Some challenges of QPE in snow

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Radars measure reflectivity. Estimation of rainfall amounts from reflectivity already suffers from significant uncertainties, which grow even further when it comes to estimate snowfall amounts. At the same time, there is a growing need for QPE in snowfall both from the end users in hydrology (spring floods) and for winter activities (road maintenance) and from the NWP community (for verification and assimilation in numerical models).

One of the biggest challenges is that there is no well-known ground truth. Many gauge types present their own challenges, and while wind-induced errors of manual gauges have already been thoroughly documented, recent automatic gauge types are affected by new error sources. Despite these errors, NWP requires more reliable observations at short time intervals. In this work, we describe and discuss error sources of radars and various gauges. We also address the issues of comparing different observation types and model outputs through an assessment of radar data against both gauges and model short-range precipitation forecasts.