



National Weather Service

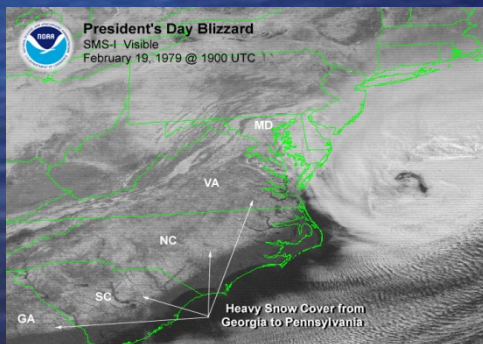
WFO Operations 1979 vs 2014

Steve Zubrick

*Science and Operations Officer (SOO)
Baltimore-Washington Weather Forecast Office*

“Advances in Extratropical Cyclone Understanding and Prediction Since the 1979 Presidents' Day Storm” Colloquium

28 May 2014



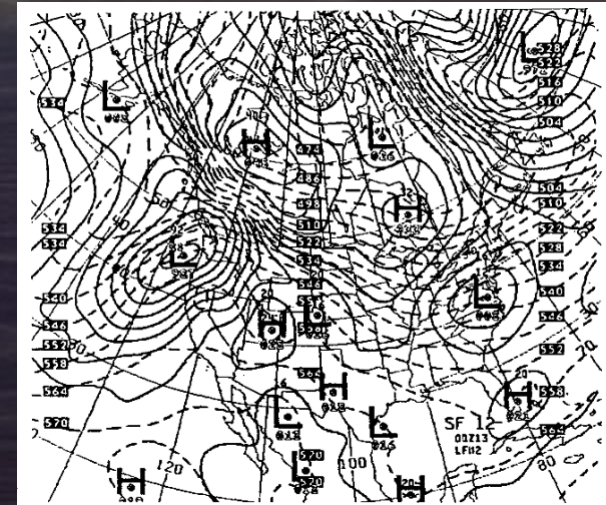
WFO 1979 Operations



- 1979 NWS technology...
 - **Observations...**
 - GOES satellite imagery (paper copy)
 - TIROS-N imaging system
 - Advanced Very High Resolution Radiometer (AVHRR)
 - Surface stations limited
 - Radar network 1950/60s (WSR57/74C)

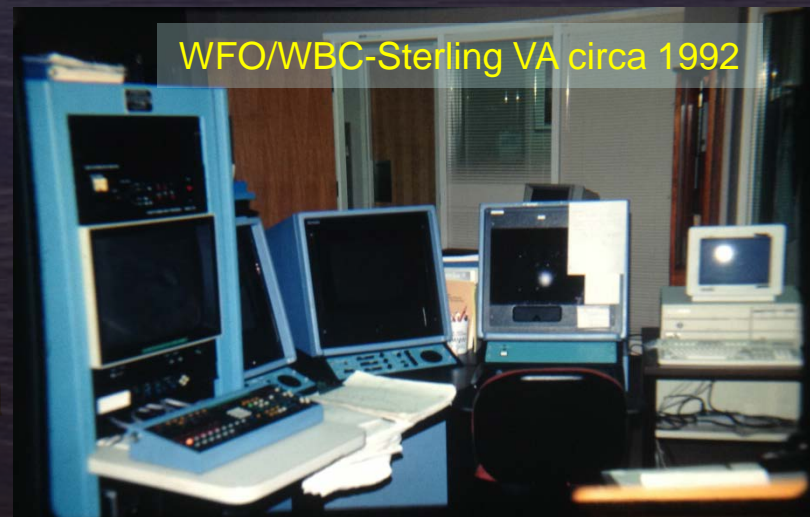
WFO 1979 Operations

- 1979 NWS technology...
 - **NWP Models...**
 - LFM-II (127 km)
 - 7-layer PE (190 km)
 - Barotropic/Baroclinic



WFO 1979 Operations

- 1979 NWS technology...
 - **Workstations...**
 - AFOS: **A**utomated **F**orecast **O**perations **S**ys.)
 - Mono-chromatic
 - Limited looping
 - Up to 3 overlays
 - Limited model data
 - No model diag.
 - Limited display of satellite/radar data



