Nowcasting with the Rijnmond X-band radar: challenges and validation of algorithms

*Albert Oude Nijhuis¹, Yann Dufournet¹, Tobias Otto¹, Igor Stepanov¹

1. SkyEcho

Nowcasting of rainfall rates at high spatial (100 m x 100 m) and temporal resolution (1 minute) is becoming more and more relevant for urban applications. It is not only relevant for the pleasure of citizens and tourists, but also for water management, risk management, and logistics operations. In the Netherlands, the FMCW full-polarimetric x-band radar is a promising new sensor that can be used to provide a high-resolution nowcast of the rainfall rate.

In this paper, different nowcasting algorithms are tested. To this end, fast image processing techniques for advection estimation are used, and also the algorithms from the PySTEPS initiative are used. A crucial question is whether the algorithms are sufficiently efficient for realtime application of the large data volume that is associated with the new high-resolution rainfall products. Further, a validation of the algorithms is done by calculation of the skill-score.

An effort is made to comprehend the remaining sources of discrepancies between what is predicted with the nowcasting algorithm and what is eventually measured with raingauges at ground level. Differences can exist for many reasons. For example due to the advection of the rain, which results in a mismatch in location and/or time. Another cause of an error can be related to the evaporation of the rain. An overview will be given of what is most important and which effects can be neglected for X-band radars that measure rain at a relatively low altitude in comparison to C-band radars.

Keywords: Nowcasting, FMCW radar, PySTEPS, Algorithm validation