Determining Precipitation Type from Maximum Temperature in the Lower Atmosphere

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Our talk will examine the distribution of maximum temperature aloft for different precipitation types. This yields the probability of three different types of precipitation: snow (SN), sleet (PL) and freezing rain/rain (FZRA or RA). The probability distributions are based on a set of over 1700 soundings associated with precipitation types at the surface. Several potential metrics to discriminate between the different forms were considered, but the most meaningful was the maximum temperature between the surface and 600 hPa (Tmax). The effects of model uncertainty on this technique were also considered by perturbing the observed soundings in accordance with the uncertainty ranges typical for a mesoscale modeling system. As one would expect, the probability distributions broaden when the uncertainty effects are accounted for. This has only marginal effects on the efficacy of the system to provide meaningful probabilities for SN, however PL and FZRA or RA are more strongly impacted. These results highlight the great difficulty in providing an accurate prediction of precipitation type using deterministic methods, even for short-range forecasts, and justify the need for more probabilistic approaches and the inclusion of more information in the algorithm.