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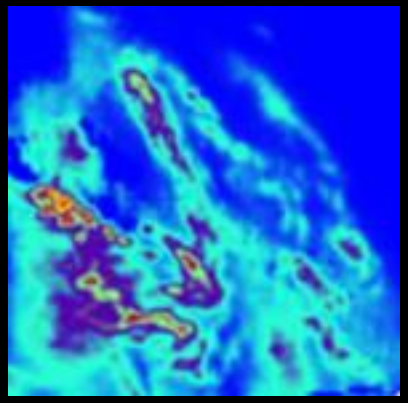
4DF

Avståndsberoende ensembleprognoser av hydrologiska skyfallseffekter



**Jonas Olsson, Charlotta Pers, Lisa Bengtsson,
Ilias Pechlivanidis, Peter Berg, Heiner Körnich**

**Research & Development
Swedish Meteorological and Hydrological Institute**

Outline

- Hydrologi och hydrologiska prognoser
- Malmö-fallet 2014
- Metodik för att utnyttja högupplösta met. ensembleprognser

Hydrologisk modellering/prognosering

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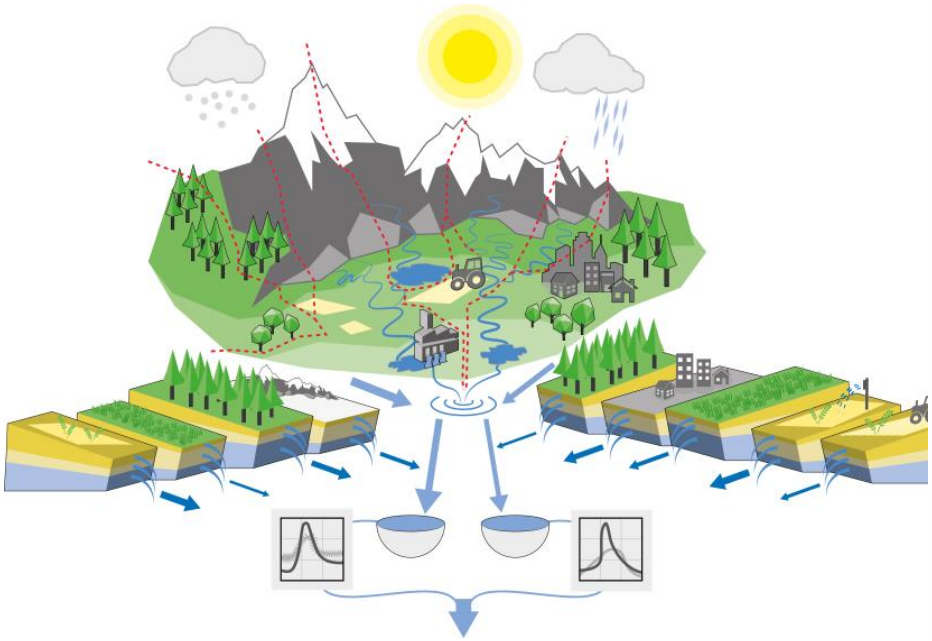
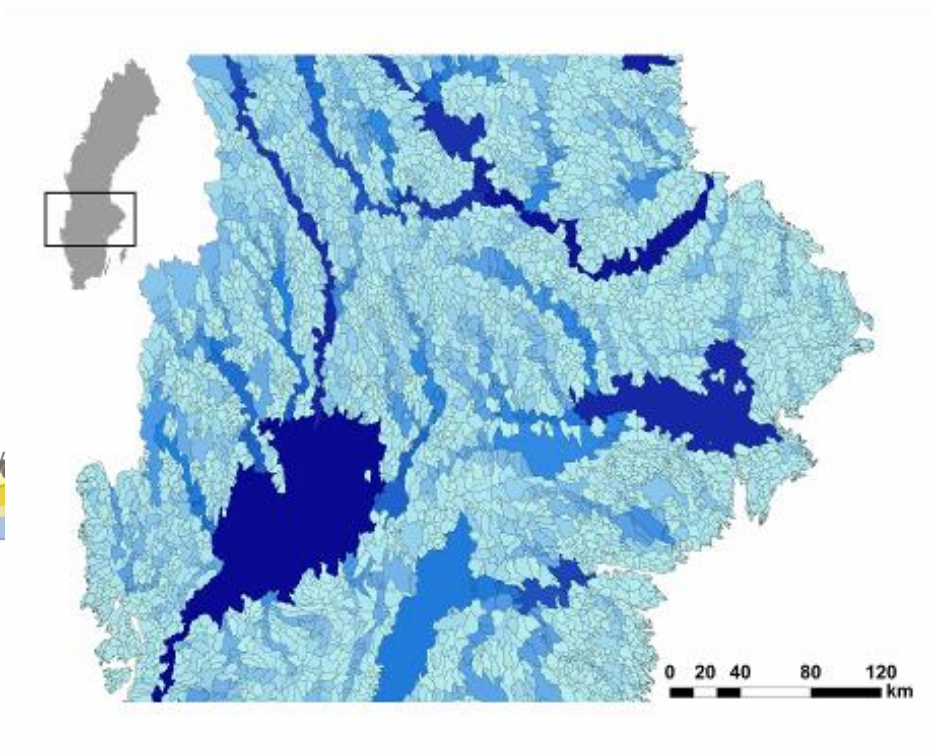
- The hydrological model HYPE set up and optimized for Sweden
- Almost 40 000 sub-basins (median size 7 km²)
- Recently adjusted and calibrated for 1 h time step (usually 1 day)