WFO 1979 Operations



- 1979 NWS technology...
 - **Communications...**
 - Telephone/Fax
 - NAWAS (hotline)
 - Mail (snail)
 - **Products...**
 - Text-based

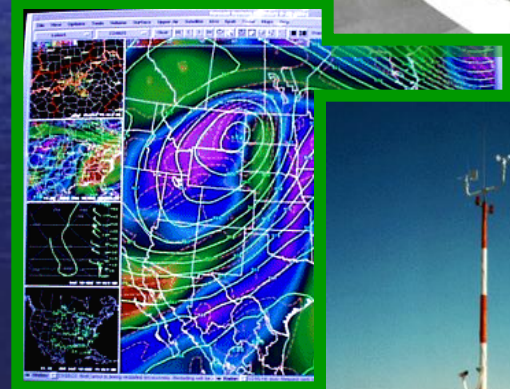
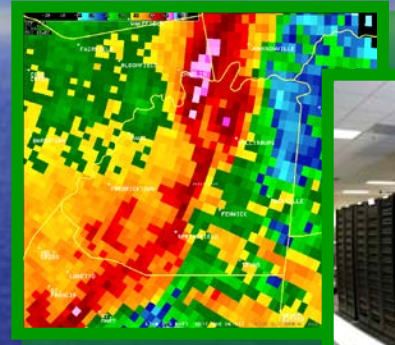
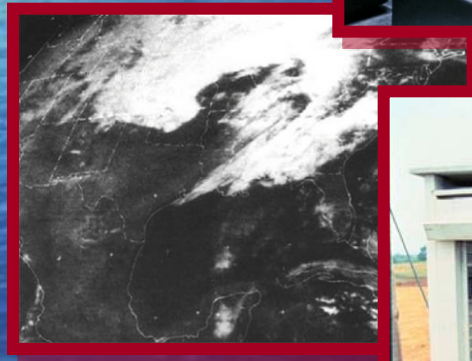
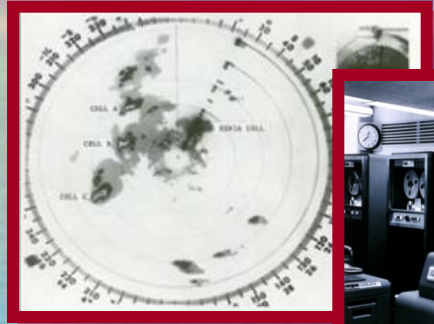




NWS 1979 to 2014

Then...

Now...



WFO 2014 Operations

- 2014 NWS technology...
ADVANCED



- NWP: Ensembles, hi-res (3-4 km)
- Workstations: AWIPS (I/II)
- OBS: Radar/Sat/surface
- Comms: Internet/digital phones
- Products: NDFD/graphical (& text)

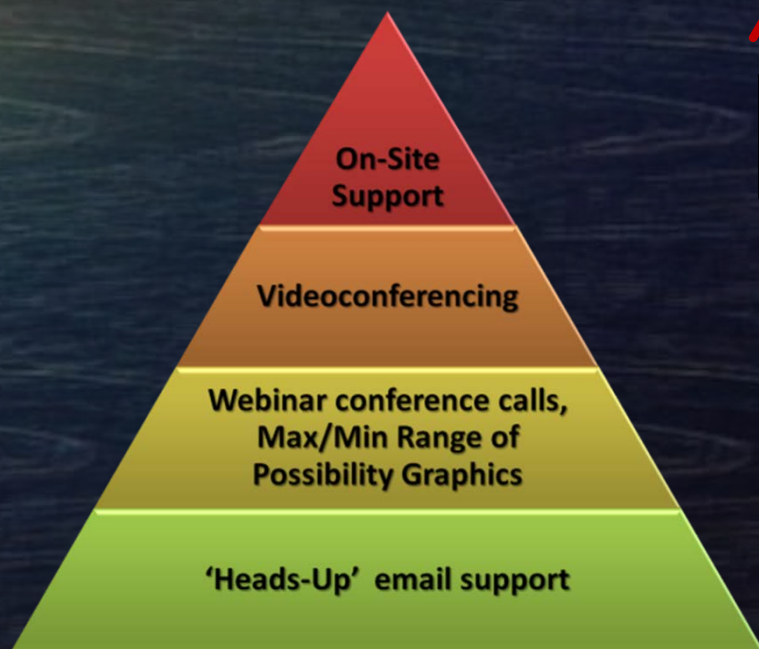


WFO 2014 Operations

- Biggest change in WFO operations:

