Impact of merging methods on radar based nowcasting of rainfall.
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1 Motivation and Objectives

- Tracking rainfall storms from radar data is commonly used for rainfall nowcasting at the required resolution for urban models.
- Conditional Merging (CM) combining radar and gauge data has been proven efficient to improve radar estimates.

→ How does this impact the forecast algorithm results?
→ How suitable is the method for forecasting urban pluvial floods?

2 Study Area and Data

- Study area: Hannover Radar, Germany (R ≈ 128 km²)
- Gauge data: 80 stations
- Radar Data: raw data (RR), conditional merged (CM)
- Resolution: 1 km², 5 min
- Events: 2 convective, 1 stratiform

Figure 1: Daily rainfall sum of the selected three events over the study area: upper raw – raw radar data (RR) and lower raw–conditionally merged data (CM).

3 Performance Assessment

- Quantitative Criteria
  Stations with P[mm/h] T>20 [a]
  RMSE[mm] = \sqrt{\frac{1}{n} \sum_{i=1}^{n} (X_i - \hat{X}_i)^2}

- Categorical Criteria
  Alarms: P[mm/h] T>20 [a]
  Accuracy = \frac{\text{hit alarms} + \text{no alarms}}{\text{total observed}}

4 Results – Part I

- Comparing time series of forecasted RR and CM radar data

4 Results – Part II

Table 1: The volume error and the RMSE for each of the stations and events using raw radar data (RR) and conditional merged data (CM) to estimate the performance of a radar data compared to station data (rad2obs), b) forecast data with respect to input radar data (for2rad) and c) forecast data compared with observed station data (for2obs).

5 Conclusion

- The implementation of CM on radar data doesn’t necessarily improve the forecast.
- The forecast algorithm performs better with RR data. However the high errors in the RR data cause high overall errors when comparing forecast to observed data.
- The benefit of using CM towards RR is higher in convective events. While for the stratiform event, the forecast was unable to satisfactorily predict movements from very smoothed CM data.
- Overall for issuing alarm, the forecast algorithm tends to favour more the use of RR data.
- Adaption of the tracking method to the CM data is necessary to improve the forecast.

References: