

Joint and Conditional Probability

Quick Reference Guide

A **joint probability** is the probability that two or more events will occur together.

A **conditional probability** is the probability that an event will occur given that another event takes place. It is a type of joint probability where you have two events and one is assumed to occur.



The probability of blizzard conditions is a **joint probability** of four events occurring together:

- Falling or blowing snow
- Sustained winds or frequent gusts ≥ 35 mph
- Visibility $\frac{1}{4}$ mile or less
- Three hours or more duration

Post-processed ensemble or model blend output might show **conditional probabilities** of precipitation type – the condition being that accumulating precipitation occurs. Even though the *conditional* probability of snow over the western part of this domain might be 100% (bottom-right image), the *overall* probability of measurable snow might be low due to dry air.

NBM v3.2 Conditional Precipitation Type Probability (%)
Rain (upper-left), Freezing Rain (upper-right), Ice Pellets (lower-left), Snow (lower-right).
36-hr Forecast valid 12 UTC 15 Mar 2019.