IDSS:

Integrated Decision Support Services



* Magnitude of Event
* Proximity in Time



WFO IDSS Operations



- Based on personal interviews with WFO/WBC personnel who worked in the 1979 event...
 - Very limited IDSS with external agencies (gov't / media)
 - No discussions on range of possibilities for event

WFO IDSS Operations



- Now...
 - Frequent communication of key IDSS information to key external agencies (gov't / media)
 - Provide guidance/discussions on range of possibilities for event



Examples IDSS in Action

Monday March 04, 2013 [previous day](#) [next day](#)

LWX Shift Log

Shift Teams:
 (Meso/Synop/HMT)

mid	██████████
day	██████████
eve	██████████

Edit	Forecaster Time	Category	Log Entry
	14:32Z	Conference Call	██████████ Enter the meeting number in the "Meeting Number" box. 3. Click "Join" Conf Call Time (UTC): 2013-03-04 21:00:00
	14:32Z	Conference Call	10 AM Conf Call <u>MEMA</u> . Call-in toll-free number: ██████████ Conf Call Time (UTC): 2013-03-05 15:00:00
	15:14Z	Conference Call	3:00 PM <u>VDEM</u> conference call. Speaker call in number ██████████ Conf Call Time (UTC): 2013-03-04 20:00:00
	15:15Z	Conference Call	10:00 AM Tuesday morning <u>WV</u> state conference call. Info TBA
	16:04Z	Conference Call	<u>DC HSEMA</u> 11am ██████████ CS will handle. Conf Call Time (UTC): 2013-03-05 16:00:00
	16:11Z	Other	██████████
	16:31Z	Weather Fire	STQ for Cowbane Praire. ██████████ had to manually enter info for STQ as the requestor could not do this on his phone.
	18:19Z	Systems Radar	BWI TDWR expected maintenance: 3/13 from 15z to 19z
	19:52Z	Conference Call	COG Call In 9PM EST Tue March 5. Call#: ██████████ Conf Call Time (UTC): 2013-03-06 02:00:00
	20:11Z	General Other	██████████ (SFSC) will be expecting guess tomorrow around 10 A.M. ██████████ Please allow access.
	21:12Z	Schedule OT	██████████ 1 OT - winter weather products/briefing
	22:40Z	Schedule OT	██████████ 5 OT briefings
	22:57Z	Conference Call	MATOC Conf Call: Time: 3:00PM (Tue, March 5) Call-In#: ██████████ Conf Call Time (UTC): 2013-03-05 20:00:00
	00:13Z	Schedule OT	██████████ IOT Wx
	02:13Z	Systems NWR	Been trying to keep cycle times down on NWR transmitters by cutting out definitions of watches and warnings and twitter and facebook info from surrounding offices likes PIT CTP and AKQ.



Example IDSS in Action

- During winter 2013-14, WFO Sterling provided probability-based snowfall amount guidance to the public/media/gov't
- Following describes briefly this effort





LWX Operations 2014

- Integration of IDSS into operations
- Less emphasis on grid production, and more emphasis on IDSS, training, & program work
- Developed a user interface which enables efficiencies in forecaster-led gridded data population
 - GFE User Interface for Data Entry

Pilot Project Objective 2: Winter Weather Probabilistic Products

- Guidance for probabilistic products provided by AMS/NSF
- Collaborated with WPC, MDL, & core customers
- Allows forecaster to add value
- Goal: Improved decision-making for core customers



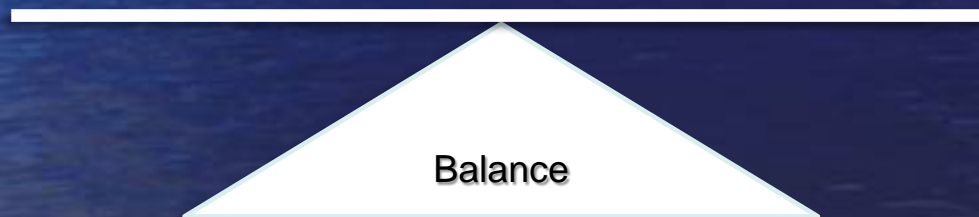


Background

- Accurate Forecasts Desired Days in Advance
- But, as Lead Time  , Certainty 
- And Vice-Versa
 - Need to Better Communicate the Range of Possibilities

