EFQM



Niels Van Steenbergen Maarten Deschamps Patrick Willems 16-18 April 2012









#### Flanders Hydraulics Research



- Provides forecasts of water levels and discharges
- Navigable waterways in Flanders
- Lead time 48h





#### Flanders Hydraulics Research



- Provides forecasts of water levels and discharges
- Navigable waterways in Flanders









- Explorative research on the added value of rainfall input based on radar images for hydrological forecasting.
- Flanders Hydraulics Research produces forecasts on the navigable waterways in Flanders, Belgium.
- Currently rainfall input for hindcast period is based on rain gauges.





- C-band radar of RMI
  - Wideumont
  - Zaventem
- Used radar-rain gauge merging techniques:
  - Brandes spatial adjustment factor
  - Simple Kriging
- Brandes
  - Calculate correction factor at each rain gauge location
  - Spatially interpolate correction factor at each radar pixel
- Simple Kriging
  - Regression of semivariogram
  - Calculation of covariance
  - Kriging weights to correct radar image













- Validation of Radar Rain gauge merging methods
  - Merging of radar images with 14 rain gauges
  - Validating adapted radar image by 5 different rain gauges
  - Period : November 2010







RMSE	Radar Wideumont	Radar Zaventem	Radar Wideumont BRA	Radar Zaventem BRA	Radar Wideumont KRI	Radar Zaventem KRI
Blaasveld	0.37	0.39	0.42	1.03	0.36	0.57
Denderleeuw	0.49	0.52	0.48	1.14	<mark>0.34</mark>	0.49
Lo-Fintele	0.55	0.57	0.53	1.98	0.49	0.44
Sint-Truiden	0.50	0.58	0.88	1.95	<mark>0.49</mark>	0.64
Sint-Baafs- Vijve	0.55	0.53	0.53	7.53	0.39	0.57







- Raw radar estimates have to be adjusted by radar-rain gauge merging techniques to be used as input for any model (same conclusion as Shrestha, Goormans & Willems (2009))
- Simple kriging is preferred in comparison with Brandes
- Radar of Wideumont provides better rainfall estimates after merging with rain gauge data by simple kriging method





- Can radar provide better input for hydrological models?
- Comparison between rainfall-runoff generated by radar input (after merging with rain gauges) and rain gauge input and observations
- 4 hydrological models
- Simple Kriging method Radar Wideumont



department Mobility and Public Works

Results









- Some results of previous research (2010)
  - different periods, catchment of Herk, radar Wideumont

6/08/2007 0:00 8/08/2007 0:00 10/08/2007 0:00 12/08/2007 0:00 14/08/2007 0:00 16/08/2007 0:00 18/08/2007 0:00 20/08/2007 0:00 22/08/2007 0:00







- General Conclusions
  - Simple Kriging method considered better than Brandes for merging radar and rain gauge data
  - No significant improvement between radar input or rain gauge input for hydrological modelling
  - Difficult to make solid conclusion due to the uncertainty of the hydrological models (parameter, model schematization)
  - Maybe larger improvements can be noticed for smaller catchments and summer storms
  - Visualization of the spatial extent of rainfall is an added value for flood forecasting personnel
- To be continued...
  - Which improvement can be achieved by making (short term) rainfall forecasts based on radar images?
  - Focus on summer storms
  - X-band