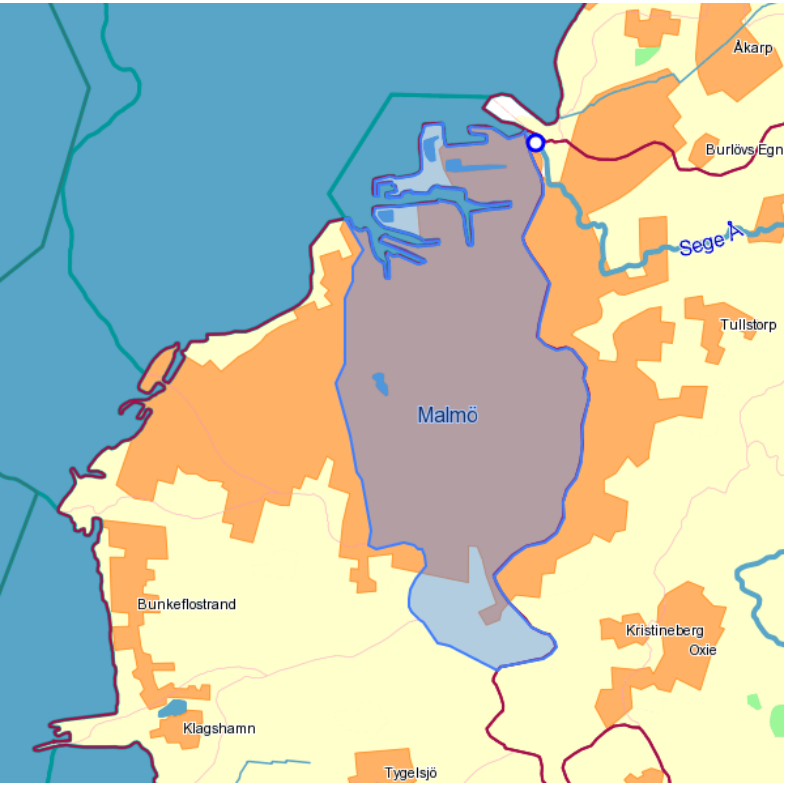


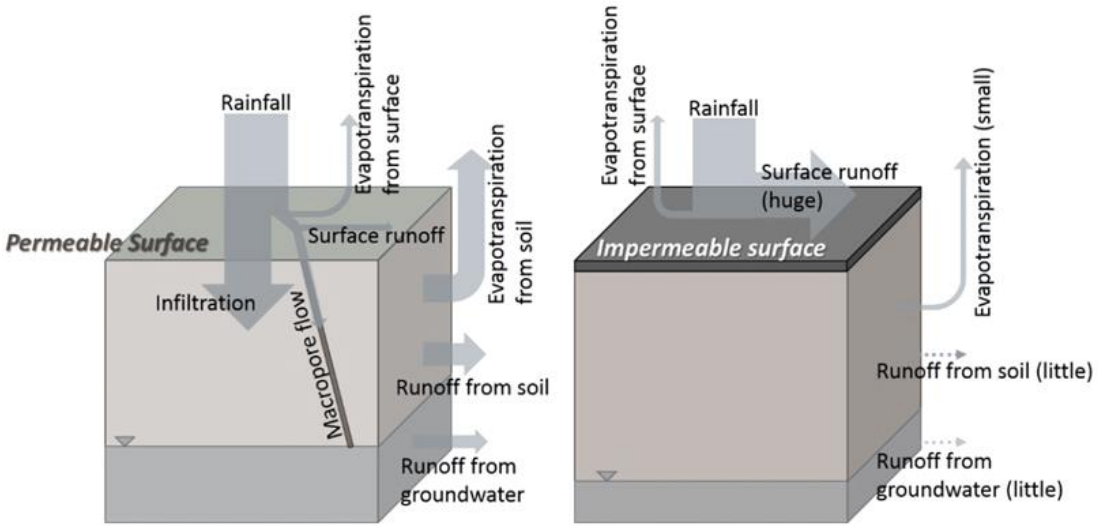


Forcing (P, T): OBSERVATIONS → FORECAST →

T=0

Urban hydrologi





PÅ LANDET

I STADEN

