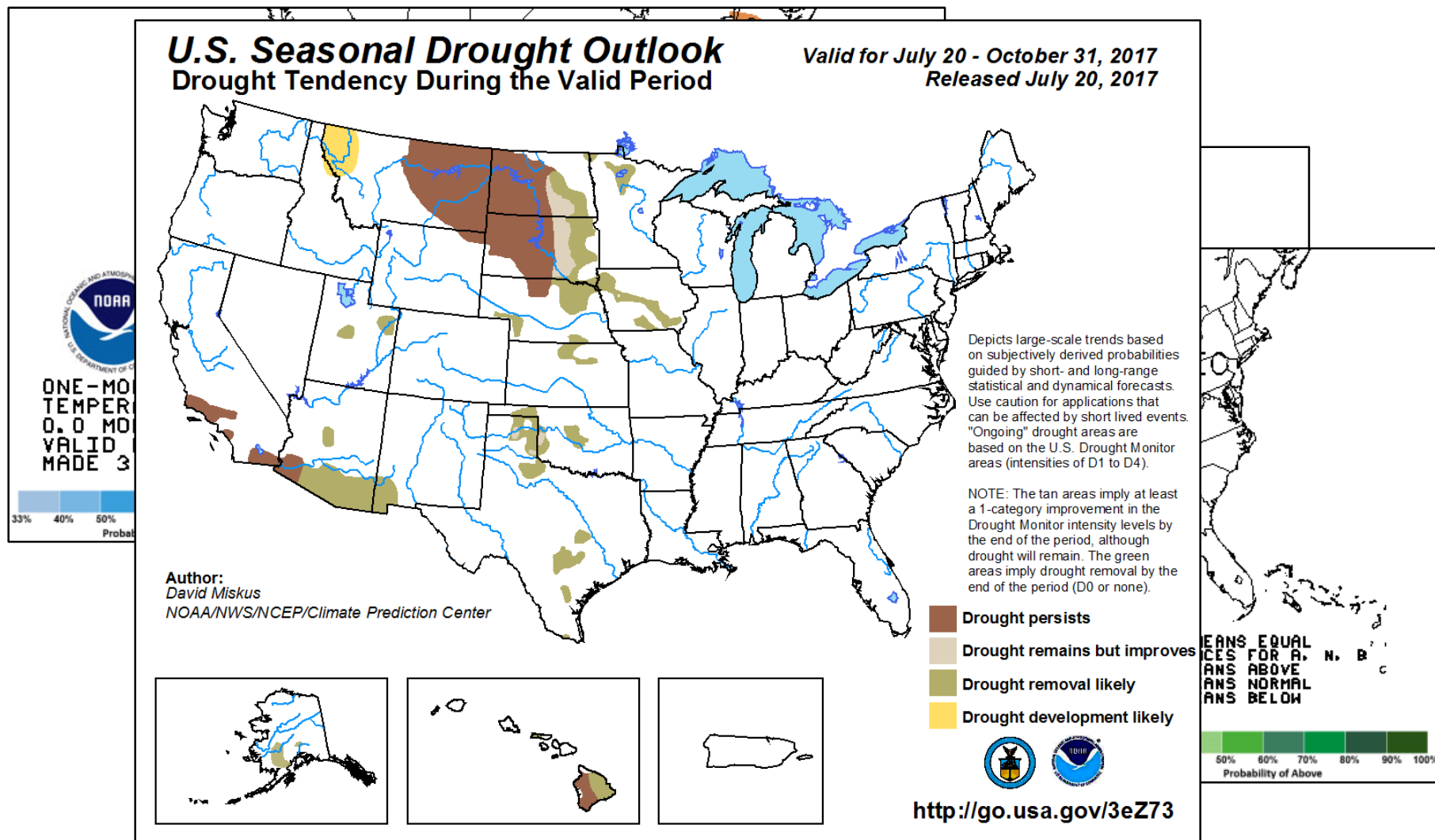
33% Above

33% Normal

33% Below



Climate Forecasts – Monthly, Seasonal



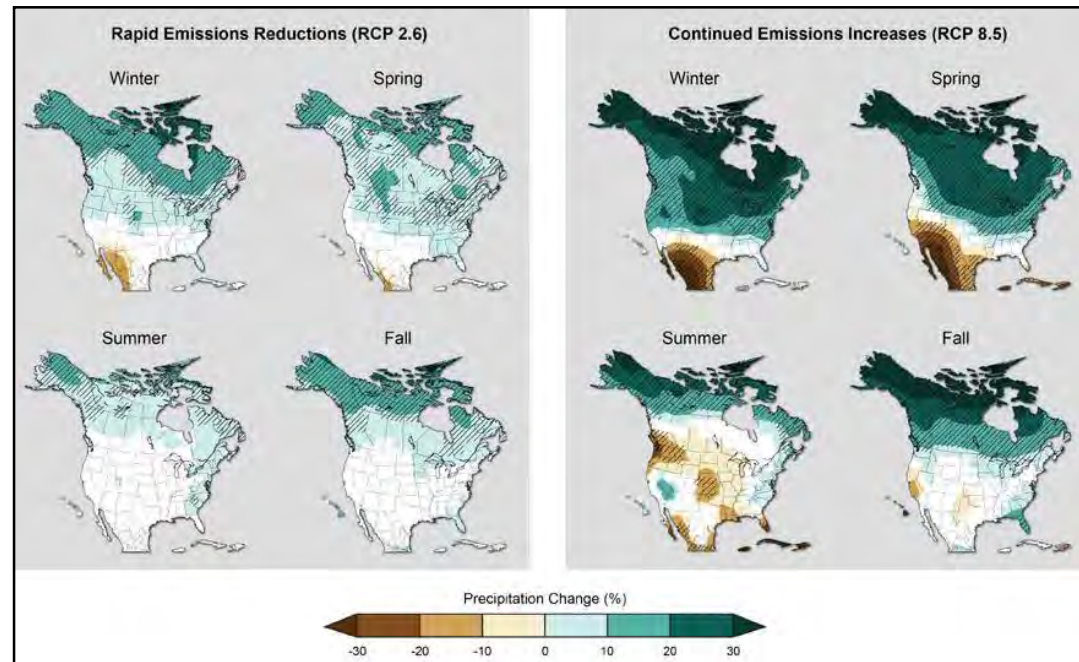
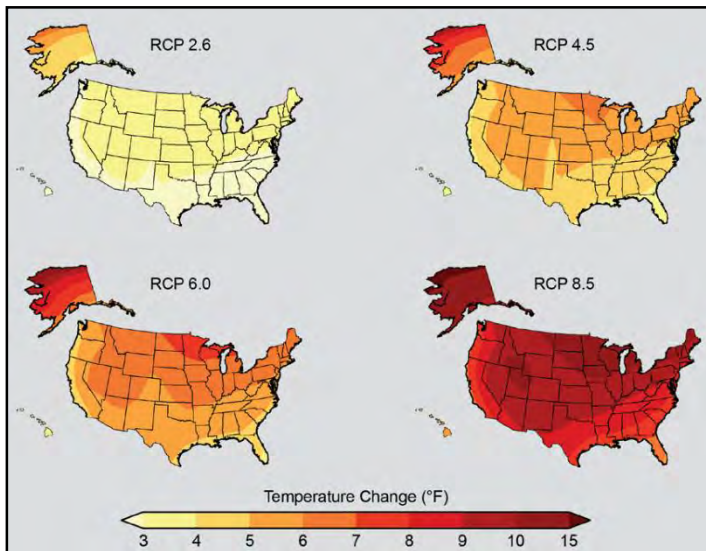
Climate Forecasts – 21st Century



Global Climate Model forecasts using greenhouse gas (GHG) “representative concentration pathways”
(RCP2.6/RCP8.5 = declining/increasing GHG emissions)

Projected Precipitation Change 2071-2100 (v. 1970-1999)

Projected Temperature Change 2071-2100 (v. 1970-1999)



Source: *Global Climate Change Impacts in the United States*,
National Climate Assessment (2013)

