Geophysical Research Abstracts
Vol. 16, EGU2014-14466, 2014
EGU General Assembly 2014
© Author(s) 2014. CC Attribution 3.0 License.

High-resolution rainfall estimation for Helsinki urban area using Helsinki radar network

Laura Rojas (1,3), Kalle Nordling (1), Roberto Cremonini (1,4), Dmitri Moisseev (1,2), Venkatachalam Chandrasekar (1,2,5)

(1) University of Helsinki, Helsinki, Finland (laura.rojas@helsinki.fi, dmitri.moiseev@helsinki.fi), (2) Finnish Meteorological Institute, Helsinki, Finland , (3) Vaisala Oy, Vantaa, finland (laura.rojas@vaisala.com), (4) Agenzia Regionale per la Prottezione Ambientale (ARPA) Piemonte, Turin, Italy (roberto.cremonini@arpa.piemonte.it, (5) Colorado State University, Colorado, USA (chandra@engr.colostate.edu)

High resolution precipitation data is a crucial factor for hydrological applications in urban areas. Small fluctuations in precipitation fields are of great importance considering the fast response of urban catchments due to the dominance of impervious surfaces. High resolution precipitation observations are needed in order to characterize these fluctuations. Weather radar provides high spatial resolution precipitation estimations. However, the quality of its observations in an urban environment is significantly degraded, among other things, by ground clutter and beam-blockage. A solution for this problem is to use a radar network, where the data gaps of one radar will be filled by using observations from the others.

Very few cities have dedicated weather radar networks. In some cities, like Helsinki, there are several weather radars covering the metropolitan area, but they are operated by different organizations. In this study, we show how such systems can be used to build a network and what is the advantage of using radarnetworks for estimating precipitation in urban catchments.

The urban Helsinki area is covered by observations from three individual-purpose C-band weather radars (Helsinki University's Kumpula (KUM), Vaisala Oy's Kerava (KER) and Finnish Meteorological Institute's Vantaa (VAN)). We used the data from these radars to form a network and we design a similar task which runs at the same time in each radar couple of times per day. Nonetheless, it is challenging to make them observe at the same area at exactly the same time, which could lead to fast changing, short precipitation events being missed. Hence, synchronization and temporal resolution are the main concerns when building a network. Consequently, to decrease the impact of these restrictions in the Helsinki radar network we propose the use of the optic flow interpolation algorithm to retrieve information in between two radar observations and use the retrieved dataset from the three radars to estimate rainfall. The accuracy of this method is studied by comparing the composite rainfall estimation with both single radar observations and ground measurements.