9.3 NOWPRECIP: AN ALGORITHM FOR LOCALIZED PROBABILISTIC PRECIPITATION NOWCASTING IN THE COMPLEX TERRAIN OF SWITZERLAND

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This presentation describes the new precipitation nowcasting system "NowPrecip" which has been developed in MeteoSwiss. The new algorithm is area-tracking, fully probabilistic, and capable of producing multi-member ensembles of possible evolutions. It follows the seamless forecasting approach: evolution starts from the last radar observation and merges smoothly into the numerical weather prediction ensemble members.

The algorithm introduces five new ideas. (a) A geostatistics-based optical flow algorithm. This approach is spatiotemporally coherent and minimizes artefacts on zero-precipitation areas where the motion field may be difficult to determine. (b) A localized approach of the nowcasting problem, as opposed to the typical one which operates on the entire-domain. The localized philosophy has been motivated by the need to deal with situations where different rainfall patterns characterize different parts of the domain (for example stratiform precipitation in the north, convective precipitation in the south). This is relevant for Switzerland, but it can also be relevant for single areal nowcasting operating in large countries or extensive regions. (c) A straightforward technique to compute and include systematic growth and decay typically associated with the underlying topography, mainly the orographic effects. (d) The ability to use machine-learning inputs as a replacement or a complement to the typical Lagrangian persistence ones. This relies on the aforementioned localized design and suggests a full methodology for employing state-of-the-art machine learning algorithms into nowcasting. Proper implementation of such algorithms could capture growth and decay patterns which are by-design ignored in Lagrangian persistence schemes. (e) Capabilities to incorporate and micro-control individual precipitation cells into the evolution. This technique is used to generate and control the evolution of cells, in terms of size, intensity and shape, directly and seamlessly into the precipitation domain. W We essentially attempt to broaden the links between an area-tracking process and object-tracking or satellite-based convection initiation procedures and amplify the benefit an area-tracking algorithm can get from such connections.