How to estimate flood areas from high-resolution radar data, nowcasts and design flood maps

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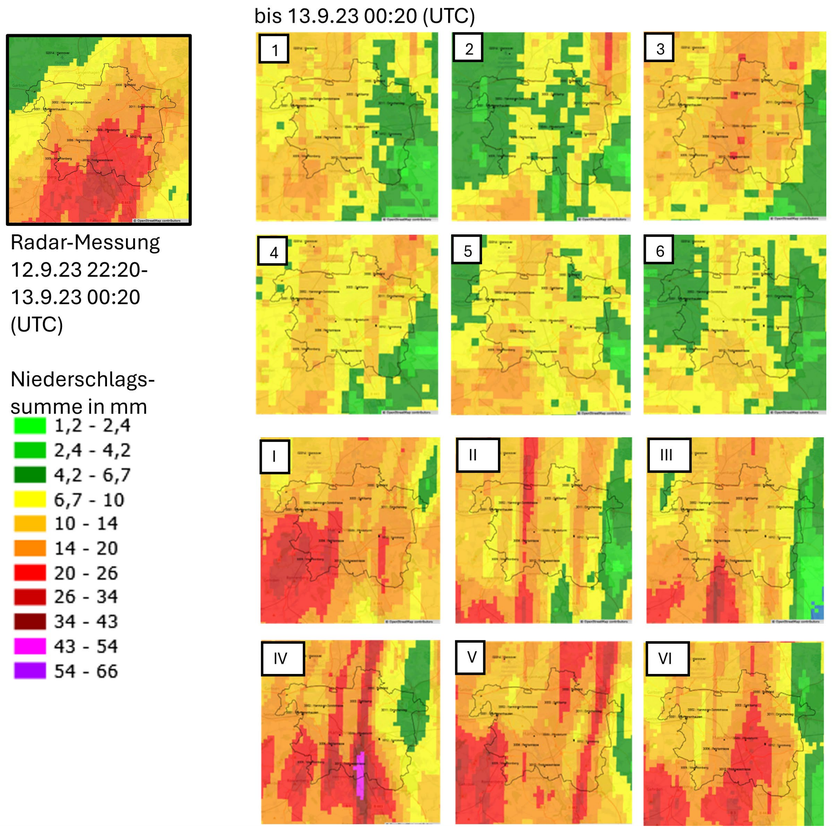
High-resolution Forecast Models

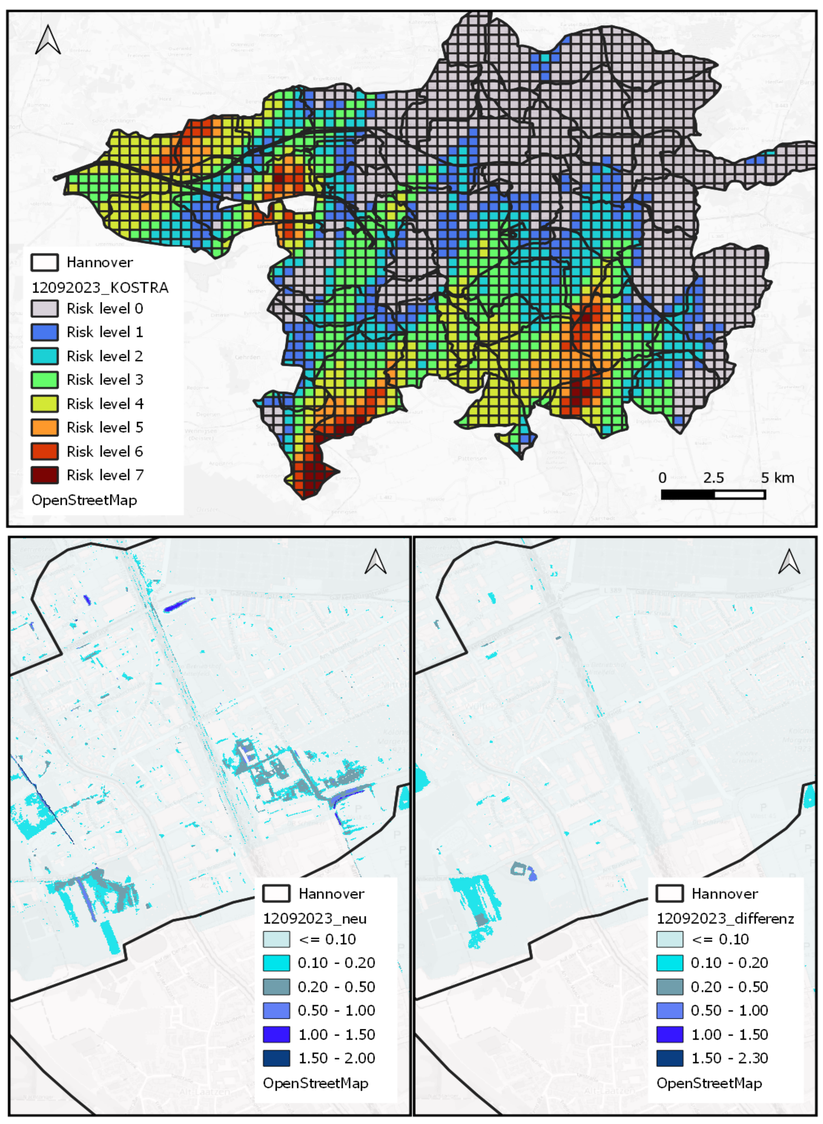
Precise Measurement for online and post-event analyses

