RainGain

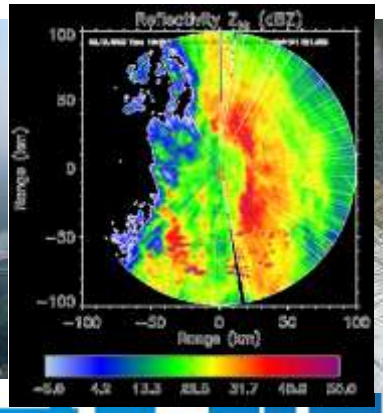
International Workshop

Leuven, 16 April 2012

Introduction RainGain Project

Marie-Claire ten Veldhuis

Project coordinator



Extreme rainfall and flooding in the city

Rotterdam region, July 2011

Extreme rainfall and Flooding in the city

What exactly happened?

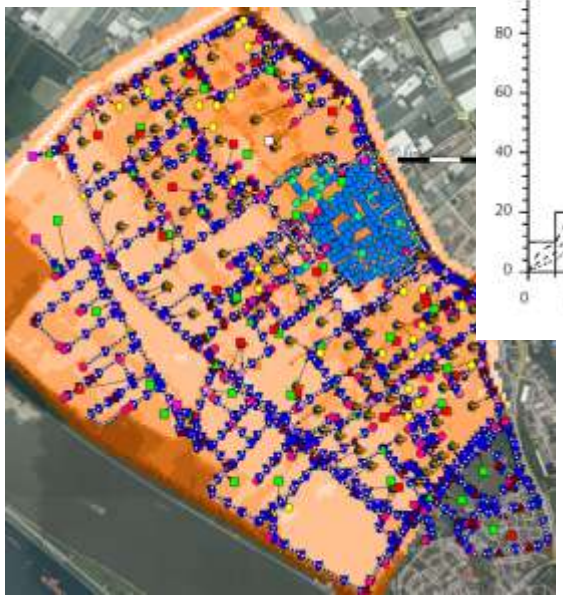
- How much rainfall (volume+intensity)?
- Capacity problem?
- Failure/Blockage?
- Design/operational error?

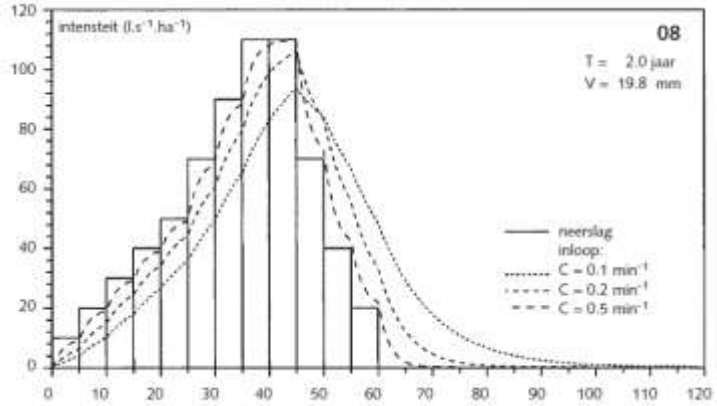
Rotterdam region, July 2011

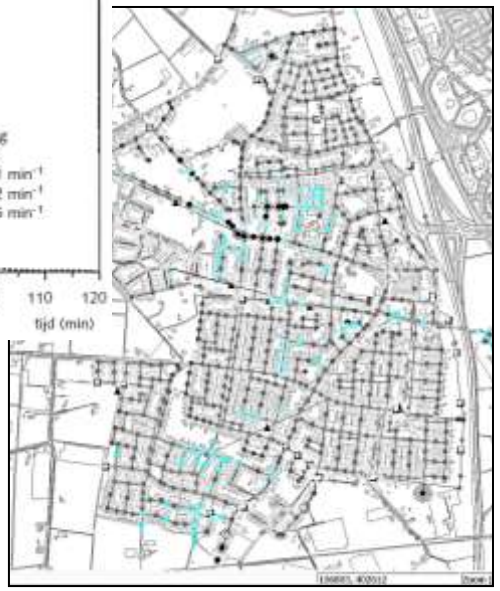
Extreme rainfall and flooding in the city

Extreme rainfall and flooding in the city

Required data resolution << 1 km in space; < 5 min in time







Oranjepolder: 490 ha

Prinsenbeek: 100 ha

RainGain

high resolution rainfall and flooding information in urban areas

Xband/Improved Cband radars in 4 Pilots:

- Rotterdam (NL)
- Leuven (BE)
- Paris (FR)
- London (UK)

RAINGAIN: 13 Partners

1) TU Delft (NL)
2) Zuid-Holland Province (NL)
3) Gemeentewerken Rotterdam (NL)
4) KU Leuven (BE)
5) Aquafin NV (BE)
6) Ecole des Ponts ParisTech (FR)
7) Marne-la-Vallée (FR)
8) Seine-St.-Denis (FR)
9) Météo France (FR)
10) Véolia (FR)
11) Imperial College London (UK)
12) Met Office (UK)
13) Local Government Flood Forum (UK)

4 Pilots:

Rotterdam (NL)

Leuven (BE)

Marne-la-Vallée (FR)
Seine-St.-Denis (FR)

Croydon (UK)
Redbridge (UK)

RainGain

high resolution rainfall and flooding information in urban areas

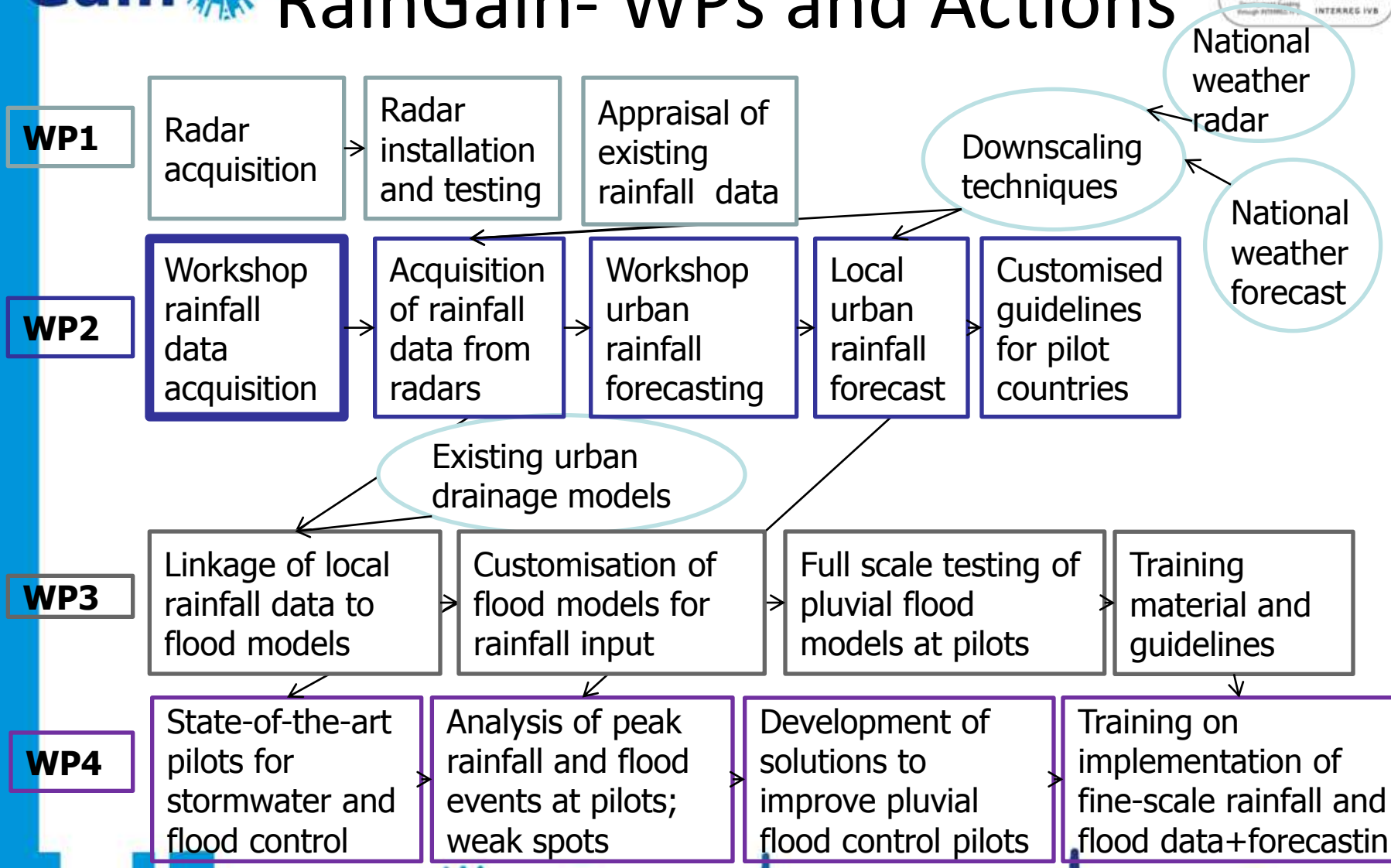
- WP1: Installation and testing of radars
  Lead: ParisTech

- WP2: Fine-scale rainfall estimation and forecasting
  Lead: KU Leuven

- WP3: Urban flood modelling and prediction
  Lead: Imperial College of London

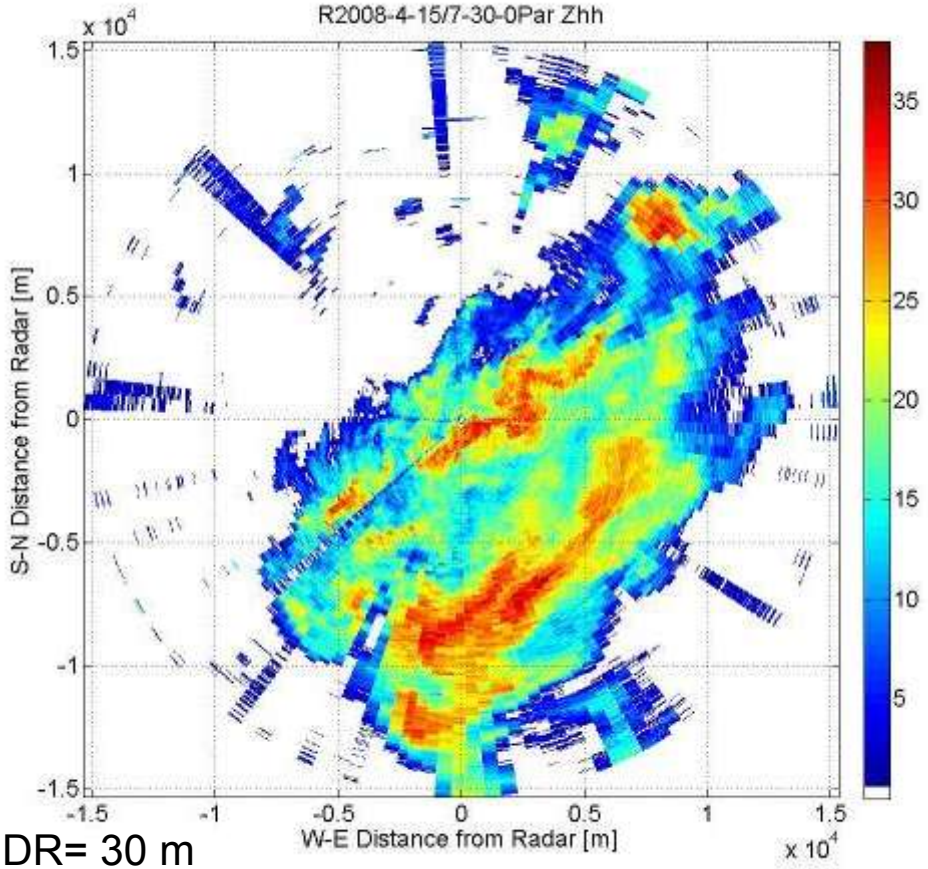
- WP4: Implementation of fine-scale rainfall estimation and flood modelling in urban water management practice
  Lead: TU Delft

