

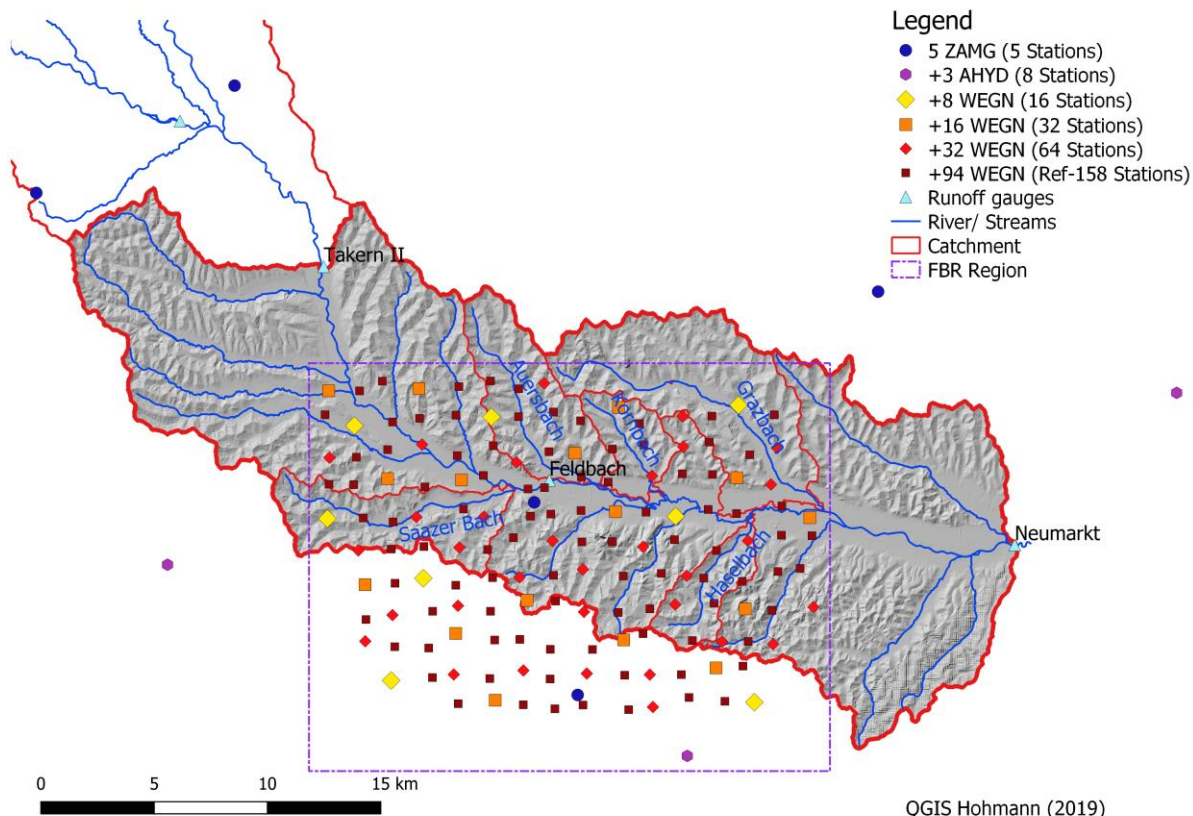


# Impact of spatial resolution and interpolation schemes of precipitation data on hydrological modeling

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# Study design

## Catchments

**Main River Raab**  
Neumarkt (987 km<sup>2</sup>)  
Feldbach (689 km<sup>2</sup>)

**Catchments**  
Grazbach (54 km<sup>2</sup>)  
Auersbach (29 km<sup>2</sup>)  
Saazerbach (27 km<sup>2</sup>)  
Haselbach (12 km<sup>2</sup>)  
Kronbach (12 km<sup>2</sup>)