Lead Time

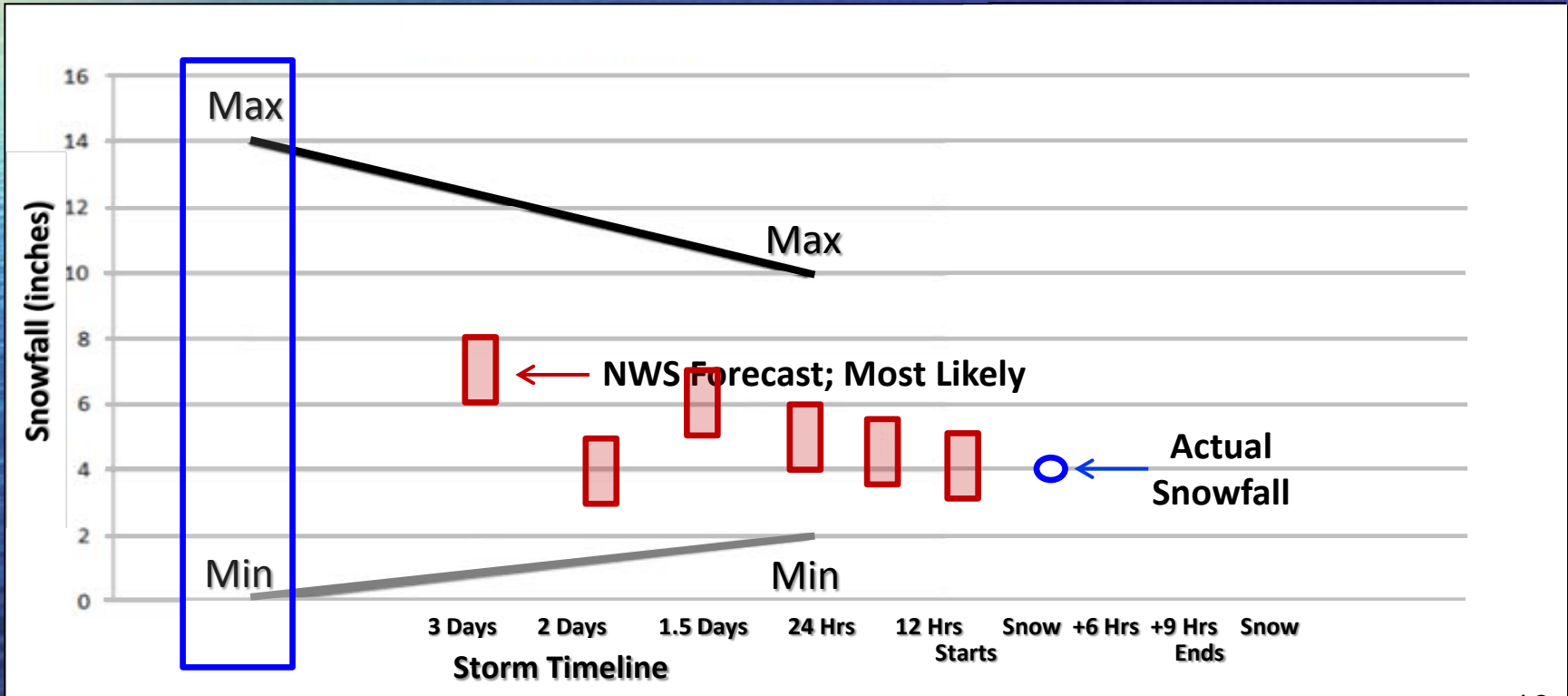
Certainty





Idealized Situation

- As Storm Nears...
 - Range of Possibilities Shrinks
 - Confidence Increases
- NWS Forecast Between Max/Min