RainGain- WPs and Actions

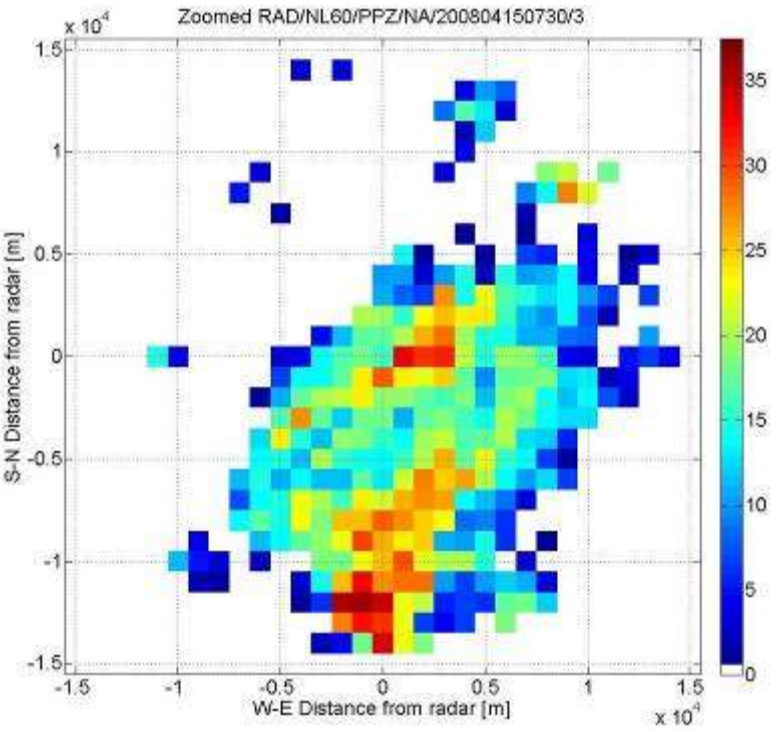


Data resolution
<< 1 km in space; < 5 min in time

Polarimetric X-band radar:
high resolution rainfall observation



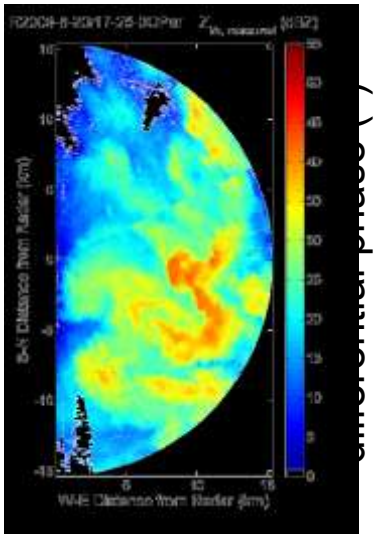
DR= 30 m

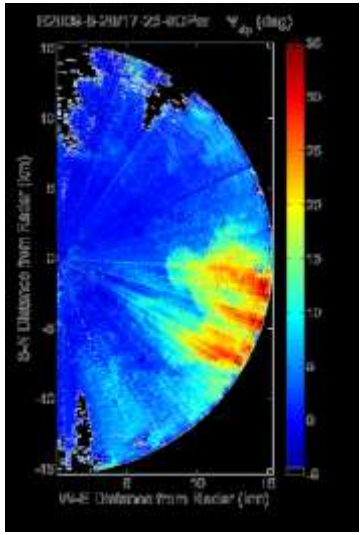


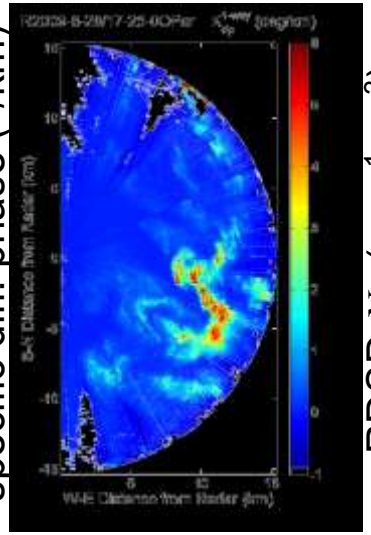
DR= 1 km

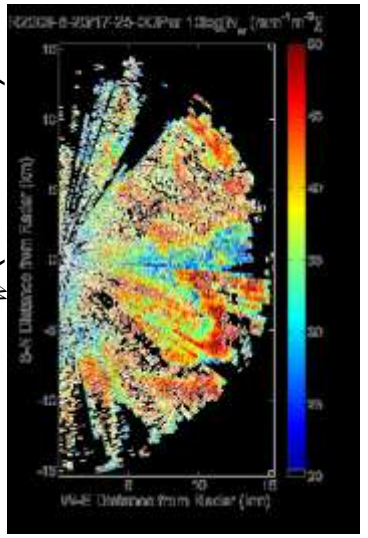
Courtesy: KNMI

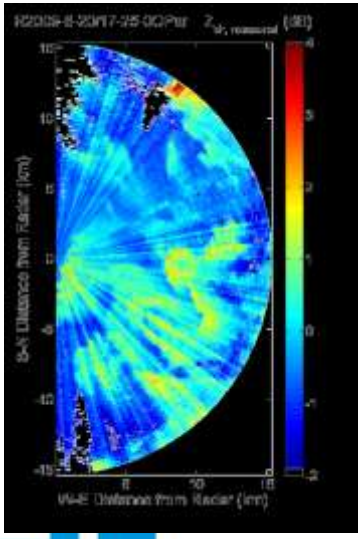
Polarimetric X-band radar

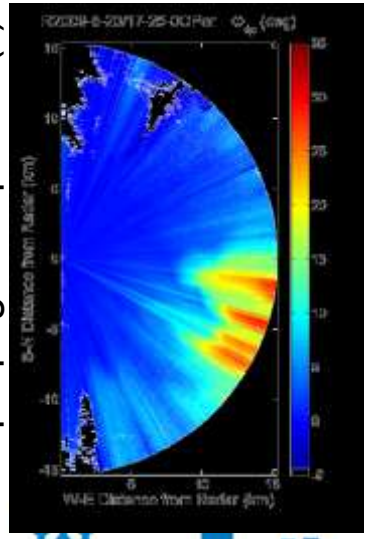


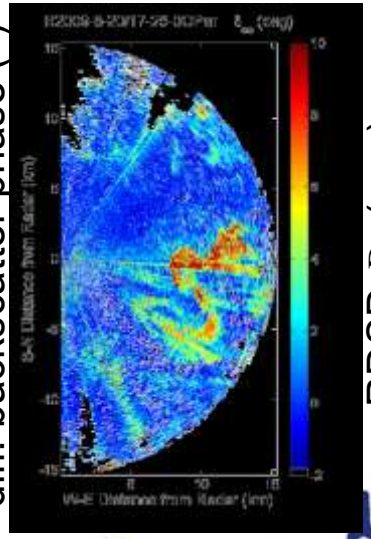


