



# URBAS

## Prediction and management of flash floods in urban areas

Project funded by the  
Federal Ministry of Education and Research BMBF (Germany)  
as a part of  
RIMAX „Risk management of extreme flood events“

Internet: <http://www.urbanesturzfluten.de>  
Internet: <http://www.rimax.de>

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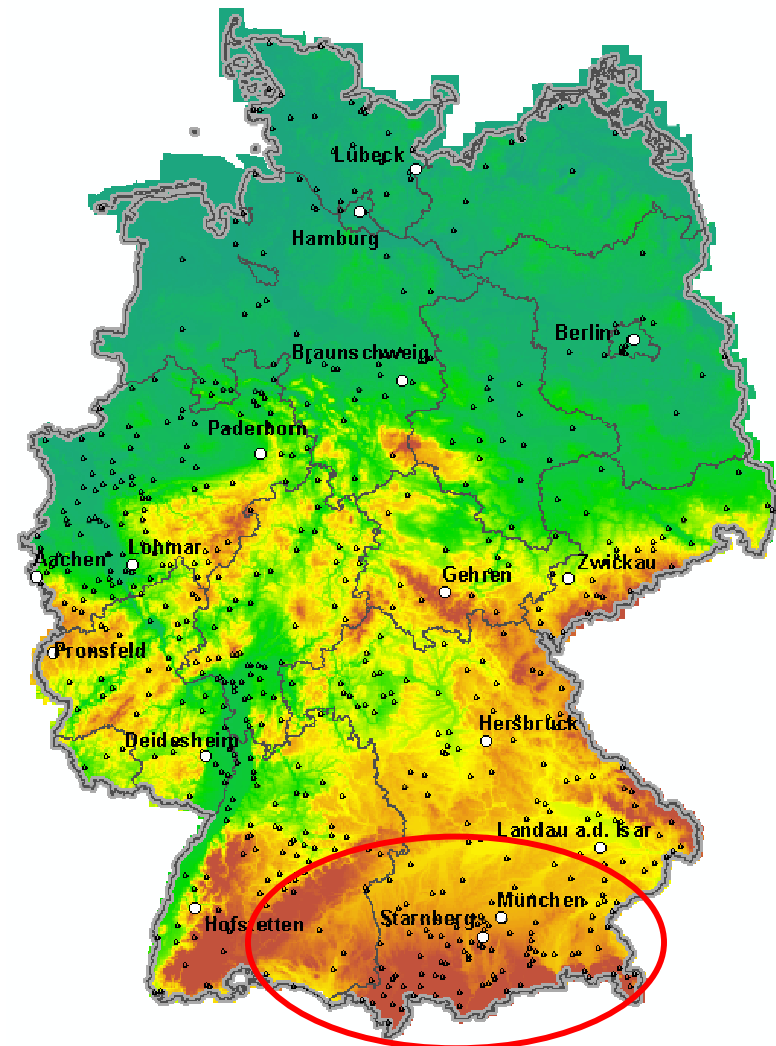
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# Flash-Floods in Germany: a serious problem?

- recorded flash flood events with damage in urban areas



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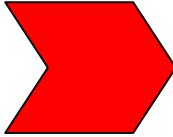
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# Challenges, objectives and „products“

- climate change
  - phenomena of flash floods
  - feasible risk management strategies
- 
- management of flash flood events in a new database
  - improved forecast tools
  - estimation of damage
  - methods for hazard and risk analyses for municipalities, hazard and risk maps
  - areas with high flash flood risk in Germany
  - guidelines for measures

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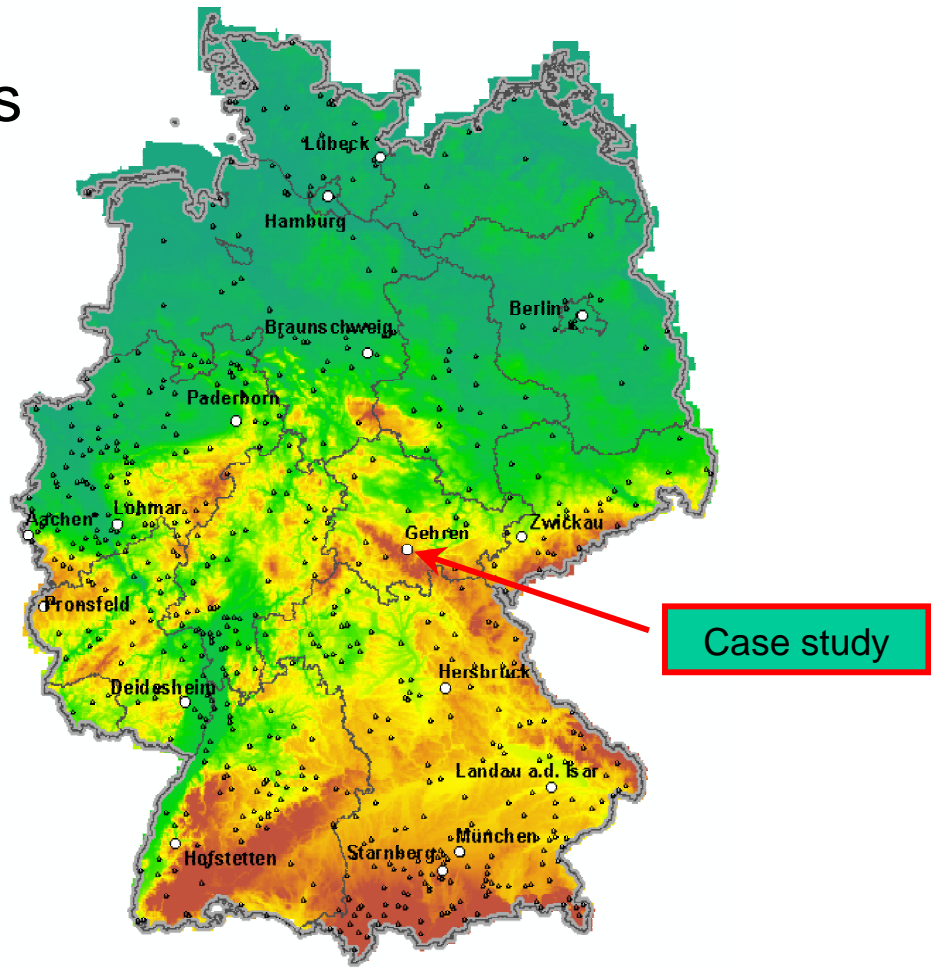
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# Case studies

- 15 representative cities
- interviews with all involved authorities
- ex post studies and simulations



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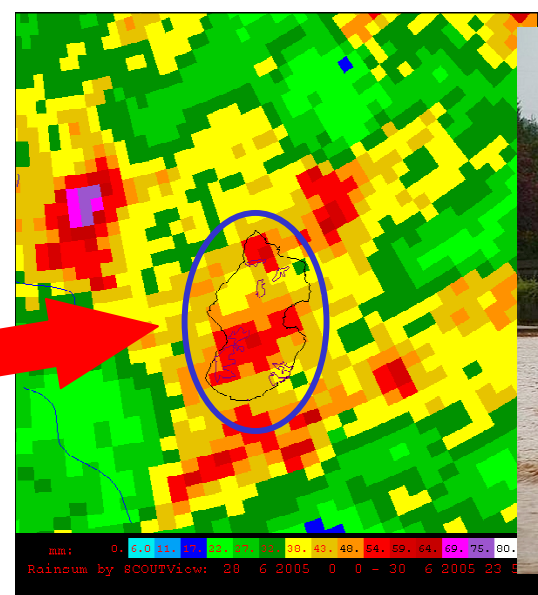
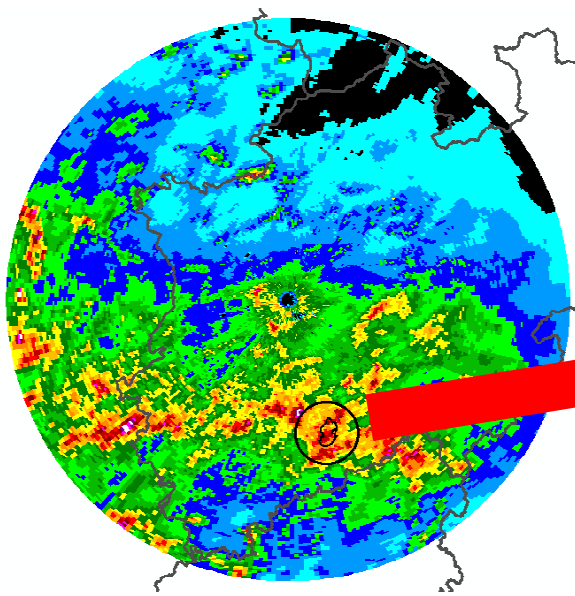
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# Case studies: meteorological situation