Min/Max/Most Likely Graphics

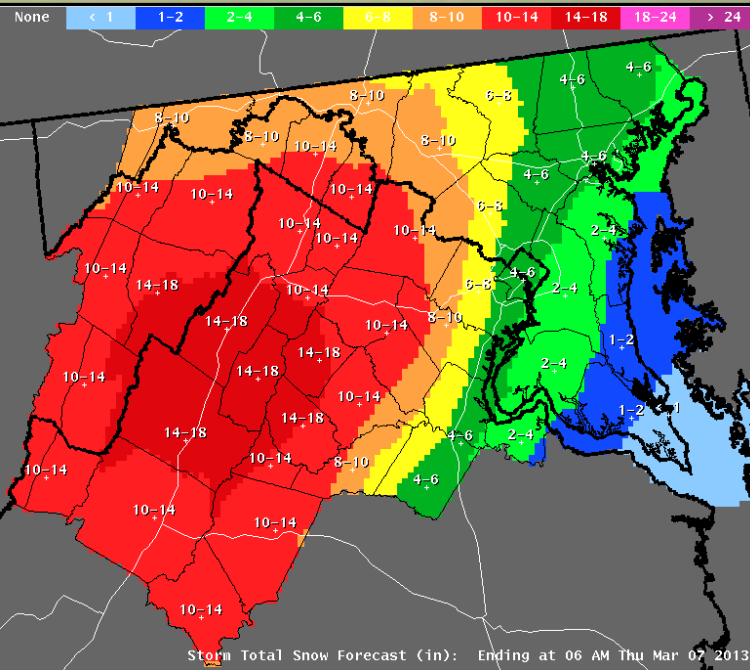


Minimum



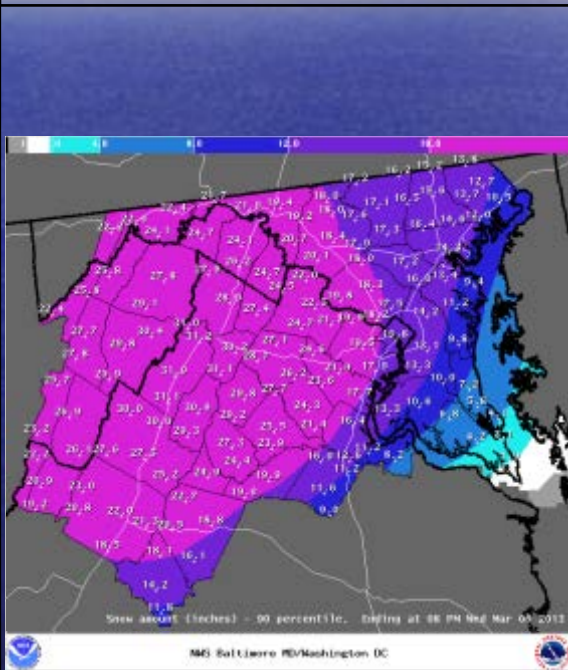
Expect at least this much

Most Likely



Official NWS Forecast

Maximum



Potential for this much



Max/Min/Likely

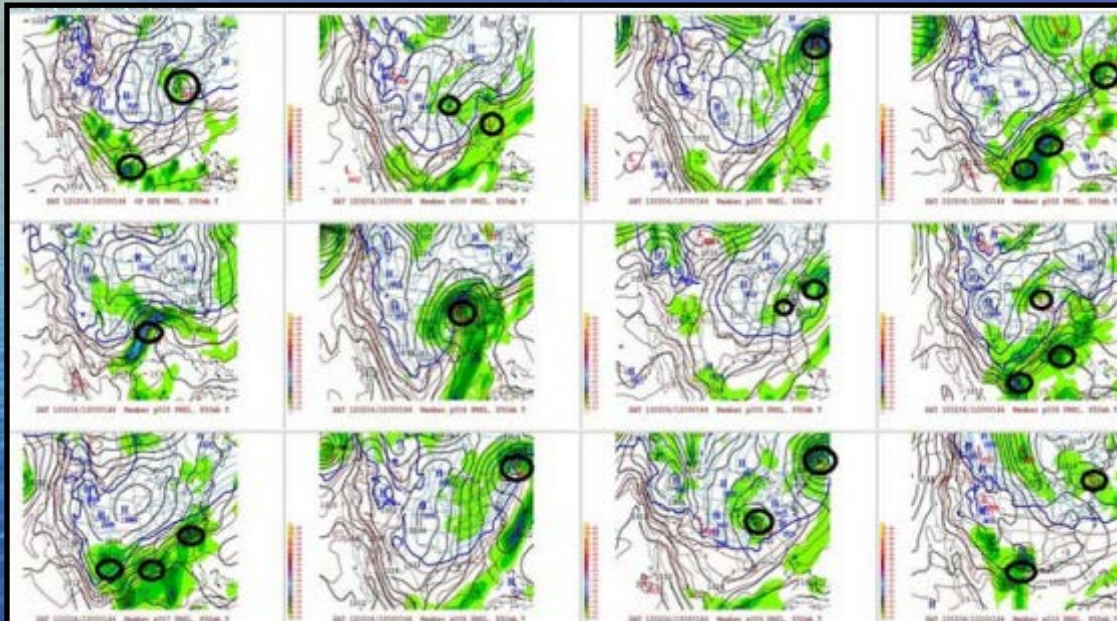
- **Better Communication of Range of Possibilities**
 - **3 New Snow Products**
 - Explain the Uncertainty in the Snowfall Forecast
 - **When We Communicate Uncertainties...**
 - Provide the “Goal Posts” of Possibilities
 - People Can Make Better Decisions
 - Leads to Less Impact on the Economy & Society