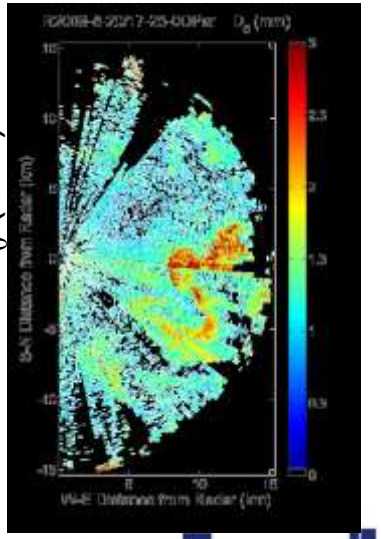








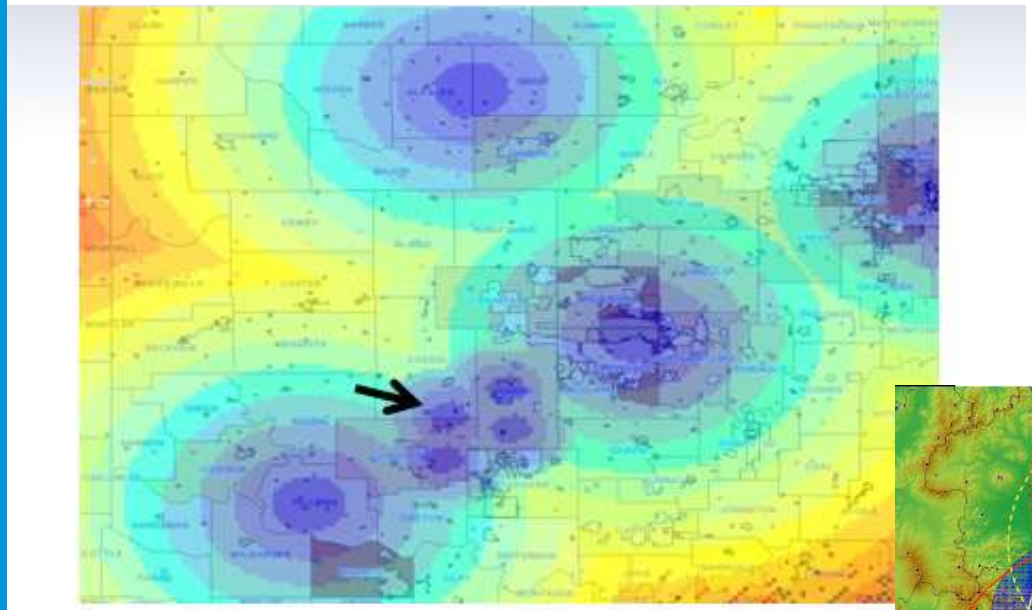




Future of urban rainfall estimation: Network of radars

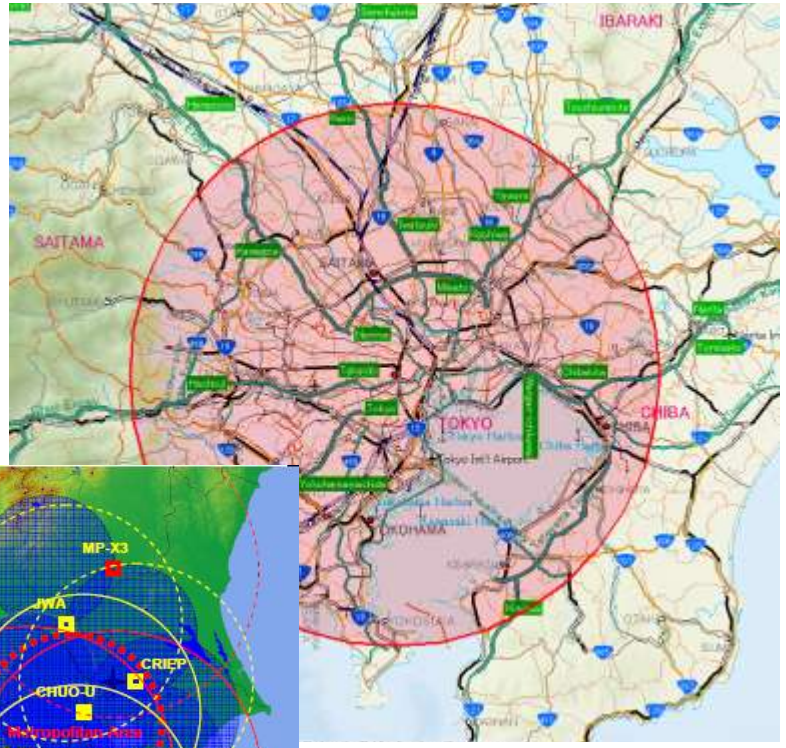
Example US: CASA X-band network underneath NEXRAD

Oklahoma; moving to Dallas Fort Worth in 2012



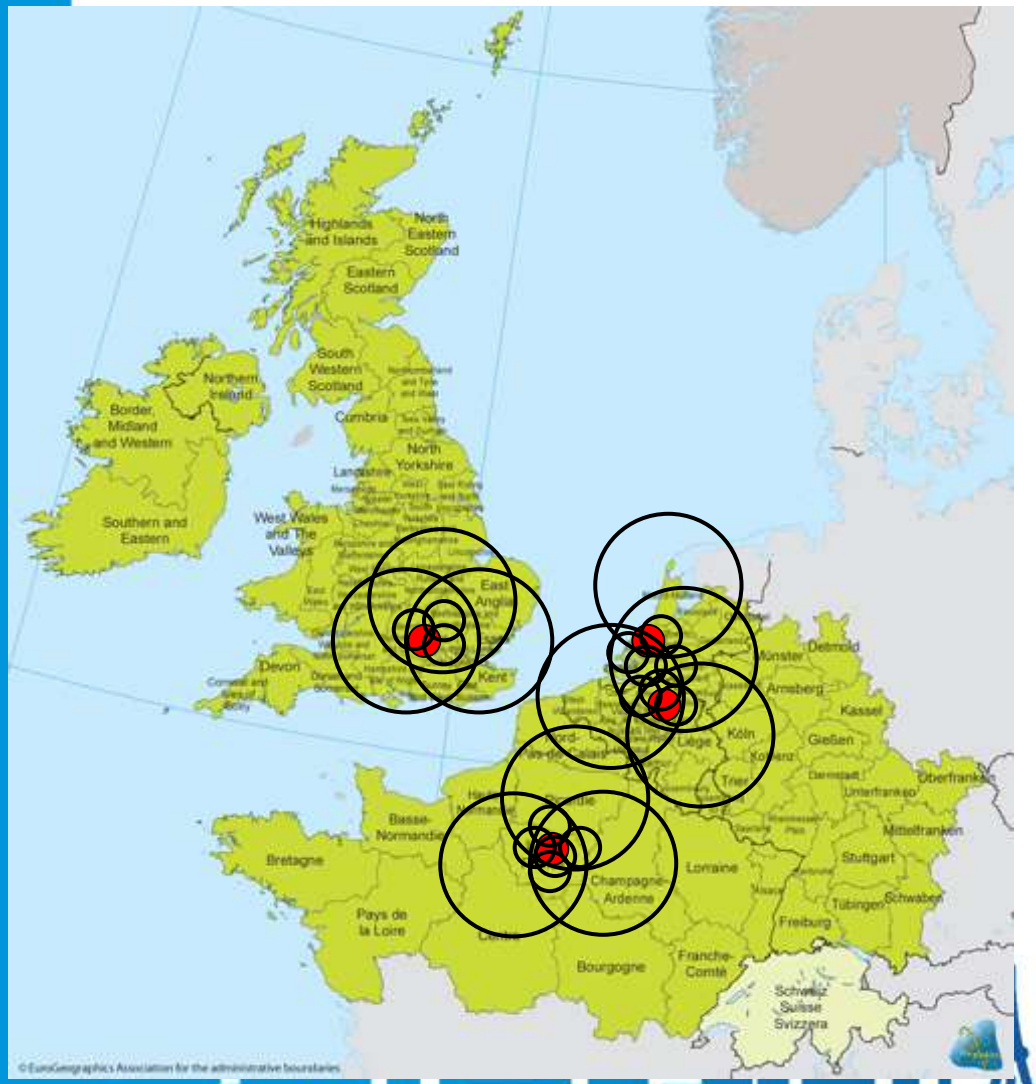
Courtesy McLaughlin

Example Japan: X-NET, Tokyo Metropolitan area



Courtesy Maki et al.

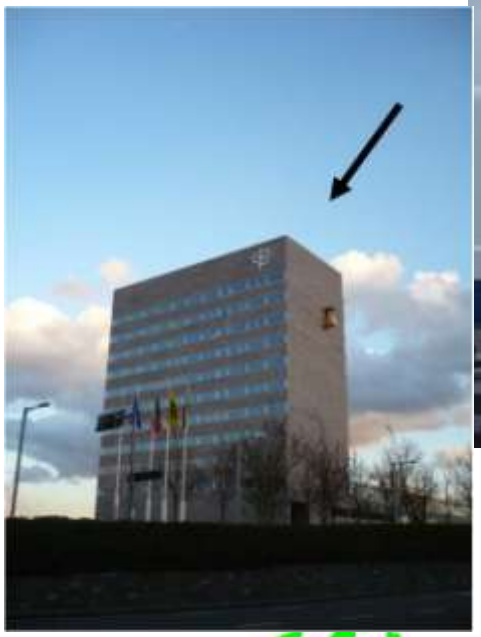
Future of urban rainfall estimation in Europe