- measured precipitation vs. design rain



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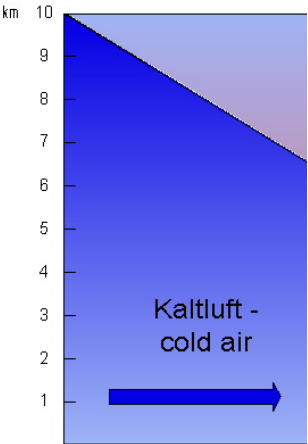


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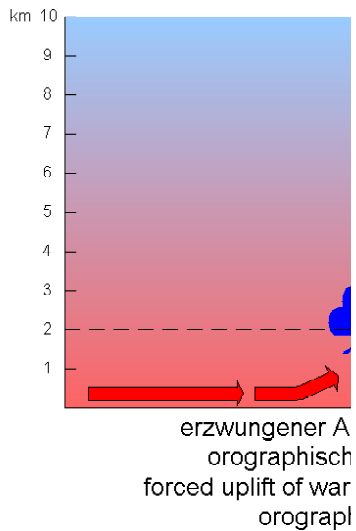


# Types of flash flood producing storms

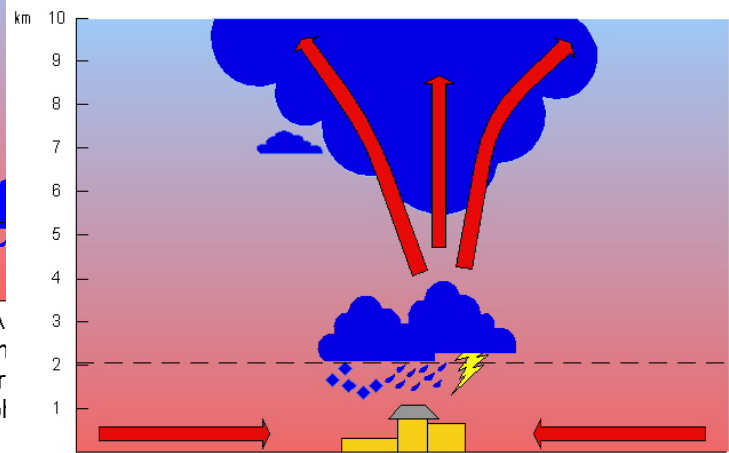
Frontal induzierte Konvektion -  
 convection induced by a front



orographisch induzierte Konvektion -  
 convection induced by a orographic barrier



Luftmassen induzierte Konvektion -  
 convection induced by insolation



**Note:** flash flood producing storms may be a combination of two different types:

e.g.: orographic precipitation behind a cold front (picture no. 1 and 2)

Taupunkt  
dew point

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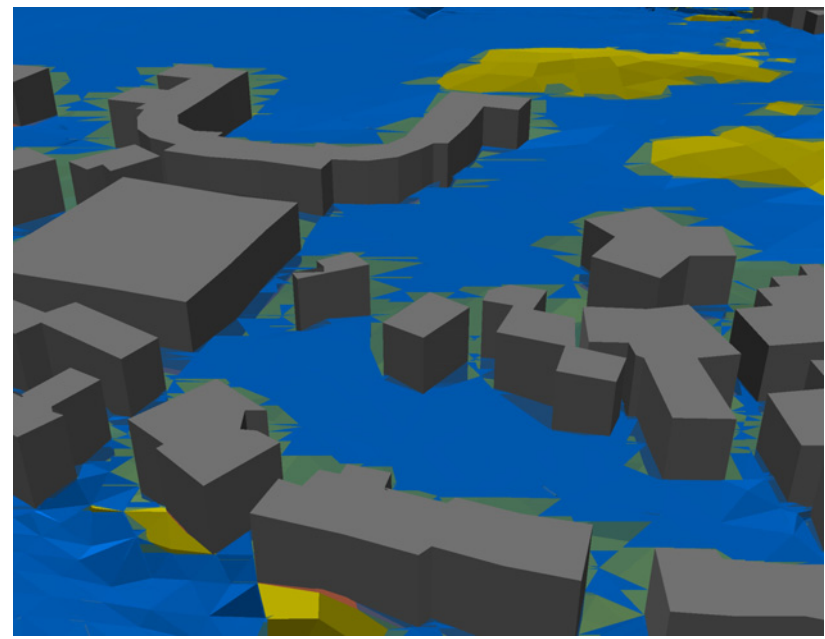
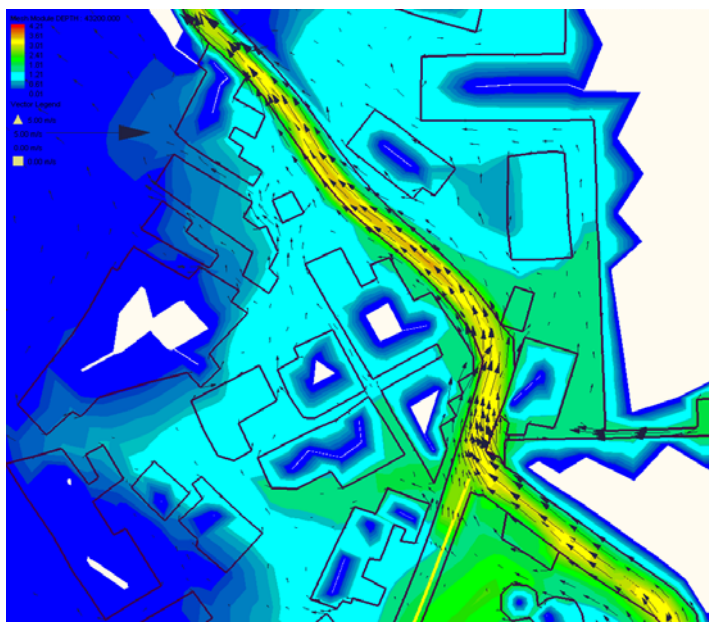
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# Case studies: runoff and flooding

- simulation of sewage/stormwater network, small urban creeks and surface flow by a 2-D hydraulic model, e.g. City of Paderborn



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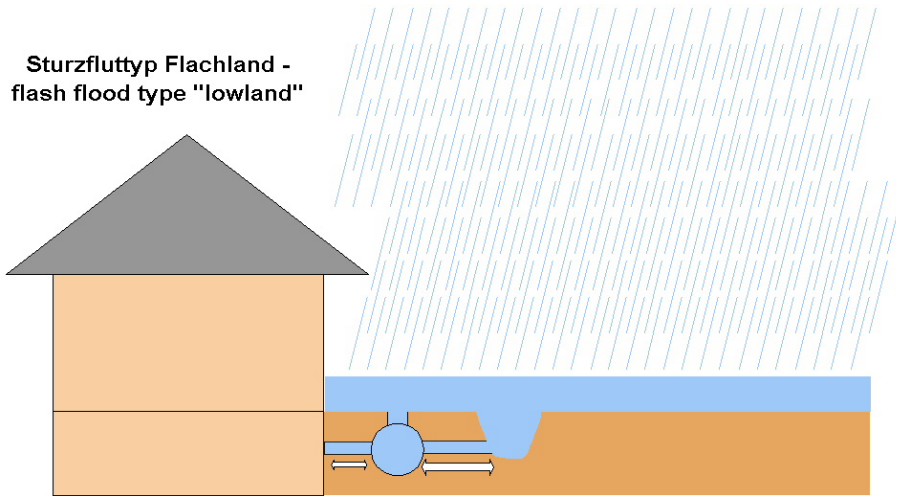