What Science is Behind This?

Provided from ensemble of atmospheric models



- 32 Pieces
- 21 SREF
 - 6 GEFS
 - 1 GFS
- 1 NAM
 - 2 Euro
 - 1 Canadian

Ensemble: Many different models of the atmosphere that show possible differences in forecast weather



What Science is Behind This?



- **Forecasters at WFO Sterling:**

- Evaluate computer guidance before being released

- **Final product combines:**

- Forecaster Knowledge/Experience
- Computer Model Ensembles

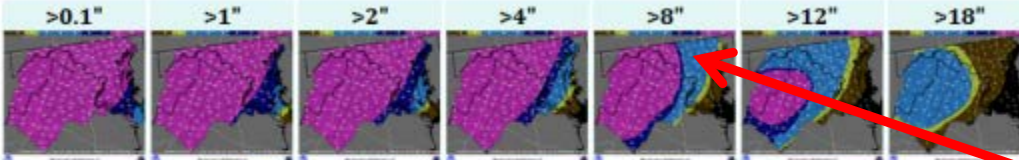


Exceedence Graphics

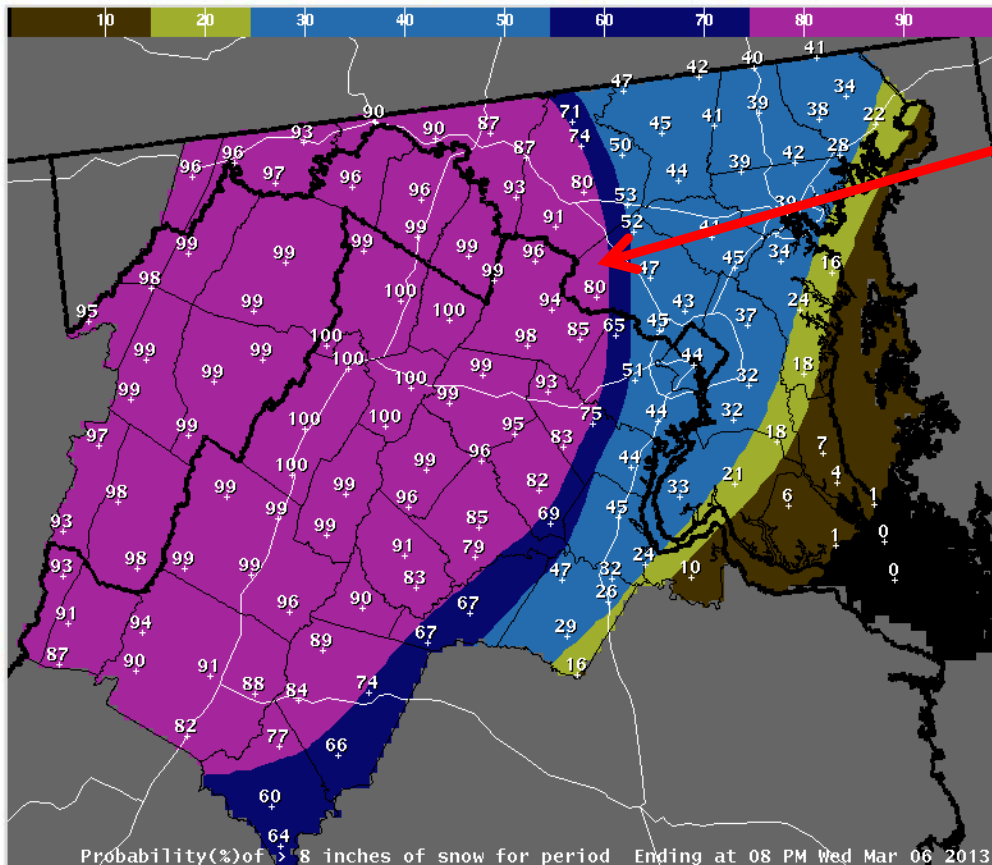
Chance That Snow Accumulation Will Be Greater Than...