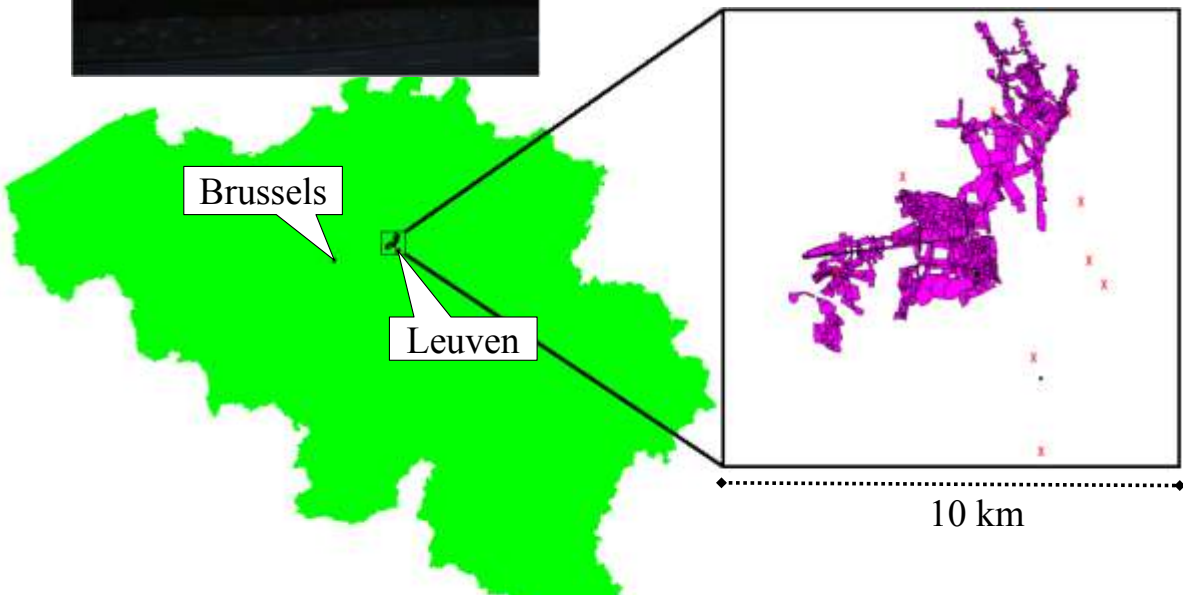


RainGain pilot site radars: Leuven

Aquafin &
K.U.Leuven

X-band radar installed
- ✓ since 2008
- ✓ City LAWR (DHI)

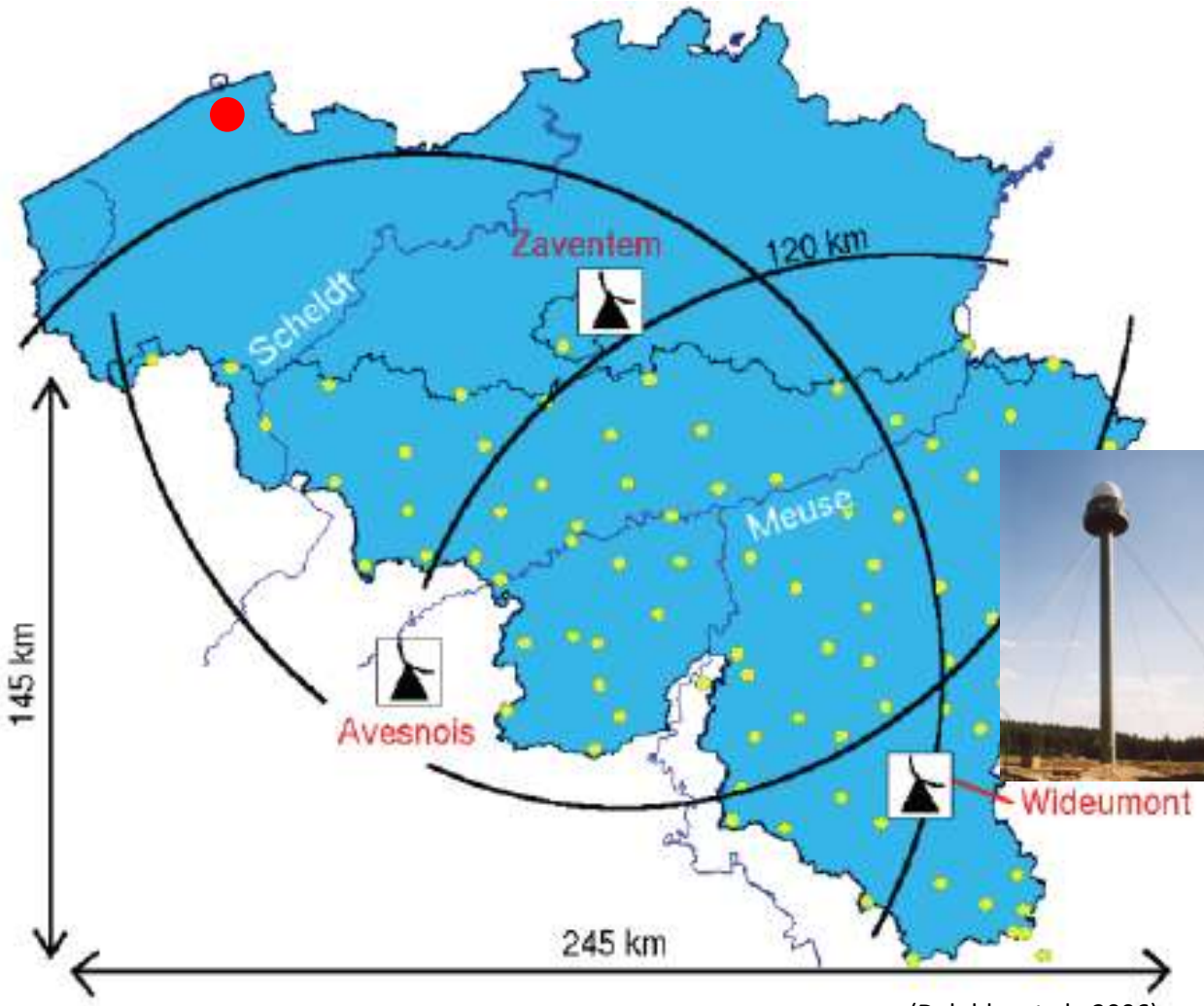




Belgium C-band radars

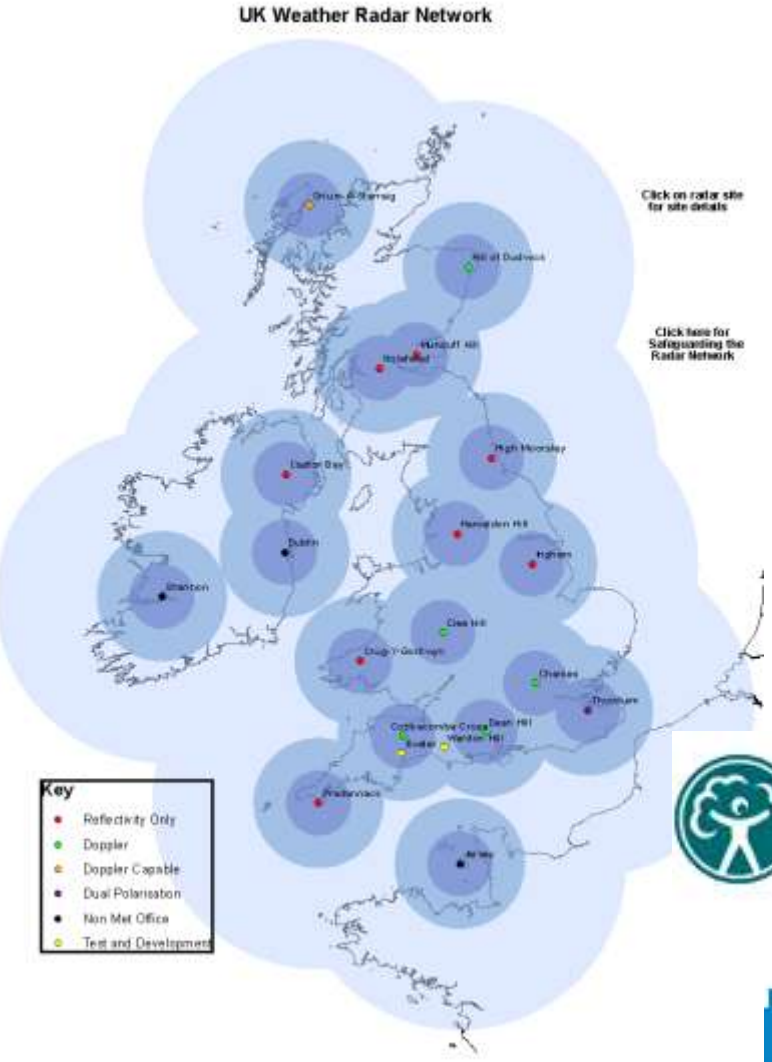
SP C-band radars
- Wideumont (RMI)
- Zaventem (Belgocontrol)