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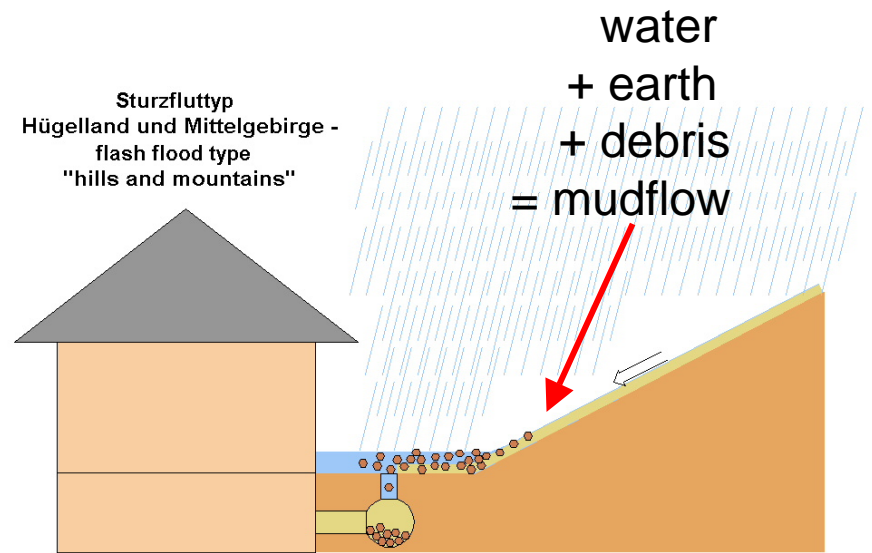


# Types of flash floods in urban areas

## Lowland



## Hills and mountains



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# Case studies: damage assessment and failure analysis, disaster management

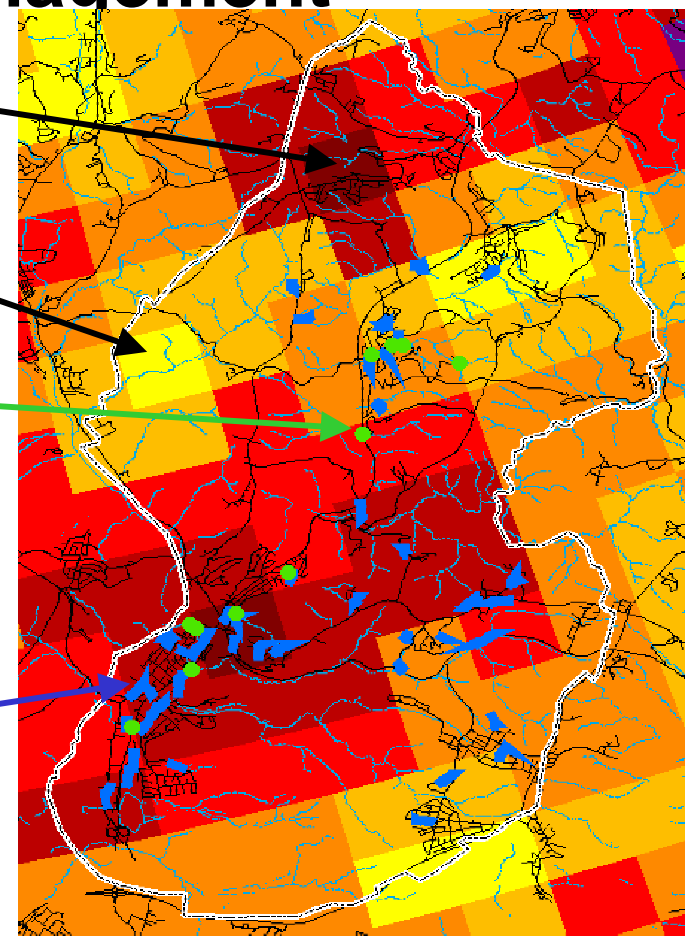
- at micro scale
- rainfall intensity and fire brigade actions during a flash flood in Lohmar
- damage assessment and failure analysis using a GIS, information given by fire brigades and insurance companies and through interviews of affected locals
- Analysis of organisation of rescue units, mitigation measures

