# RainGain International workshop "Fine scale rainfall estimation"

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# Overview

- Topic 1: X-band and C-band radar calibration: methods and experiences
- Topic 2: X-band versus C-band performance: experiences
- Topic 3: Integration of X-band, C-band and rain gauge measurements: methods and experiences
- Topic 4: Fine-scale rainfall estimation: recommendations and guidelines

# Topic 1: X-band and C-band radar calibration: methods and experiences

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# T1: X-band Radar calibration

- Built in calibration by DHI
- Attenuation correction, Volume correction, Noise cut-off and clutter removal (parameters are adjustable)
- Original data are not stored → comparison to find best parameters is very difficult

# Topic 2: X-band versus C-band performance: experiences

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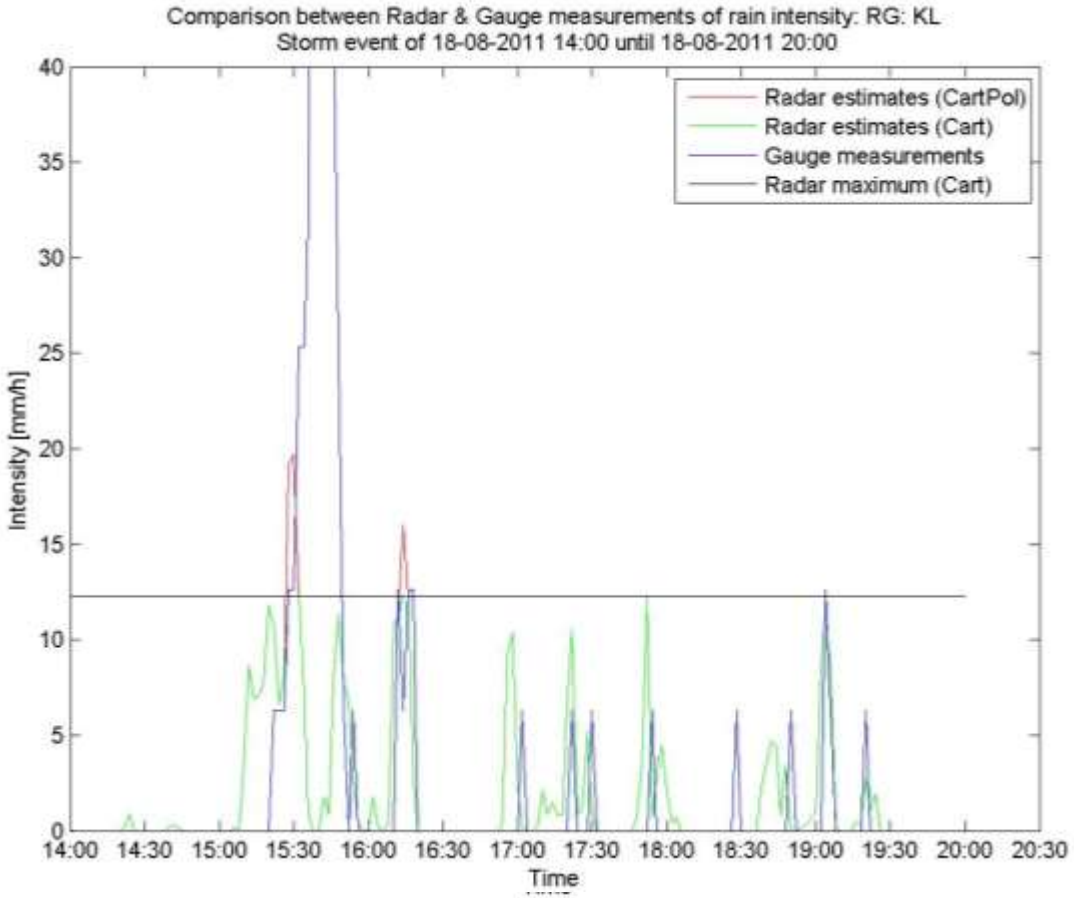
# T2: X-band versus C-band performance

- Magnetron of X-band: decay & replacement
- Performance of X-band: Comparison with TBR for rainfall intensities and sewer simulations (compared to measurements)
  → reasonable results
- Peak values topped off by X-band radar (difficulties observing high peak values)
- TBR outperforms radar for sewer modeling