03/05/2013 1900 to 03/06/2013 2000 EST

Whats this?



Allows user to evaluate threat for their thresholds



Mouse over desired amount and image appears on large screen

- > 0.1"
- > 1"
- > 2"
- > 4"
- > 8"
- > 12"
- > 18"

Probability(%) of > 8 inches of snow for period Ending at 08 PM Wed Mar 06 2013



Table of Probabilistic Snowfall Accumulations

Chance of Snow Accumulation Ranges

03/05/2013 1900 to 03/06/2013 2000 EST

County:

User can see threat of all possible scenarios for their town

Location	Min	Likely	Max	0"	T-1"	1-2"	2-4"	4-8"	8-12"	12-18"	>18"
Baltimore, MD	1	4-8	15	0%	9%	6%	17%	28%	21%	15%	4%
Bayard, WV	9	8-12	22	0%	0%	0%	1%	4%	47%	21%	27%
Charlottesville, VA	4	12-18	19	0%	6%	0%	4%	16%	25%	37%	12%
Frederick, MD	7	8-12	19	0%	0%	0%	1%	17%	38%	32%	12%
Fredericksburg, VA	0	4-8	14	11%	11%	6%	11%	25%	20%	13%	3%
Hagerstown, MD	8	8-12	19	0%	0%	0%	1%	13%	46%	26%	14%
Harrisonburg, VA	14	12-18	28	0%	0%	0%	0%	1%	6%	49%	44%
Leonardtown, MD	0	1-2	5	39%	3%	24%	20%	13%	1%	0%	0%
Martinsburg, WV	10	8-12	24	0%	0%	0%	0%	4%	50%	13%	33%
National Mall, DC	1	4-8	17	0%	9%	5%	11%	30%	19%	19%	7%
Staunton, VA	9	12-18	22	0%	0%	1%	0%	7%	19%	42%	31%
Winchester, VA	13	12-18	29	0%	0%	0%	0%	0%	6%	56%	38%

Location	Min	Likely	Max	0"	T-1"	1-2"	2-4"	4-8"	8-12"	12-18"	>18"
Baltimore, MD	1	4-8	15	0%	9%	6%	17%	28%	21%	15%	4%



How Can This Help Me?

- **Better Communicating Uncertainty Leads To...**
 - Decision makers can weigh cost of taking action based on a range in forecasts vs. potential loss if no action is taken
 - Some plan for worst case; others need most likely
 - Ideally no surprises for anyone
 - Less impact from winter storms through better planning & decision making





Summary



- **NWS WFO Baltimore/Washington DC issues snow forecasts for the range of possibilities in snow amount**
- **3 new products** (In addition to what was always issued)
 - “Maximum / Most Likely / Minimum” maps
 - “Chance of Exceeding” maps
 - “Probability of Ranges” table
- **New winter weather webpage**
 - <http://www.erh.noaa.gov/lwx/winter>
- **Communicating uncertainty to decision-makers**
 - Minimize Winter’s Impact on the Region





Summary

- Events like 1979 storm have and will happen again
- Advances in forecasting extreme cyclogenesis must be communicated to key core partners to get proper response
- Heart of Weather-Ready Nation:
 - *“A Nation that is prepared for and responds to hazardous weather events”*



*WFO Sterling Staff
WRN Open House
October 2012*





Questions?