high rainfall

low rainfall

places with river flooding

fire brigade assignment



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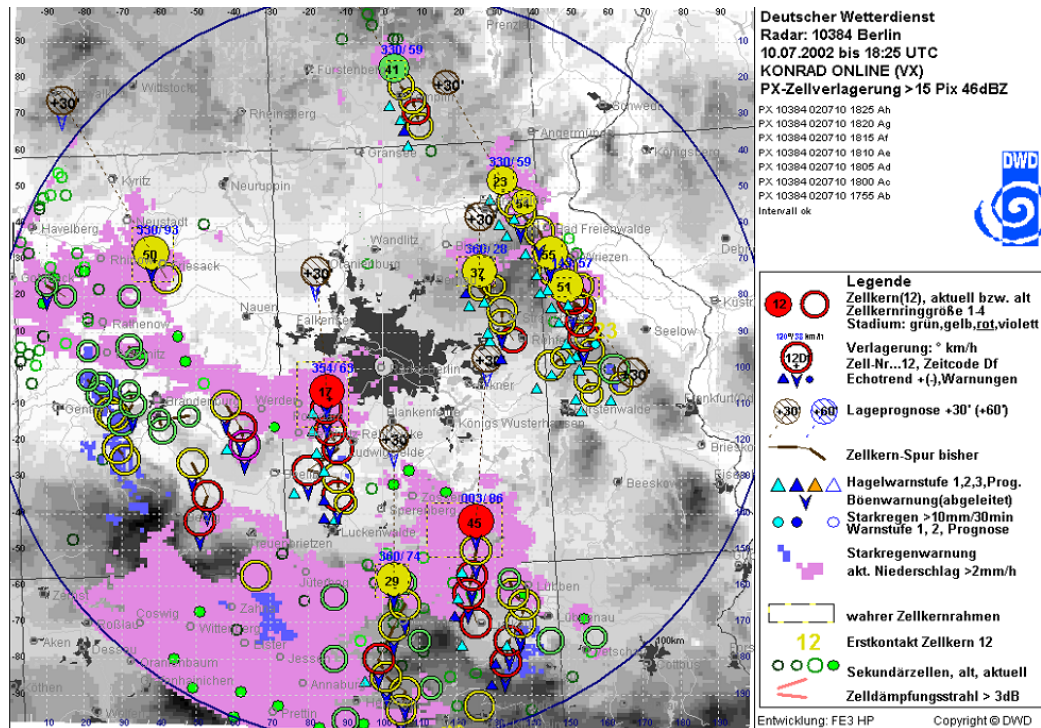
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# Improvement of forecast tools and systems for early warning



- Radar Network (Nowcasting tool KONRAD) from the German Weather Service

- improvement of cell tracking methods
- improvement of detecting methods for flash flood events
- more knowledge about environmental influences