# T2: X-band versus C-band performance

- Performance of X-band: Comparison with TBR



# T2: X-band versus C-band performance

- Comparison C- and X-band:
  X-band radar performs better than C-band radar
- C band (Wideumont) located at about 120km from the catchment

| Statistical | Summer period/weeks | | Winter period/weeks | |
|---|---|---|---|---|
| indicators | LAWR | RMI | LAWR | RMI |
| RMSE [mm] | 3.09 | 4.91 | 3.40 | 3.76 |
| MAE [mm] | 2.06 | 3.02 | 2.42 | 4.38 |
| NSE [-] | 0.70 | 0.48 | 0.55 | 0.66 |

Source: N. Shrestha 2012
Journal of Hydroinformatics

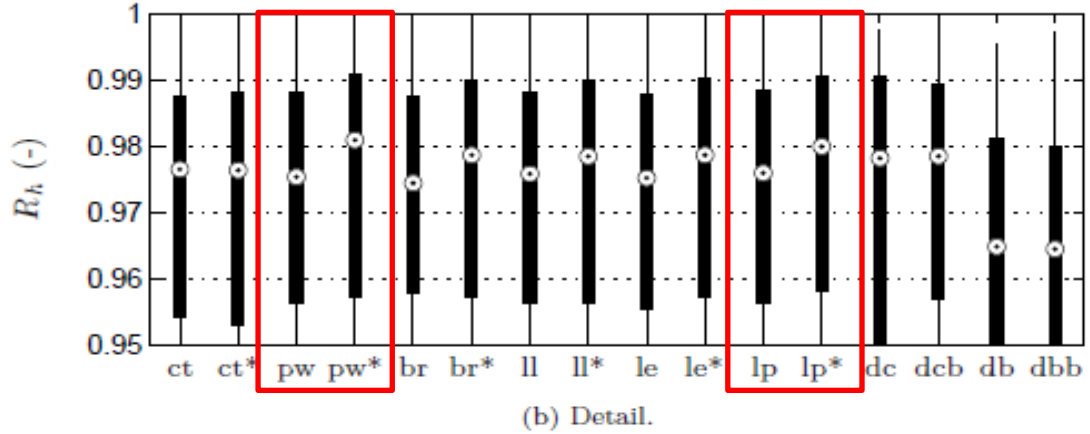
# Topic 3: Integration of X-band, C-band and rain gauge measurements: methods and experiences

# T3: Radar and rain gauge integration

- Point integration, radar adjusted to rain gauge
- Mean field bias correction
  (gives good results, but works for historical data only)
- Range dependant calibration
  (different regression functions tested, best: power law)
- Brandes spatial adjustment
  (gives good results within TBR network, but not outside network)
- Power law calibration (2 parameters)
  (Parameters range dependant: best results with lin-exp combination)
- Dynamic calibration factor (cfr MFB in realtime)
  (doesn't give the expected good results)

# T3: Radar and rain gauge integration

- Power law calibration performs best
- Extra parameters influencing the radar-rain gauge relation currently investigated, will be used in the adjustments in the near future




(b) Detail.

Source: Goormans T, PhD thesis

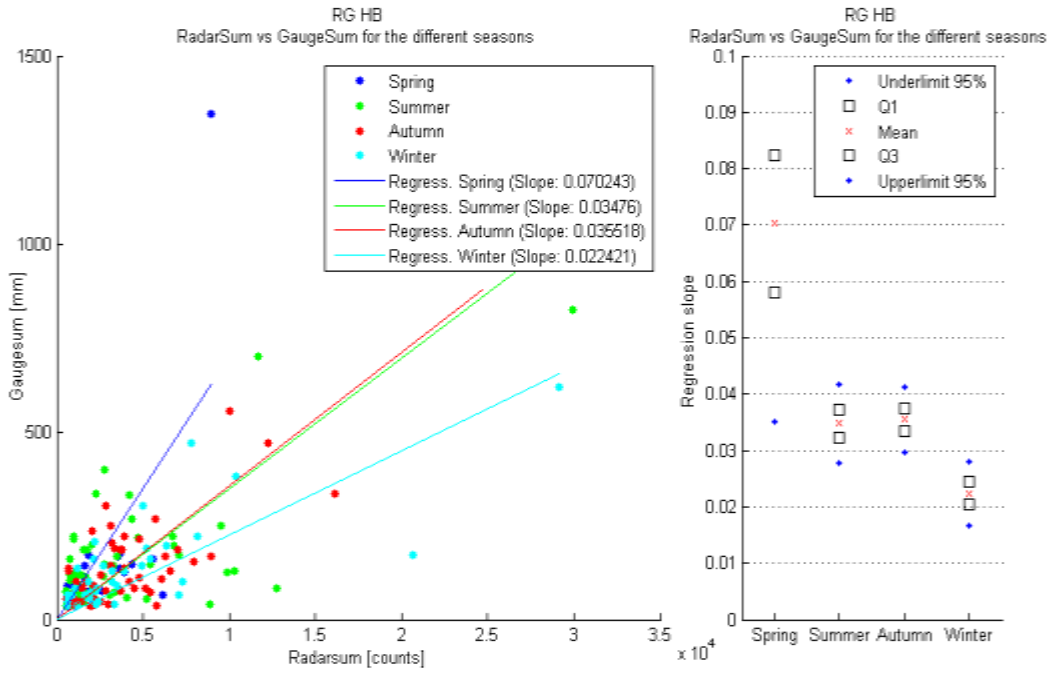
Figure 5.38: Comparison of the cross-correlation of water depth $R_h$ for radar rainfall input only. '*' means MFB corrected.