Malmö-regnet/översvämningen 2014-08-31

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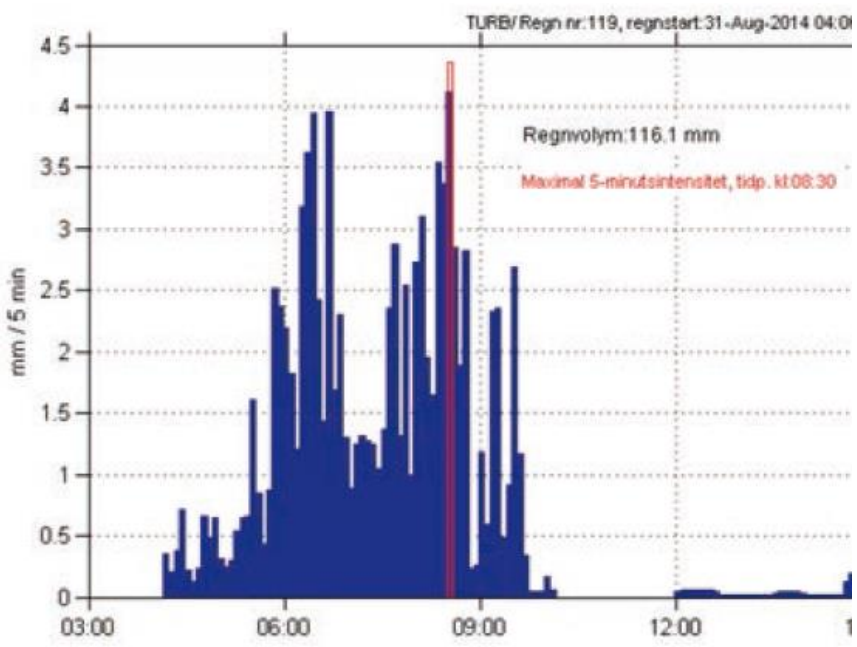
- ❑ ~120
- ❑ >1000
- ❑ 2200
- ❑ 3000
- ❑ >300

Svenskt rekord!