DP C-band radar:
- from beginning 2012 in Jabbeke



(Delobbe et al., 2006)

RainGain pilot site radars: UK Weather Radar Network



- Location of radars
- 5km resolution coverage
- 2km resolution coverage
- 1km resolution coverage

- A diverse range of stakeholders and users

ENVIRONMENT AGENCY

Met Office

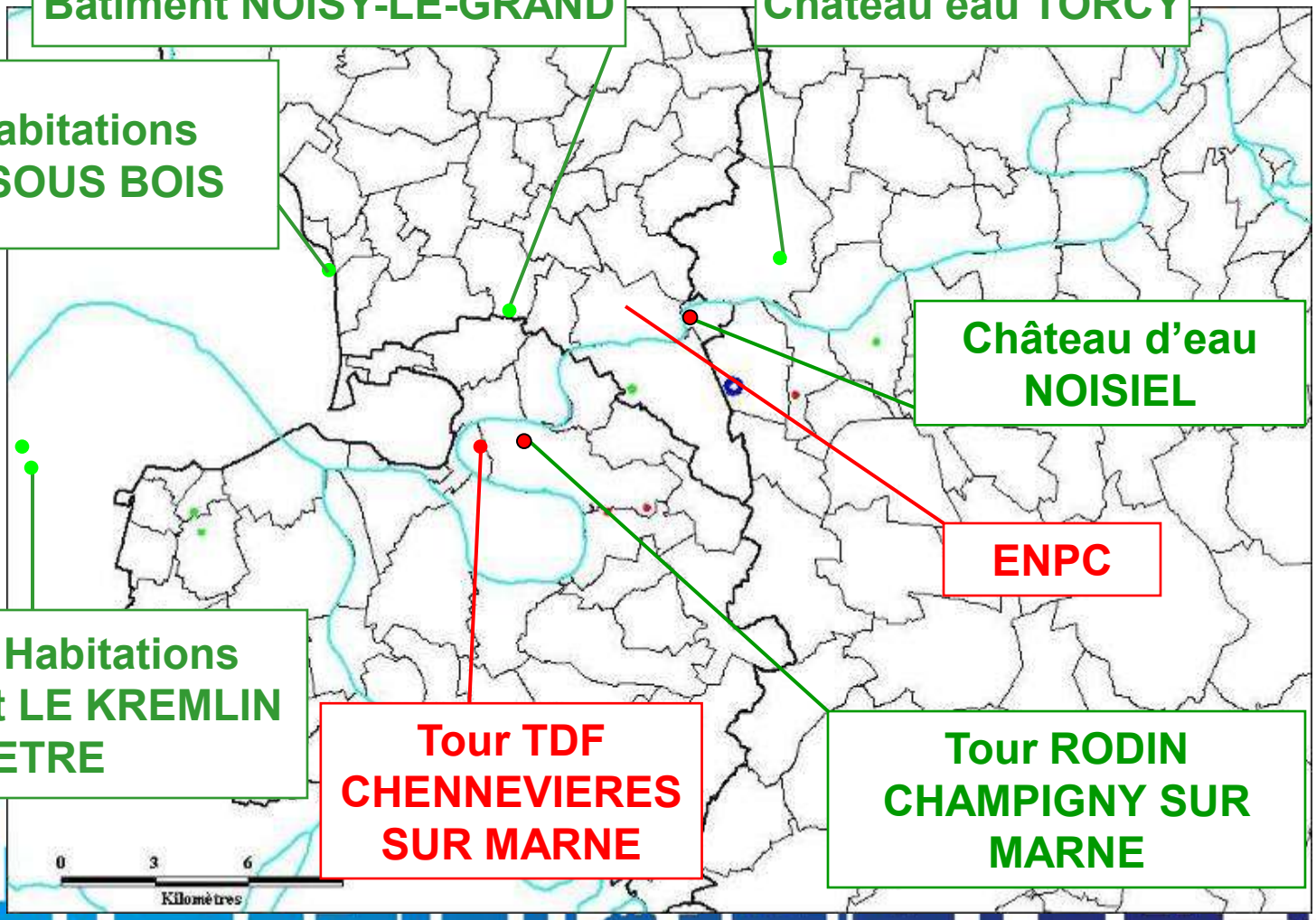
NORTHUMBRIAN WATER GROUP

anglianwater

ROYAL NAVY

ScottishPower
gas and electricity

RainGain pilot site radars: Paris