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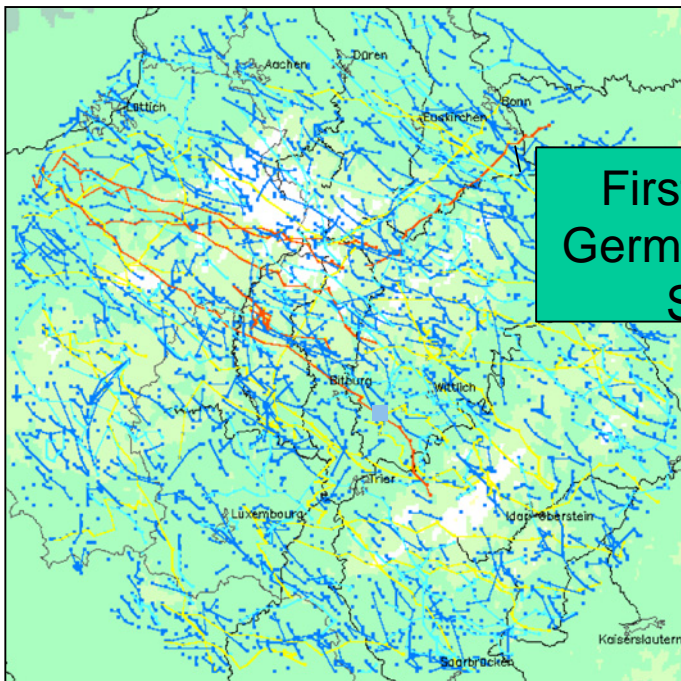
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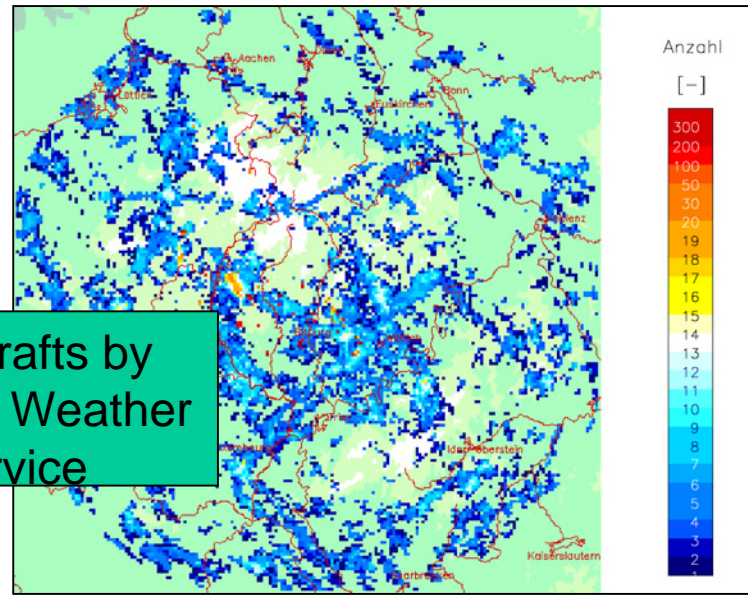


# Affected regions: distribution, frequency, intensity

- Statistical analysis of radar images in the last 5 years



First drafts by  
 German Weather  
 Service



- Detection of „typical“ thunderstorm tracks
- Most and least affected regions (1 year example)

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# Hazard and risk analyses in urban areas

- Development of different methods for hazard and risk analysis for small and big cities
- Collection of best-practice case studies
- Prototypes of urban hazard and risk maps



Übersicht 1:20000

Wellingbüttel / Wandsbek



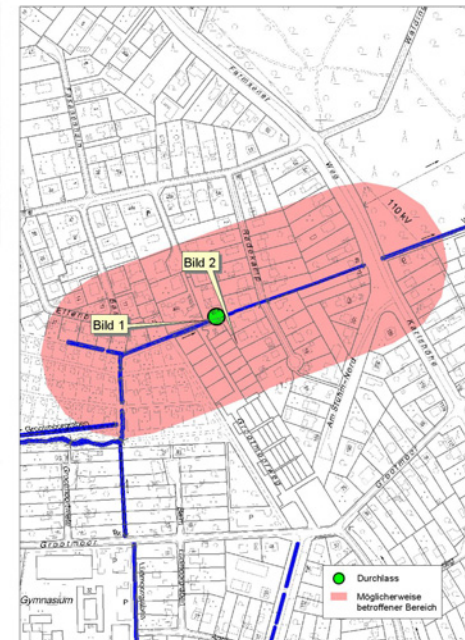
Bild 1: Durchlass hinter Grootmoorweg 56



Bild 2: Entwässerungsmulde hinter Neubauten

Hinweise	Notizen
Durchlass hinter Haus Grootmoorweg 56 erzeugt, wenn verstopft, Rückstau in Entwässerungsmulde hinter der neuen Bebauung. Überschwemmung von Radekamp 18 bis Stühm-Nord. Durchlass kontrollieren und gegebenenfalls räumen. Wenn notwendig, Sicherung der Grundstücke im Bereich Radekamp 18.	

