Product/Service Description Document
Experimental Probabilistic Snowfall Products
Winter 2016-2017

Part I - Mission Connection

a. Product/Service Description – Experimental probabilistic storm total snowfall graphics will be posted to the web indicating the minimum, most likely and maximum snowfall scenarios; the probability of various snowfall thresholds such as ≥ 0.1", 1", 2", 4", 6", 8", 12", 18"; plus a table showing the probability of snow falling within specified ranges and the probability of exceeding specified snowfall amounts.

b. Product Type – Experimental

c. Purpose - The purpose of these experimental probabilistic internet-based snowfall products is to provide customers and partners a range of snowfall possibilities, better communicate forecast uncertainties and enhance Decision Support Services (DSS) during winter weather events. The probabilistic snowfall products will complement existing NWS deterministic snowfall graphics, indicating areas of low and/or high uncertainty. The offices involved will produce 10% and 90% exceedance percentile graphics represented as the "Minimum Case" and "Maximum Case" scenarios, along with a "Most Likely Amount" case. Winter weather coordination calls with partners and customers frequently involve requests regarding forecast uncertainty, forecaster confidence, and best/worst case scenarios. These experimental probabilistic snowfall products will convey this critical information and enhance DSS. These probabilistic products were initially introduced to the WFO Washington DC/Baltimore emergency management community during the winter of 2012/2013 with overwhelmingly favorable feedback. Additional expansion up the eastern seaboard to Boston during the winter of 2014/2015 also received positive feedback so scaling up the experiment is a reasonable action.

d. Audience - The target audiences for this experimental product are customers and partners such as emergency managers, state and local officials including School Superintendents, DOT, media and the general public. The forecast offices involved for the 2016-17 winter experiment include: Aberdeen, SD, Albany, NY, Atlanta, GA, Baltimore, MD-Washington, DC, Binghamton, NY, Bismarck, ND, Blacksburg, VA, Boulder, CO, Buffalo, NY Burlington, VT, Caribou, ME, Charleston, WV, Cheyenne, WY, Chicago, IL, Cleveland, OH, Des Moines, IA, Dodge City, KS, Eastern North Dakota, Elko, NV, Flagstaff, AZ, Glasgow, MT, Goodland, KS, Hanford, CA, Gray, ME, Green Bay, WI, Greenville/Spartanburg, SC, Indianapolis, IN, Jackson, KY, Louisville, KY, Lubbock, TX, Marquette, MI, Medford, OR, Milwaukee, WI, Minneapolis, MN, Missoula, MT, Morristown, TN, Mt. Holly, NJ, New York, NY, Norman, OK, Northern Indiana, Omaha/Valley NE, Paducah, KY, Pendleton, OR, Pittsburgh, PA, Pueblo, CO, Raleigh, NC, Reno, NV, Sacramento, CA, Salt Lake City, UT, San Diego, CA, Seattle, WA, Sioux Falls, SD, Spokane, WA, Springfield, MO, State College, PA, Taunton, MA, Tulsa, OK, Wakefield, VA, Wichita, KS, Wilmington, OH.

The following offices will display the data on their web pages:

Aberdeen, SD:	http://www.weather.gov/abr/winter
Albany, NY:	http://www.weather.gov/aly/winter
Atlanta, GA:	http://www.weather.gov/ffc/winter
Baltimore, MD-Washington, DC:	http://www.weather.gov/lwx/winter
Binghamton, NY:	http://www.weather.gov/bgm/winter
Bismarck, ND:	http://www.weather.gov/bis/winter
Blacksburg, VA:	http://www.weather.gov/rnk/winter
Boulder, CO:	http://www.weather.gov/bou/winter
Burlington, VT:	http://www.weather.gov/btv/winter
Caribou, ME:	http://www.weather.gov/car/winter
Charleston, WV:	http://www.weather.gov/rlx/winter
Cheyenne, WY:	http://www.weather.gov/cys/winter
Chicago, IL:	http://www.weather.gov/lot/winter
Des Moines, IA:	http://www.weather.gov/dmx/winter
Dodge City, KS:	http://www.weather.gov/ddc/winter
Eastern North Dakota:	http://www.weather.gov/fgf/winter
Goodland, KS:	http://www.weather.gov/gld/winter
Gray, ME:	http://www.weather.gov/gyx/winter
Green Bay, WI:	http://www.weather.gov/grb/winter
Greenville/Spartanburg, SC:	http://www.weather.gov/gsp/winter
Indianapolis, IN:	http://www.weather.gov/ind/winter
Jackson, KY:	http://www.weather.gov/jkl/winter
Louisville, KY:	http://www.weather.gov/lmk/winter
Lubbock, TX:	http://www.weather.gov/lub/winter
Marquette, MI:	http://www.weather.gov/mqt/winter
Milwaukee, WI:	http://www.weather.gov/mkx/winter
Minneapolis, MN:	http://www.weather.gov/mpx/winter
Mt. Holly, NJ:	http://www.weather.gov/phi/winter
New York, NY:	http://www.weather.gov/okx/winter
Northern Indiana:	http://www.weather.gov/iwx/winter
Omaha/Valley NE:	http://www.weather.gov/oax/winter
Paducah, KY:	http://www.weather.gov/pah/winter
Pittsburgh, PA:	http://www.weather.gov/pbz/winter
Pueblo, CO:	http://www.weather.gov/pub/winter
Raleigh, NC:	http://www.weather.gov/rah/winter
Reno, NV:	http://www.weather.gov/rev/winter
Sioux Falls, SD:	http://www.weather.gov/fsd/winter
Springfield, MO:	http://www.weather.gov/sgf/winter
State College, PA:	http://www.weather.gov/ctp/winter
Taunton, MA:	http://www.weather.gov/box/winter
Tulsa, OK:	http://www.weather.gov/tsa/winter
Wakefield, VA:	http://www.weather.gov/akq/winter
Wichita, KS:	http://www.weather.gov/ict/winter
Wilmington, OH:	http://www.weather.gov/iln/winter

e. Presentation Format – The format for the first probabilistic snowfall graphic is: minimum/most likely/maximum case scenario; the second graphic shows snowfall threshold amounts in whole inches with color curve probabilities from zero to 100 percent; the third product is a text-based range probability/exceedance probability table for specific locations. Please see examples in Part II.

f. Feedback Method – Feedback will be gathered from representatives from federal, state, county, and local government agencies and broadcast media during scheduled customer review meetings and via a web-based survey linked to the product page:

www.nws.noaa.gov/survey/nws-survey.php?code=NWS/PSTS/FY16

Customer comments or questions on the Probabilistic Snowfall products may be addressed to:

Rick Watling
National Weather Service (NWS) Eastern Region HQ
E-mail: Richard.Watling@noaa.gov
Phone: 631-244-0123

Jim Keeney
National Weather Service (NWS) Central Region HQ
E-mail: Jim.Keeney@noaa.gov
Phone: 816-268-3141

Walt Zaleski
National Weather Service (NWS) Southern Region HQ
E-mail: Walt.Zaleski@noaa.gov
Phone: 817-978-1100 x106

Steve Apfel
National Weather Service (NWS) Western Region HQ
E-mail: Steven.Apfel@noaa.gov

Dave Soroka
National Weather Service (NWS) Headquarters
E-mail: David.Soroka@noaa.gov

The customer comment period runs from Dec 1, 2016 through April 30, 2017.