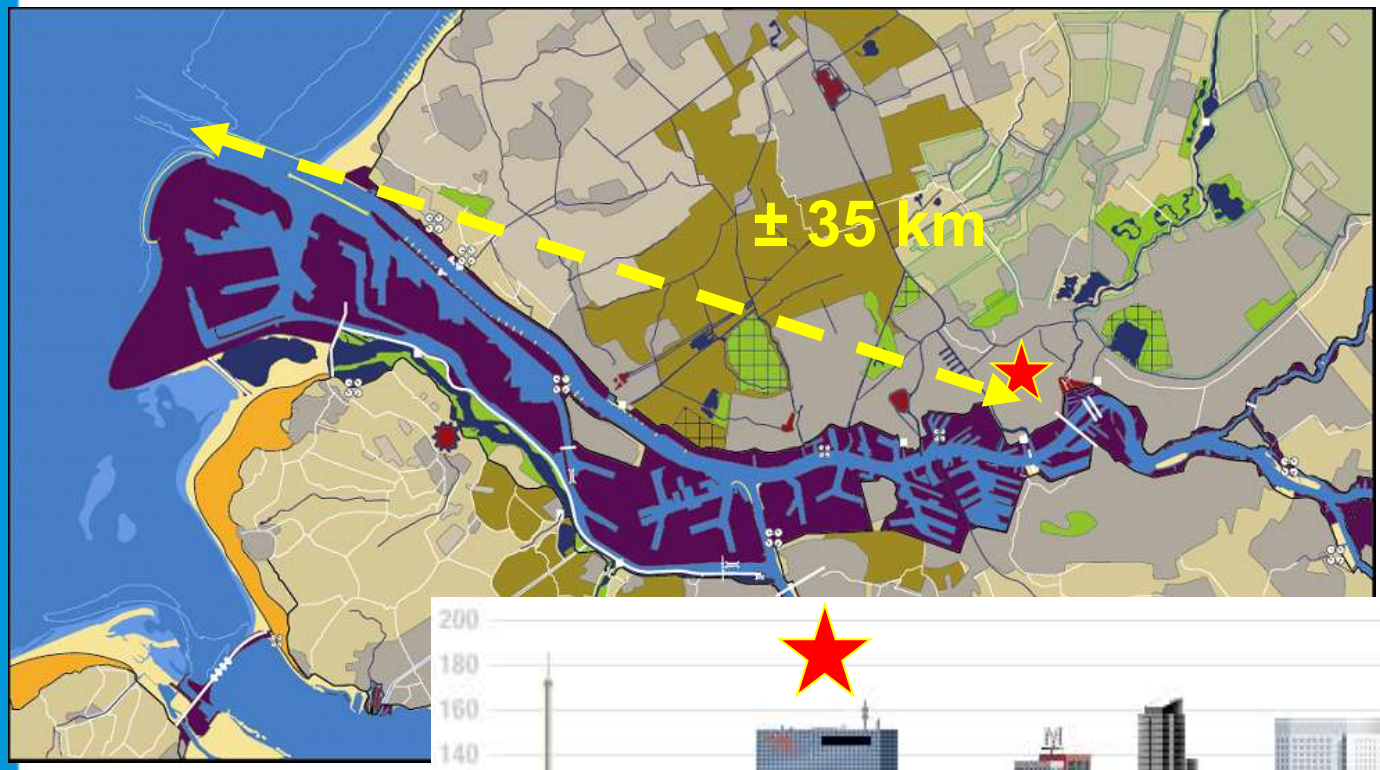


RainGain pilot site radars: Paris

ENPC campus
Noisy Champs

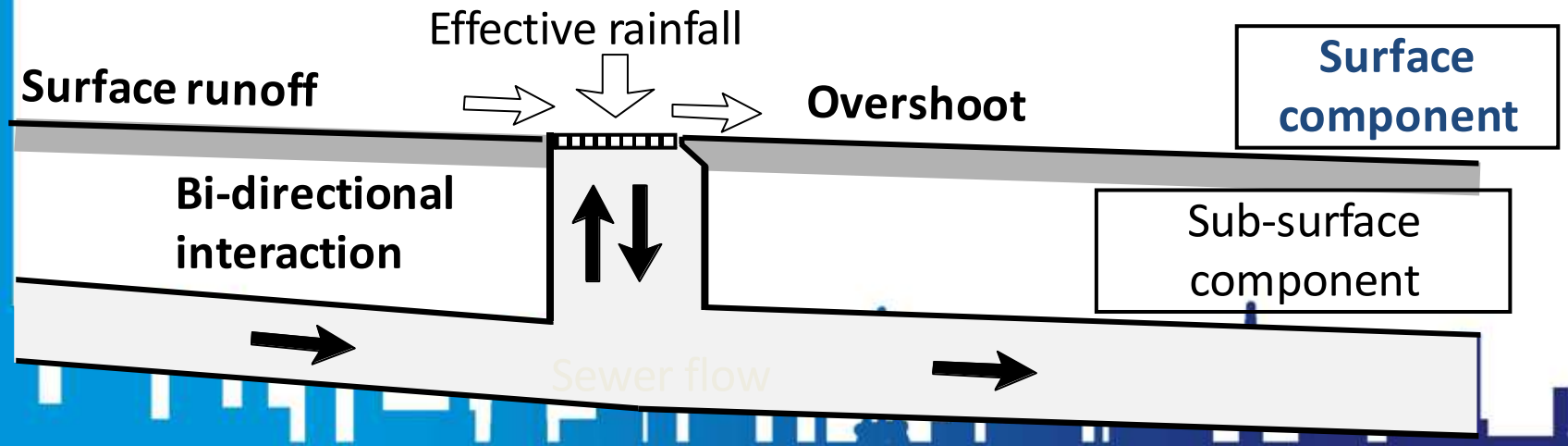
Tour EDF

RainGain pilot site radars: Rotterdam



Modelling of urban flooding

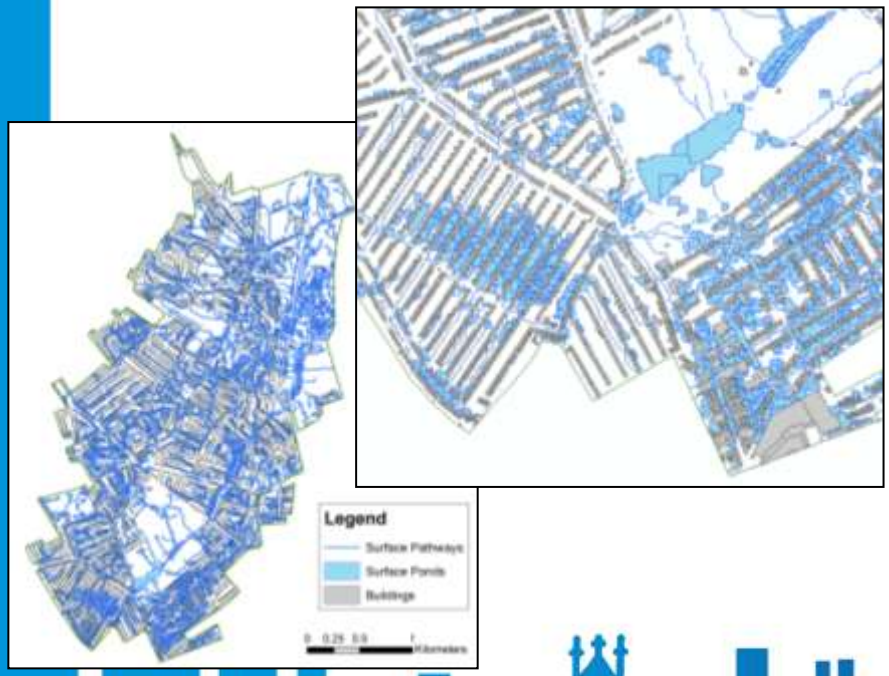
Dual Drainage Concept



Dual-drainage concept: overland network + sewer network

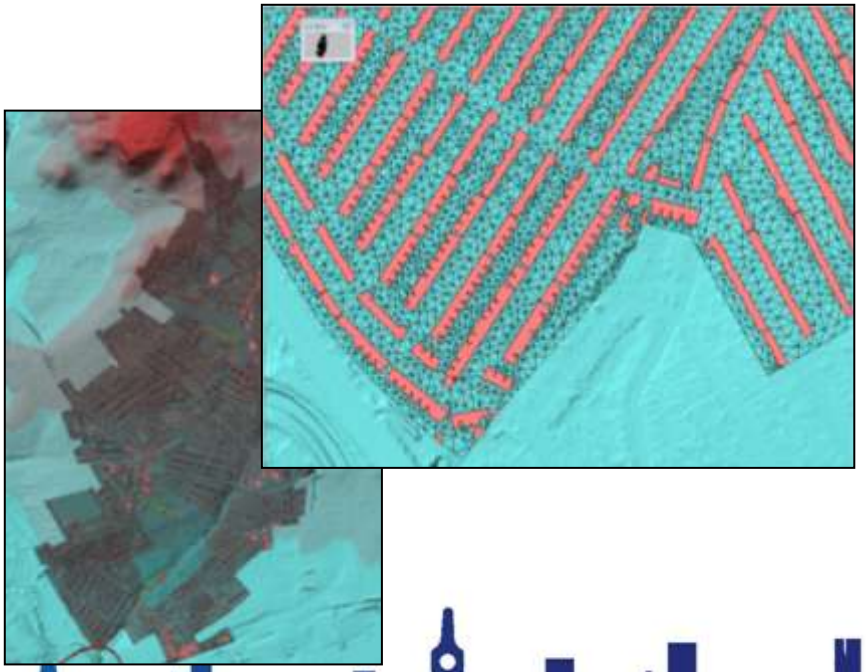
1D overland flow modelling

Nodes (ponds) and links (flow paths)