Behörde für Stadtentwicklung und Umwelt -  
Amt für Bau und Betrieb  
B 523



Präventionsmaßnahme  
Wellingbüttler Grenzgraben -  
Grootmoorweg / Radekamp  
Maßstab 1:3000

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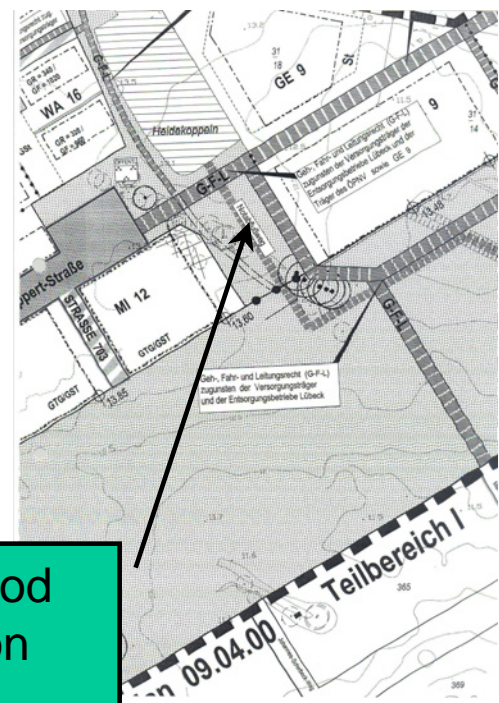
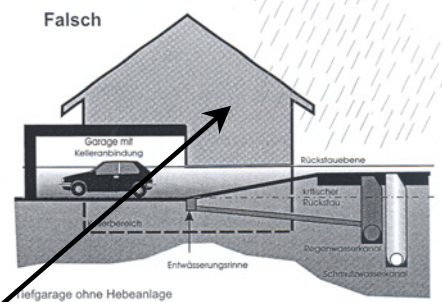




# Actions and measures for risk reduction in urban areas

- Risk reduction
  - town planning
  - technical measures
  - information

## Wohin mit dem Abwasser?



information

e.g. emergency flood ways and retention ponds

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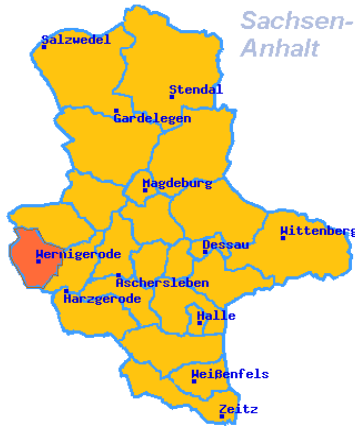


# Actions and measures disaster management

## Damage reduction

- early warning and alarming
- disaster management
- disaster control

Warnsituation - Alle Warnungen



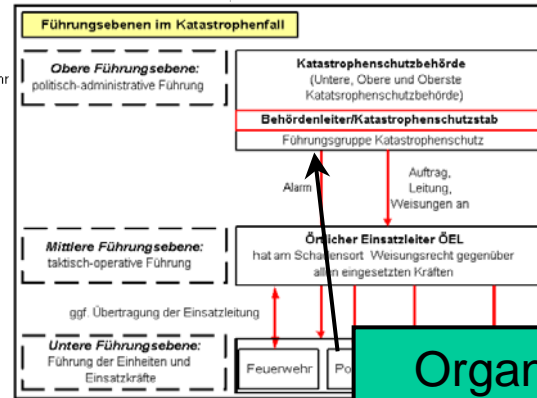
Stand: 03.06.03 16:16 Uhr

- Aktuelle Warnungen:**
- Alle Warnungen
  - Gewitter incl. Begleiterscheinun
- Zur **Deutschlandübersicht**
- Regionales Warnlagebericht**  
Wochenvorhersage Wettergefahr
- Aktuelle Wetterdaten**
- Warnung vor extremem Unwetter
  - Unwetterwarnung
  - Vorwarnung zur Unwetterwarnun
  - Warnung vor markantem Wetter
  - Wetterwarnung
  - Seewetterwarnung
  - keine Warnung

Warning by German Weather Service

Simplified Decision matrix for warning and alarming in Hamburg

Warnart	X	WW	WU	WUEX
Warnstufe Gewässer				
0		W	W	A
1	W	W	A	A
2	A	A	A	A



Organisation

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# More information....

Internet: <http://www.urbanesturzfluten.de>

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# and thank You for listening

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