

HPC Probabilistic Winter Precipitation Forecasts Exceedance and Percentiles

Part 1 – Mission Connection

a. Product Description – The Probabilistic Winter Precipitation Forecasts (PWPF) are based on the deterministic Hydrometeorological Prediction Center (HPC) Winter Weather Desk (WWD) accumulation forecasts, but are generated automatically using an ensemble of model forecasts along with the WWD forecasts. The automatic nature of this product generation allows a much more extensive set of displays of probabilities for snowfall or freezing rain exceeding a number of thresholds (probability of exceedance). On an experimental basis, the production of snowfall and freezing rain accumulations for several percentile levels will be added.

b. Purpose – These probabilistic winter precipitation forecasts are provided as guidance forecasts for use by the RFCs and WFOs. They are also available to the emergency management community, media, and general public.

c. Audience - The target audience includes NWS forecasters, the academic community, the emergency management community, and anyone interested in winter weather forecasts.

d. Presentation Format – The forecasts are presented on an interactive HPC webpage at the following URLs for snow and freezing rain, respectively:

http://www.hpc.ncep.noaa.gov/pwpf/wwd_accum_probs.php?ptype=snow (existing)

http://www.hpc.ncep.noaa.gov/pwpf/wwd_accum_probs.php?ptype=icez (existing)

http://www.hpc.ncep.noaa.gov/pwpf/wwd_percentiles.php?fpd=24&ptype=snow
(experimental)

http://www.hpc.ncep.noaa.gov/pwpf/wwd_percentiles.php?fpd=24&ptype=icez
(experimental)

e. Feedback Method – Comments regarding the winter weather forecasts should be sent to one of our feedback email addresses. Links for these addresses are located on the left-hand menu under “Contact Us”.

Comments may also be provided to:

NOAA/NCEP
David Novak (W/NP 32)
5830 University Research Court
College Park, MD 20740
(301) 683-1484
David.Novak@noaa.gov

Part II – Technical Description

a. **Format and Science Basis** – A multi-model ensemble is utilized to create a distribution of values around the HPC accumulation at each grid point. The 6-hour snow-to-liquid ratio (SLR) at each grid point is an average of the value obtained using the Roebber neural-network algorithm (Rnna) applied to the NAM forecast, the value from the Rnna applied to the GFS forecast, and a seasonal climatological value. For one member of the ensemble, the mean SLR applied to 24-h/48-h precipitation is the average of four/eight 6-h SLRs covering the 24-h/48-h period. For all other members, the 24-h and 48-h accumulations are sums of 6-h accumulations, using the 6-h SLR values in the case of snowfall. The precipitation type determination for the NCEP models is the dominant type algorithm. Precipitation type for non-NCEP models is determined by applying a simple decision tree algorithm using surface temperature, and temperatures on the 925-hPa, 850-hPa, and 700-hPa mandatory isobaric levels.

A binormal probability distribution (density) function (PDF), which allows skewness, is utilized for the PWPF. The fitting of the binormal distribution is a method of moments approach. The HPC deterministic forecast is the mode of the ensemble distribution. The placement of the HPC deterministic forecast in the ensemble order statistics determines the skewness of the distribution. The variance of the distribution is matched to the variance of the ensemble. The HPC deterministic forecast is included as a 29th member of the ensemble for the computation of the variance. This fit is done at each grid point; so, the probability density function (PDF) varies from grid point to grid point.

Various probability of exceedance and the experimental percentile data are then derived from the final PDF at each grid point, and displayed on maps.

b. **Product Availability** – These products are updated twice per day by 0630 UTC and by 1830.

c. **Additional Information** – None.