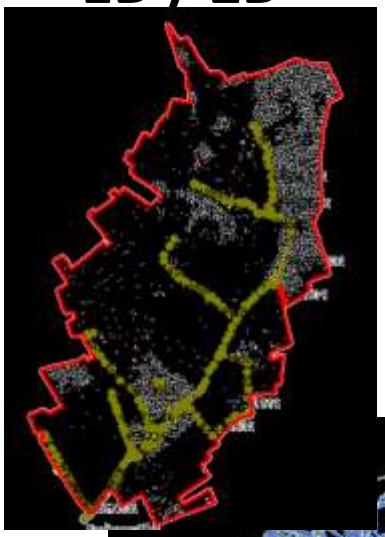
2D overland flow modelling

Surface divided into small elements (squares or irregular triangles)

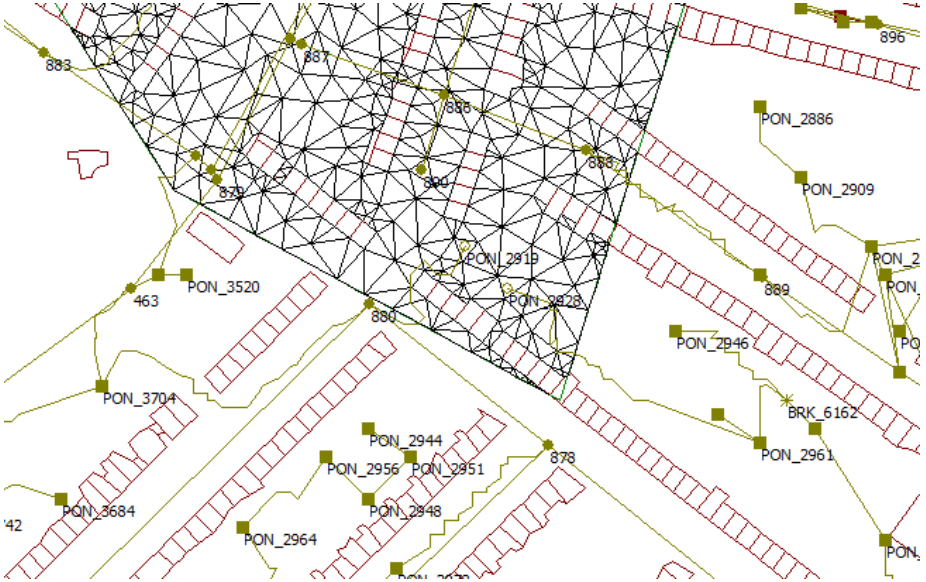


To combine their advantages and overcome their disadvantages…

1D / 2D



1D / 1D



Hybrid
1D/1D + 1D/2D simulation

Control of urban flooding through fine-scale rainfall and flood data

- Better analysis of local flooding problems (! Local rainfall data)
- More efficient investments in flood control measures
- Optimising water storage
- Heavy rainfall and flood warnings (lead ≥1 hour)
- Flooding detection (tunnels)

RainGain
National Observer Groups

Four National Observer Groups: NL, BE, FR, UK (1x/year)

20 – 50 participants:

- Specialists: e.g. meteorologists, hydrologists, modellers,…
- Practitioners and planniner: water authorities, city planners, sewer agencies, infrastructure planners,…
- Exchange of information and ideas about RainGain project
- Information/training developed models and forecasting tools

RainGain Projectplanning

Start date: 1 September 2011
End date: 31 July 2015

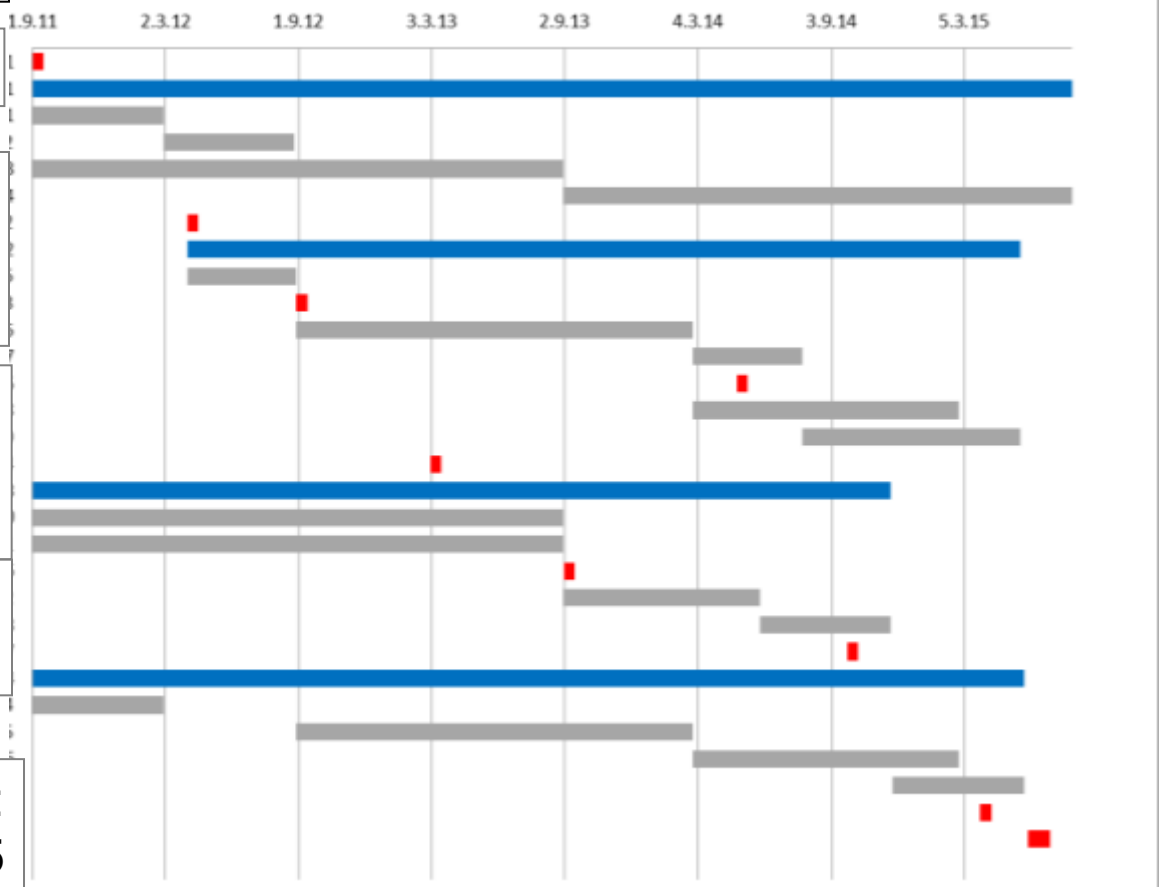
Official Kickoff: 17-18 Nov 2011

Workshops for WPs
(WP2 workshop
16 April, Leuven)

Project consortium meetings
(17 April 2012, Leuven
October 2012: Rotterdam)

Nat. Observer Group meetings:
4 per pilot/country

International conference:
June 2015



RainGain: meet the team

AGENDA 16 April

- 9:30 – 10:00 Welcome and introduction
- 10:00 – 11:30 X-band and C-band radar calibration : methods and experiences
- 11:30 – 12:00 Break
- 12:00 – 13:00 X-band versus C-band performance : experiences
- 13:00 – 14:00 Lunch
- 14:00 – 15:30 Integration of X-band, C-band and rain gauge measurements: methods and experiences
- 15:30 – 16:00 Break
- 16:00 – 17:00 Fine-scale rainfall estimation : recommendations and guidelines