## Station Networks

**+ Weather service**  
5-Stations

**+ Hydrological service**  
8-Stations

**+ Dense network**  
16-Stations  
32-Stations  
64-Stations  
Ref-158-Stations

## Precipitation Events

**Short Duration**  
10-Aug-2009  
05-Aug-2010  
01-Sep-2011

**Long Duration**  
23-Jun-2009  
17-Sep-2010  
31-Aug-2012

## Spatial Interpolation

**Inverse Distance Weighting (IDW2 & IDW3)**

**Thiessen Polygon (TP)**

## Runoff Analysis

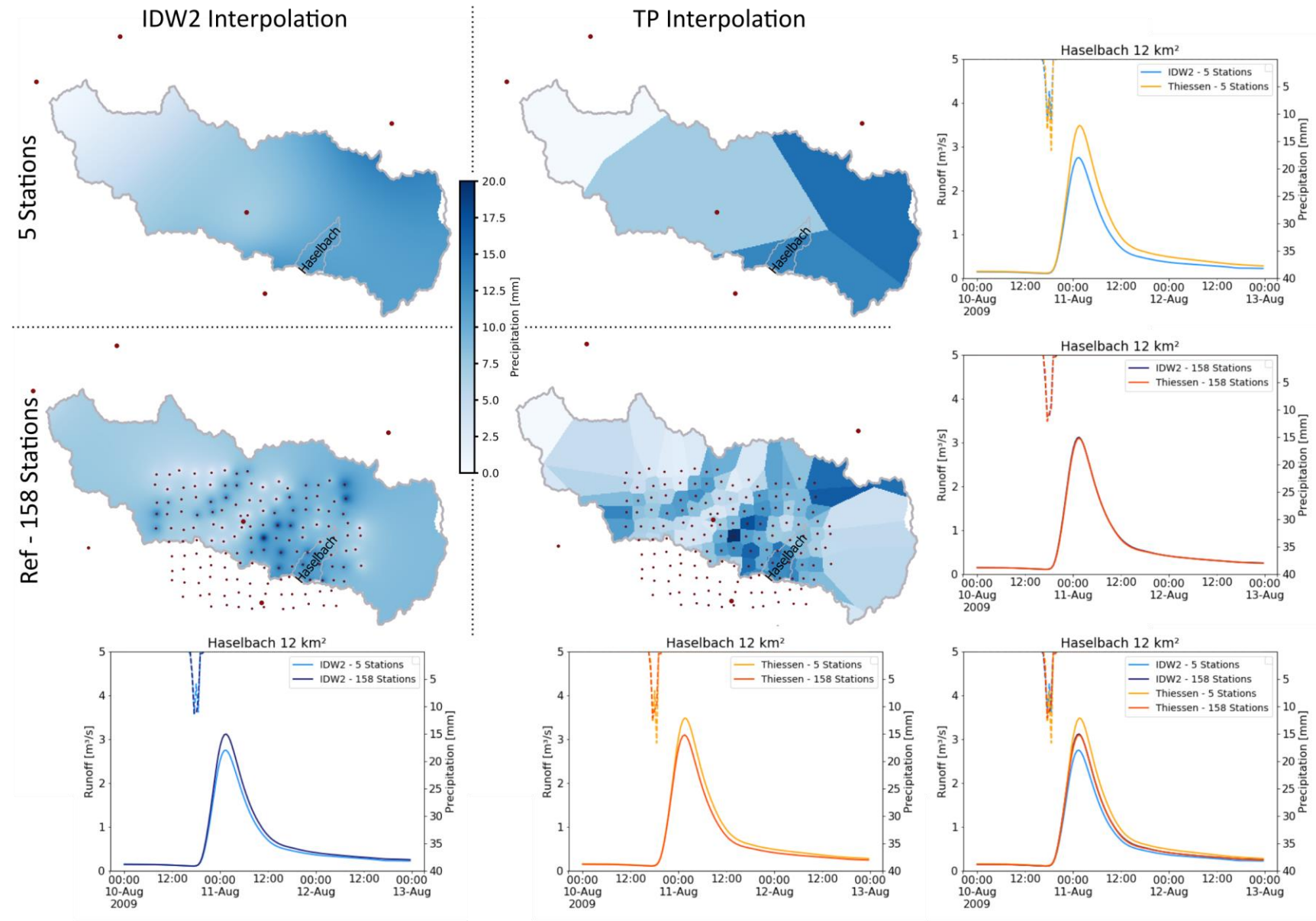
**Time Series**  
[m<sup>3</sup>/s]