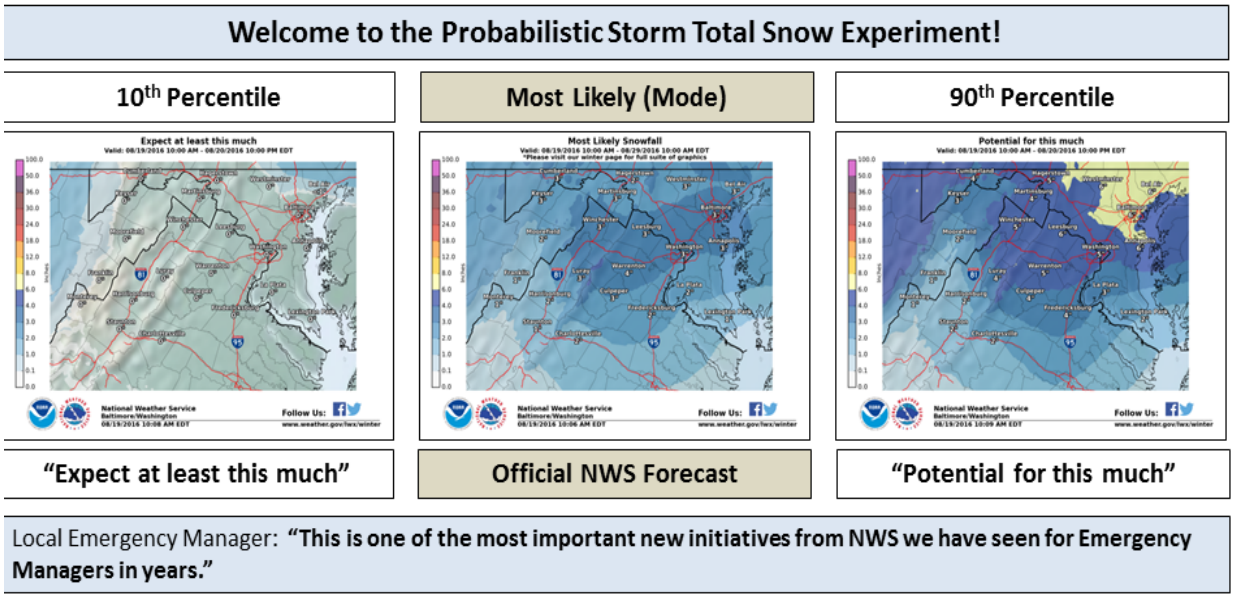
Part II – Technical Description

a. Format and Science Basis – The format is described in Part I under "Presentation Format." As for the scientific basis, a 70 member multi-model ensemble will serve as the basis for computing the 5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th} and 95^{th} percentile boundaries of expected accumulation, with forecasters adjusting the most likely snowfall amount based on experience. A probability density function (PDF) will be created automatically based on these eight reference points, with range interval and exceedance probabilities derived from the PDF.

b. Availability – These products will be available at all times during the winter season, except once accumulating snowfall from a storm has begun. Probability charts will restart once accumulating snow from that storm has ended.

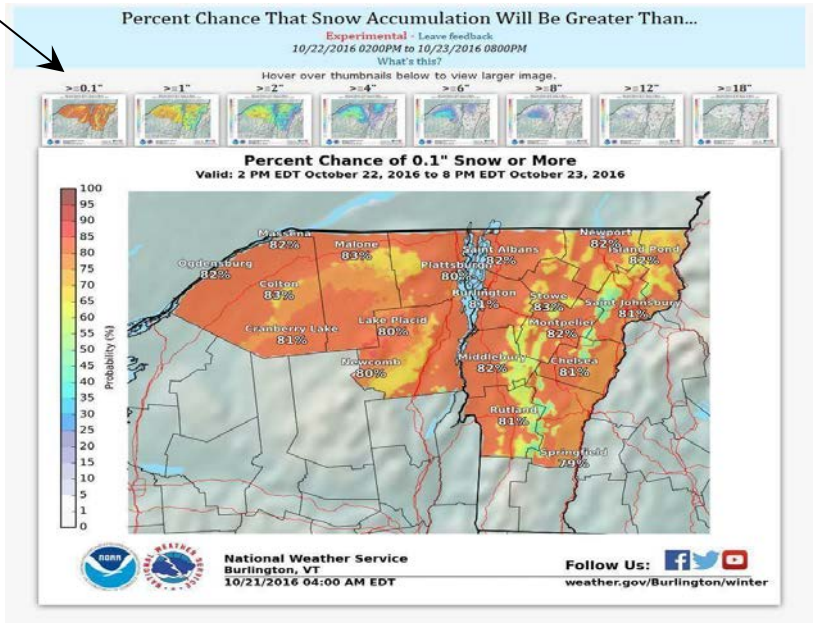
Probabilistic Storm Total Snowfall Product examples:

1. The graphic below depicts the minimum, most likely and maximum snowfall totals in the WFO Washington DC/Baltimore county warning area for a particular event.



A wide range between minimum and maximum snow amounts indicates large uncertainty in the forecast. Conversely, a narrow range indicates high confidence in the forecast.

