

# WindRisk: Analysis of summer storm event ‚Ela‘ - *Case Study Essen* -

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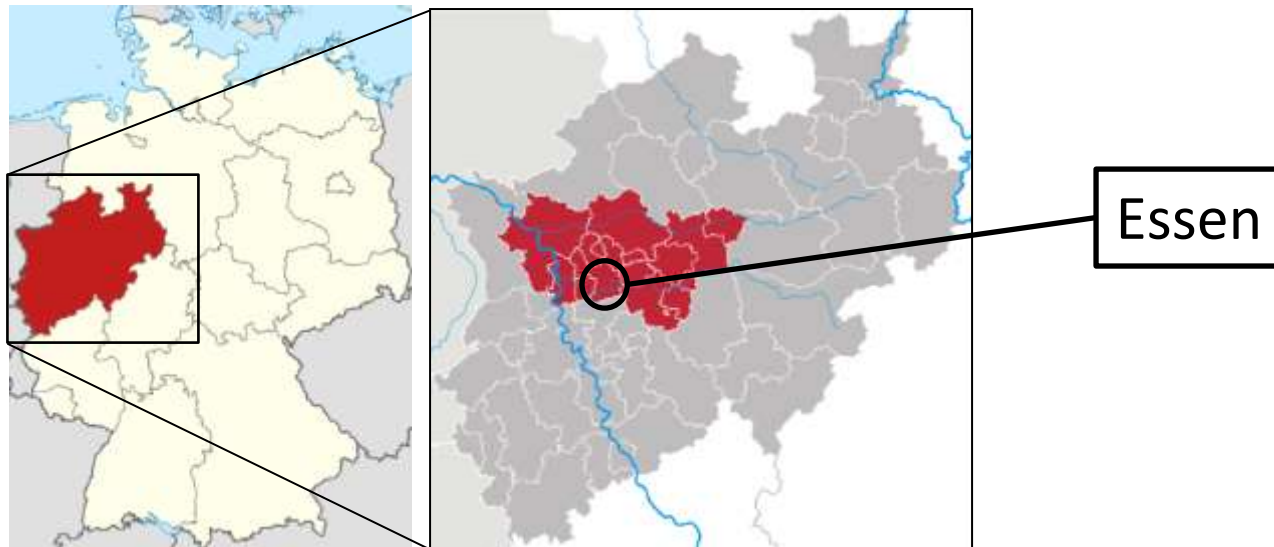


# Agenda

1. Introduction
2. Summer storm event ,Ela‘
3. State of work
4. Conclusions & outlook

# Introduction

- City of Essen is situated in the core of the Ruhr area, North Rhine-Westphalia, Germany
- ~576.000 inhabitants (2014)
- Essen covers approx. 210 km<sup>2</sup>
- Awarded European Green Capital 2017



# Introduction (2)

- North-Western Germany usually prone to winter storms, summer storms are rather unusual
- Winter storms are more broad events, summer storms usually more local
- Ela most intense summer storm event ever recorded in Essen

# Introduction (3)

- Summer storms pose specific threats since trees are particularly vulnerable due to full leaf coverage
- Other threats include: hail, flash floods, lightning and associated dangers
- On 9<sup>th</sup> of June 2014 the 'Ela' summer storm struck the Ruhr area particularly hitting the municipalities of Düsseldorf, Mülheim a.d.R., **Essen** and Bochum

# Summer storm event ,Ela‘

## *Weather evolution on 9<sup>th</sup> of June 2014*

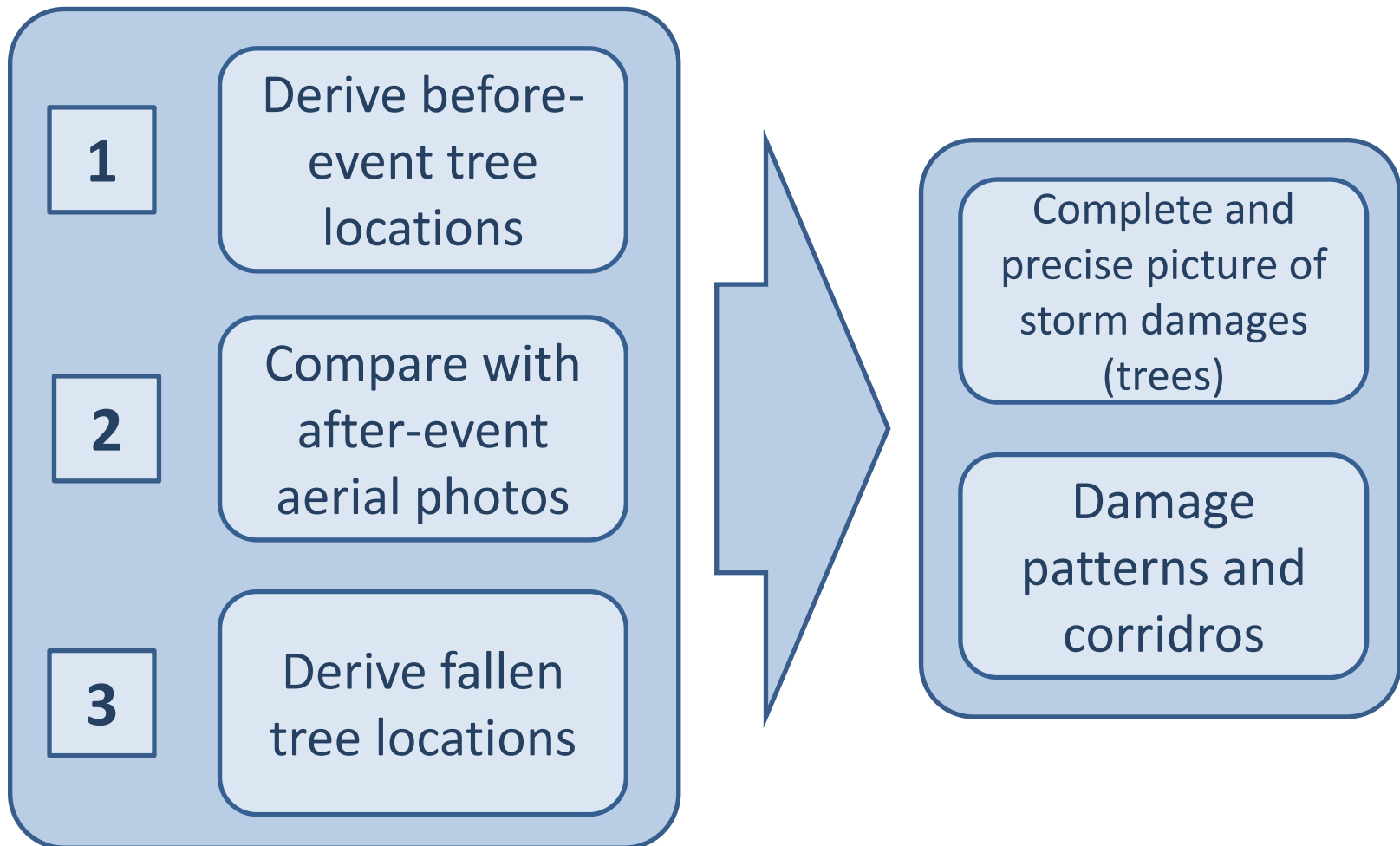
- The radar image showed a huge storm complex over the East of Belgium with a distinct thunderstorm line which hit the West of North Rhine-Westphalia at around 8 p.m.
- At the forefront of the thunderstorm a distinct gust front evolved with severe storm gusts and few minutes later hurricane-like gusts. The whole complex moved quickly on to the East/North-East.
- On the forefront of the thunderstorm complex a so-called **Bow-Echo** evolved. (Bow-Echo: a curved area of precipitation, which evolves from very heavy downbursts)
- As consequence wind speeds up to 130km/h occurred and precipitation up to 40 litres/m<sup>2</sup>
- At around 9:30 p.m. this mesoscale convective complex (MCC) hit the city of Essen.

# Summer storm event ‚Ela‘ (2)

- Consequences in Essen:
  - Approx. damages: > 60 mio. EUR
  - ~20.000 fallen/damaged trees all over the municipal area
  - Blocked roads and damaged infrastructures (e.g. railway cables)
  - Damaged and/or flooded buildings
  - 9 severe, 6 light injuries, luckily **no casualties**
  - 950 firefighters involved over the first 3 days
  - Forests and some public facilities like playgrounds closed for long periods after the event

# State of work

- Methodology





# State of work (2)

- Recent image data of the whole municipal area acquired in course of WindRisk in April 2015
- Data being analysed since August



Aerial photograph 2014



Aerial photograph 2015

# State of work (3)

- Analysis of tree locations before the event (2014)
- Based on Laserscan data (point cloud)
- Previous approach based on 2009 data refined and re-worked with most recent (2014) LS data



Comparison of old and new LS-based tree locations

# State of work (4)

- Compare before-event data on trees with 2015 images



# State of work (5)

- Analysis of fire brigade operations data
- Get better image of 'search corridors' and event locations

[video]

# Conclusions & outlook

- Refinement of LS-based tree locations as promising first result
- Challenge to derive damaged/fallen tree locations from 2015 aerial photographs
- Goal: get precise and complete picture of locations and patterns of storm damages (→ trees)
  
- Compare with locations of critical infrastructures
- Derive (planning) recommendations / check operation plans of local fire brigade and civil protection in light of these results
- Feed relevant outcomes into further work (e.g. vulnerability model)

**Thanks for listening!**