**Peak Flow Deviation**  
[%]



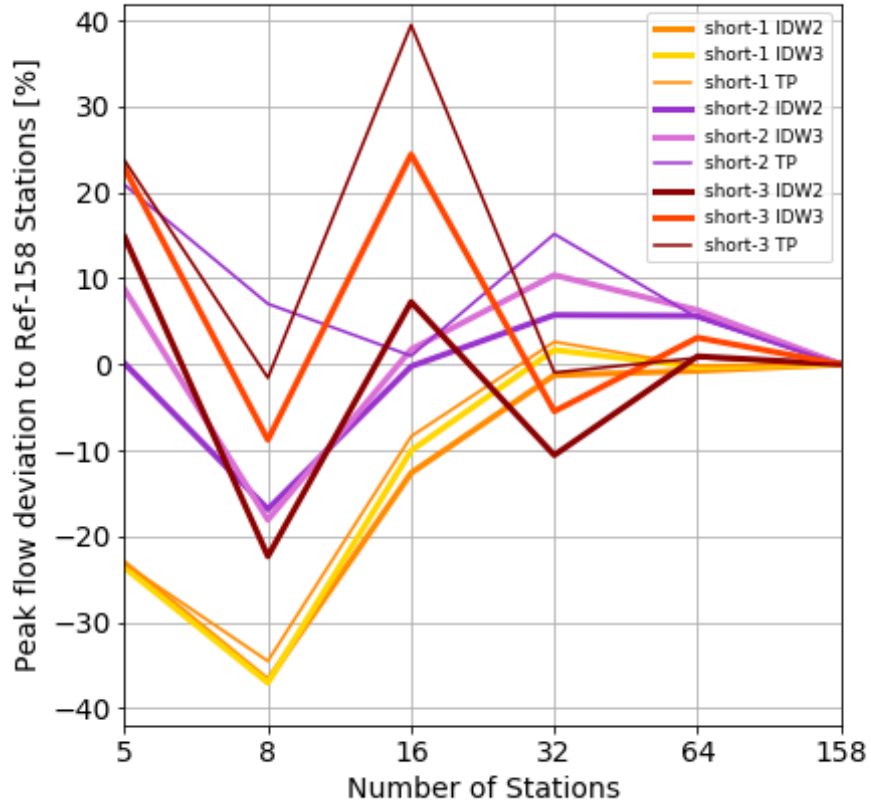
# Individual example result

- Representative small catchment Haselbach (12 km<sup>2</sup>)
- Short duration event (short-1) for 5-Stations case (top) and 158-Stations case (bottom)
- Precipitation maps with Inverse Distance Weighting (IDW2, left) and Thiessen Polygons (TP, right)
- Time series at pour point to river Raab
  - precipitation (dashed, top)
  - simulated runoff curves (solid)
- Interpolated and modeled with the hydrological model WaSiM (widely physically-based model, 100 m x 100 m grid and ½ hourly time resolution)



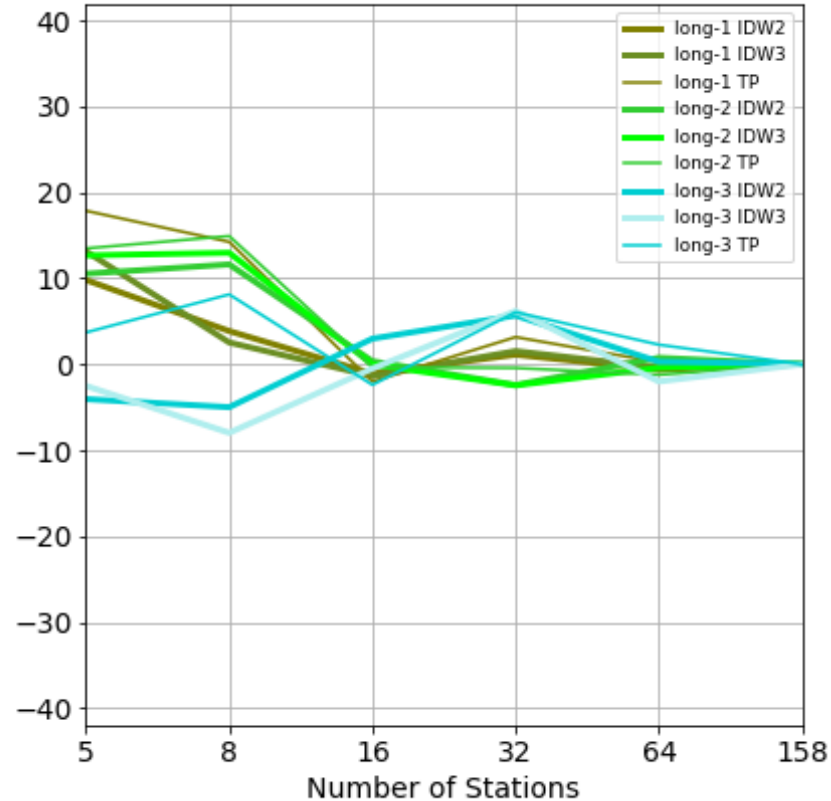
## Short duration

### heavy precipitation events



## Long duration

### heavy precipitation events



## Interpolation

Thiessen Polygons (TP)  
Inverse Distance Weighting  
weighting power of 2 (IDW2)  
weighting power of 3 (IDW3)

**Under which station density has the interpolation method influence on runoff simulations?**

- Mostly event-dependent
- Fewer stations result in more differences between the interpolation schemes

**Number of Stations** from weather service network (5 stations) to highly dense network (158 Stations)

**How many stations do we need to model runoff under heavy convective precipitation events?**

- For short duration events, the number of stations is event-dependent
- For long duration events, around 16 stations (per 1000 km<sup>2</sup>) are enough