2. The next graphic shows the probabilities of exceeding certain snowfall threshold amounts in whole inches with color curve probabilities from zero to 100 percent. In this example, clicking on the thumbnail picture with the >= .1" threshold at the top displays an enlarged image of that frame below, for the period ending at 8 PM Oct 23, 2016.



3. The final product is a text-based exceedance probability table:

Selecting a county displays a list of specific cities within that county and shows the probability of snow amounts exceeding a particular threshold for each location.

Chance of Snow Accumulation

Experimental - Leave feedback

10/22/2016 0200PM to 10/23/2016 0800PM

What's this?

County:

Location	At least	Likely	Potential for	>=0.1"	>=1"	>=2"	>=4"	>=6"	>=8"	>=12"	>=18"
Barre, VT	0	0	3	82%	58%	36%	10%	2%	0%	0%	0%
Burlington, VT	0	0	2	81%	55%	32%	6%	1%	0%	0%	0%
Island Pond, VT	0	0	3	82%	60%	39%	12%	2%	0%	0%	0%
Malone, NY	0	0	5	83%	70%	57%	33%	17%	8%	1%	0%
Massena, NY	0	0	3	82%	61%	41%	14%	3%	0%	0%	0%
Middlebury, VT	0	0	3	82%	60%	38%	11%	2%	0%	0%	0%
Newport, VT	0	0	4	82%	67%	50%	24%	9%	3%	0%	0%
Plattsburgh, NY	0	0	2	80%	49%	23%	2%	0%	0%	0%	0%
Potsdam, NY	0	0	6	83%	70%	57%	34%	18%	8%	1%	0%
Randolph, VT	0	0	3	81%	57%	34%	8%	1%	0%	0%	0%
Rutland, VT	0	0	3	81%	57%	34%	8%	1%	0%	0%	0%
Springfield, VT	0	0	1	79%	34%	8%	0%	0%	0%	0%	0%
St. Albans, VT	0	0	4	82%	66%	49%	23%	8%	2%	0%	0%
St. Johnsbury, VT	0	0	2	81%	51%	25%	3%	0%	0%	0%	0%
Stowe, VT	0	0	5	83%	69%	55%	31%	15%	6%	1%	0%
Ticonderoga, NY	0	0	3	82%	60%	39%	12%	2%	0%	0%	0%

Switch to Range

The table can be switched to portray the probability of snow amounts falling within specific range bins as well, as shown below:

Chance of Snow Accumulation

Experimental - Leave feedback

10/22/2016 0200PM to 10/23/2016 0800PM

What's this?

County:

Location	At least	Likely	Potential for	0"	0.1-1"	1-2"	2-4"	4-6"	6-8"	8-12"	12-18"	>18"
Barre, VT	0	0	3	18%	24%	22%	26%	8%	2%	0%	0%	0%
Burlington, VT	0	0	2	19%	26%	23%	26%	5%	1%	0%	0%	0%
Island Pond, VT	0	0	3	18%	22%	21%	27%	10%	2%	0%	0%	0%
Malone, NY	0	0	5	17%	13%	13%	24%	16%	9%	7%	1%	0%
Massena, NY	0	0	3	18%	21%	20%	27%	11%	3%	0%	0%	0%
Middlebury, VT	0	0	3	18%	22%	22%	27%	9%	2%	0%	0%	0%
Newport, VT	0	0	4	18%	15%	17%	26%	15%	6%	3%	0%	0%
Plattsburgh, NY	0	0	2	20%	31%	26%	21%	2%	0%	0%	0%	0%
Potsdam, NY	0	0	6	17%	13%	13%	23%	16%	10%	7%	1%	0%
Randolph, VT	0	0	3	19%	24%	23%	26%	7%	1%	0%	0%	0%
Rutland, VT	0	0	3	19%	24%	23%	26%	7%	1%	0%	0%	0%
Springfield, VT	0	0	1	21%	45%	26%	8%	0%	0%	0%	0%	0%
St. Albans, VT	0	0	4	18%	16%	17%	26%	15%	6%	2%	0%	0%
St. Johnsbury, VT	0	0	2	19%	30%	26%	22%	3%	0%	0%	0%	0%
Stowe, VT	0	0	5	17%	14%	14%	24%	16%	9%	5%	1%	0%
Ticonderoga, NY	0	0	3	18%	22%	21%	27%	10%	2%	0%	0%	0%

Switch to Exceedance