# Radar calibration activities

- Extra parameters influencing the radar-rain gauge relationship investigated:
  - Seasonal variance
  - Convective or stratiform nature
  - Mean rainfall intensity
  - Wind speed & direction
  - Temperature
  - Size of precipitating system
- Extra algorithms implemented and adapted to obtain extra parameters
  - Convective stratiform separation algorithm (Steiner et al. 1995)
  - Cloud movement and direction algorithm
- Significant correlations for some parameters

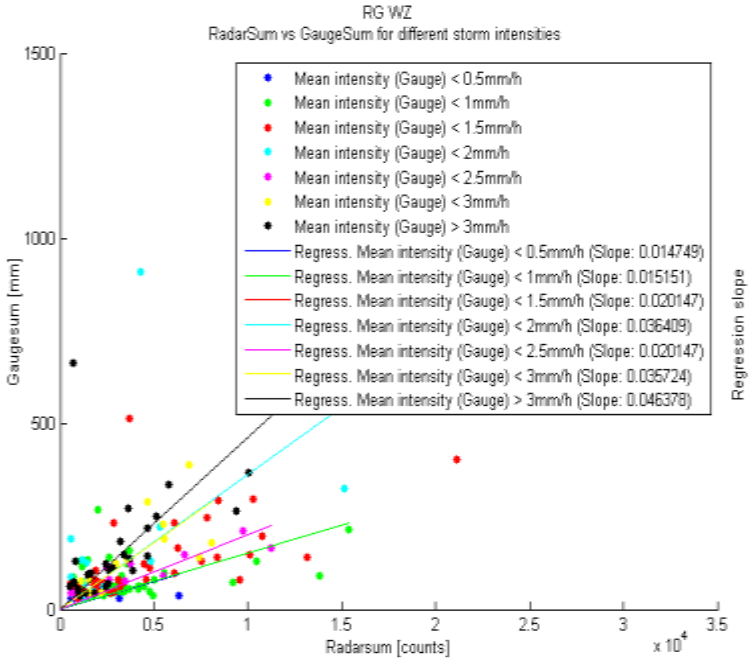
# Influential parameters

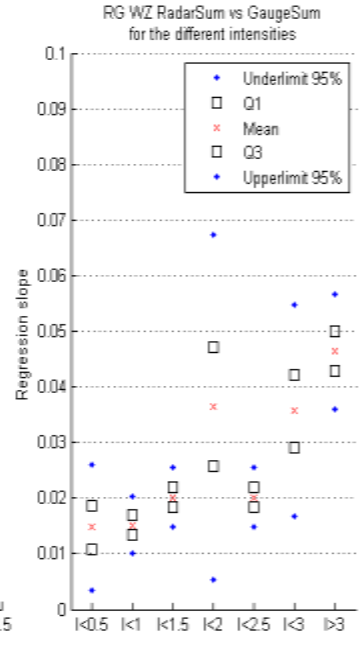
- Season:
  - Spring higher, summer and autumn similar and winter lower
  - Supports Convective / Stratiform separation algorithm
- Direction:
  - Nearly no East
  - West & North similar
  - South higher
- Velocities within direction:
  - West: increasing relation found



# Influential parameters

- Area:
  - No increasing relation, however, for relative radar filling levels within 40-50%, a higher relation is eminent
  - Supports Convective / Stratiform separation algorithm
- Temperature:
  - T <10° lower,
  - 10°< T<20° higher
  - T > 20° mean
  - Supports Conv./Strat.
- Intensities:
  - Increasing relation, but not super clear



# Topic 4: Fine-scale rainfall estimation: recommendations and guidelines

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# T4: Fine-scale rainfall estimation

- Conclusion

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