Rainfall radar data from *German Weather Service*: Polar scans with a resolution of 250 m x 1°, 5 min & post-processing with the SCOUT software (hydro & meteo)

- Data corrections for e.g. clutter, beam blockage
- Advection correction
- Adjustment with rain gauge data from a dense network by *GWS* and *Hanover Municipal Drainage Department*



Forecast sums from ensemble nowcasts over 2 hours, compared to measurement (u.l.). 1-6: Nowcasts based on a 1 km radar resolution, I-VI: based on a 0.5 km radar resolution and reduced forecast timestep. Event of 12 September 2023.

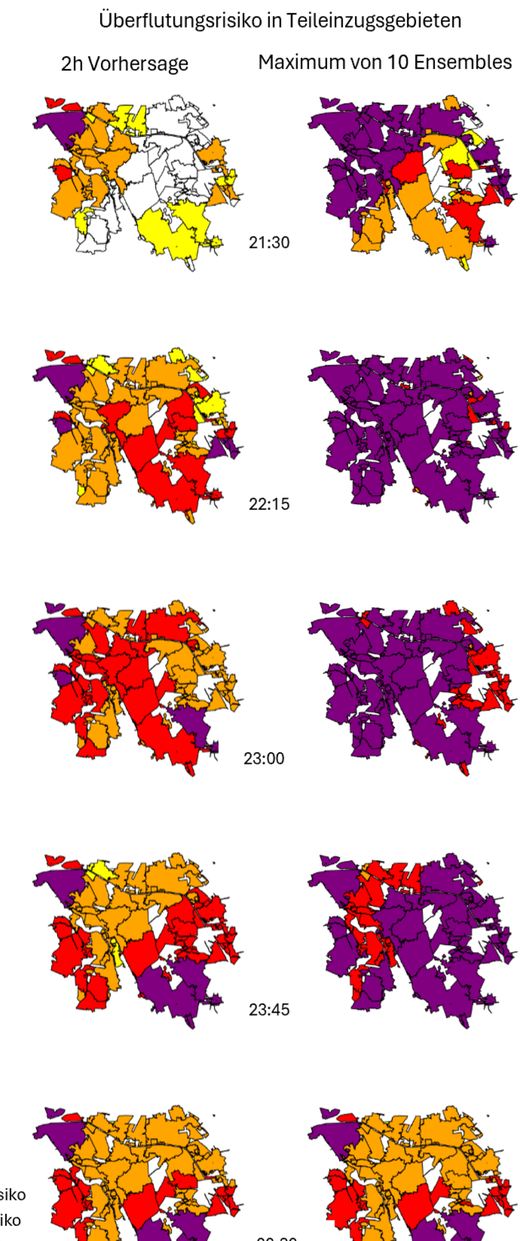


RadEF algorithm for a fast assessment of flooded areas

The newly developed empirical/ statistical RadEF algorithm permits a rapid assessment of maximum water depths in the municipal area of Hanover based on static flood maps and real-time radar data and radar nowcasts.

Left:
Upper: Intermediate step for the setup of RadEF flood maps: Risk classification based on the maximum return period according to the KOSTRA statistical maps (DWD)

Lower: Derived maximum water levels for a subsection of Hanover (l. l.) and absolute difference to results of a coupled 1D/2D-simulation (l. r.).
Event of 12 September 2023



RadEF forecast of the flood risk based on 2 hour nowcasts (left column) and maximum risk based on 10 ensembles (right column), Classification of risk in 5 classes.
Event of 12 September 2023 from21:30 UTC

Ensemble nowcasts

Radar-based ensemble nowcasts with a lead time of up to 2 hours
Methods:

- Cell recognition with attributes like size, intensity and travel speed
- Advection with a semi-Lagrange method
- Computation of ensemble nowcasts through variation of initial conditions and consideration of uncertainties

New: Adjustment with advection correction and nowcast calculation on a 500m x 500m grid.
Blending with numerical weather prediction (ICON-D2-EPS) for forecast lead times between 2 and 48 hours.

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