Malmö-regnet med HarmonEPS

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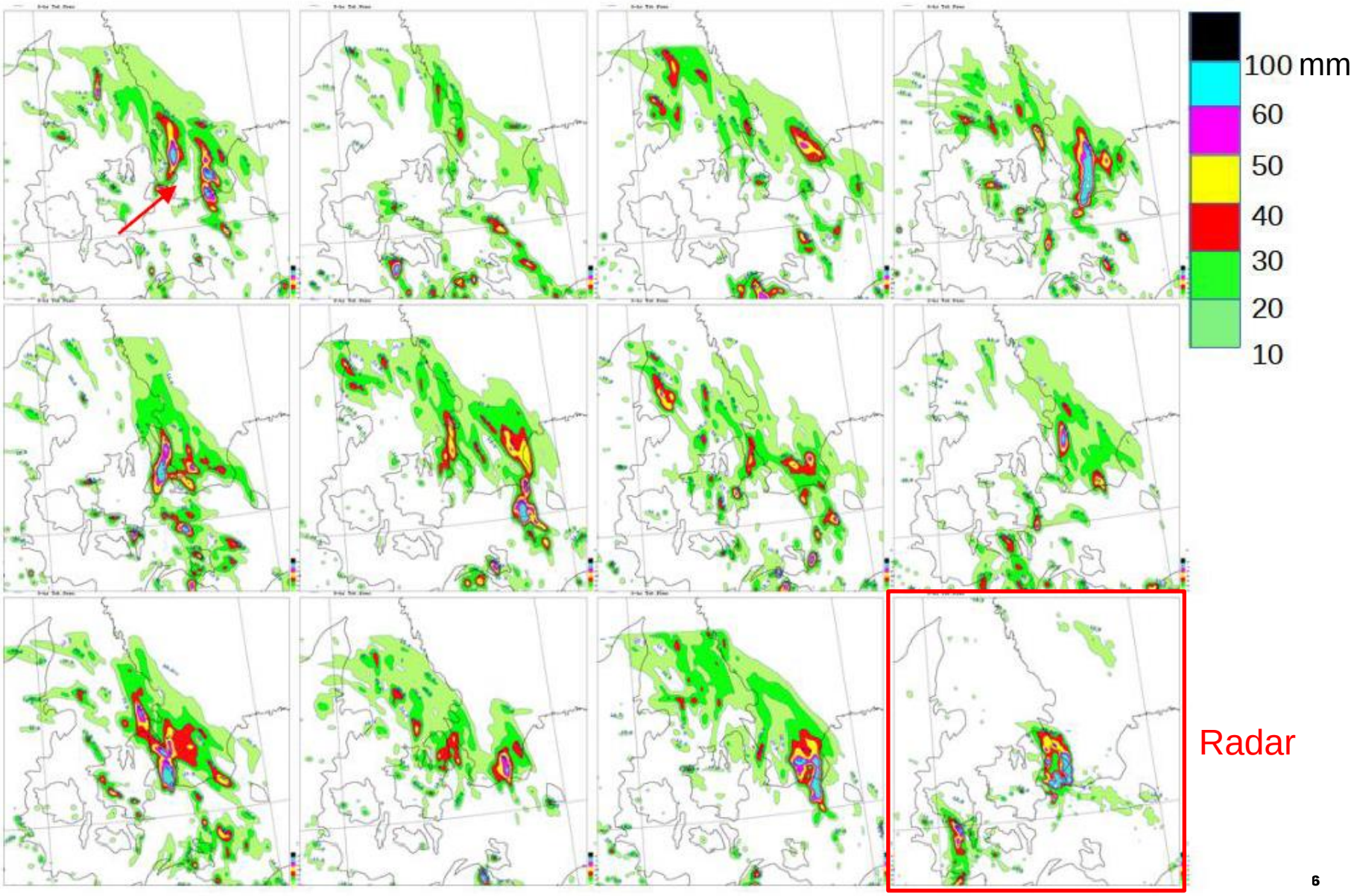
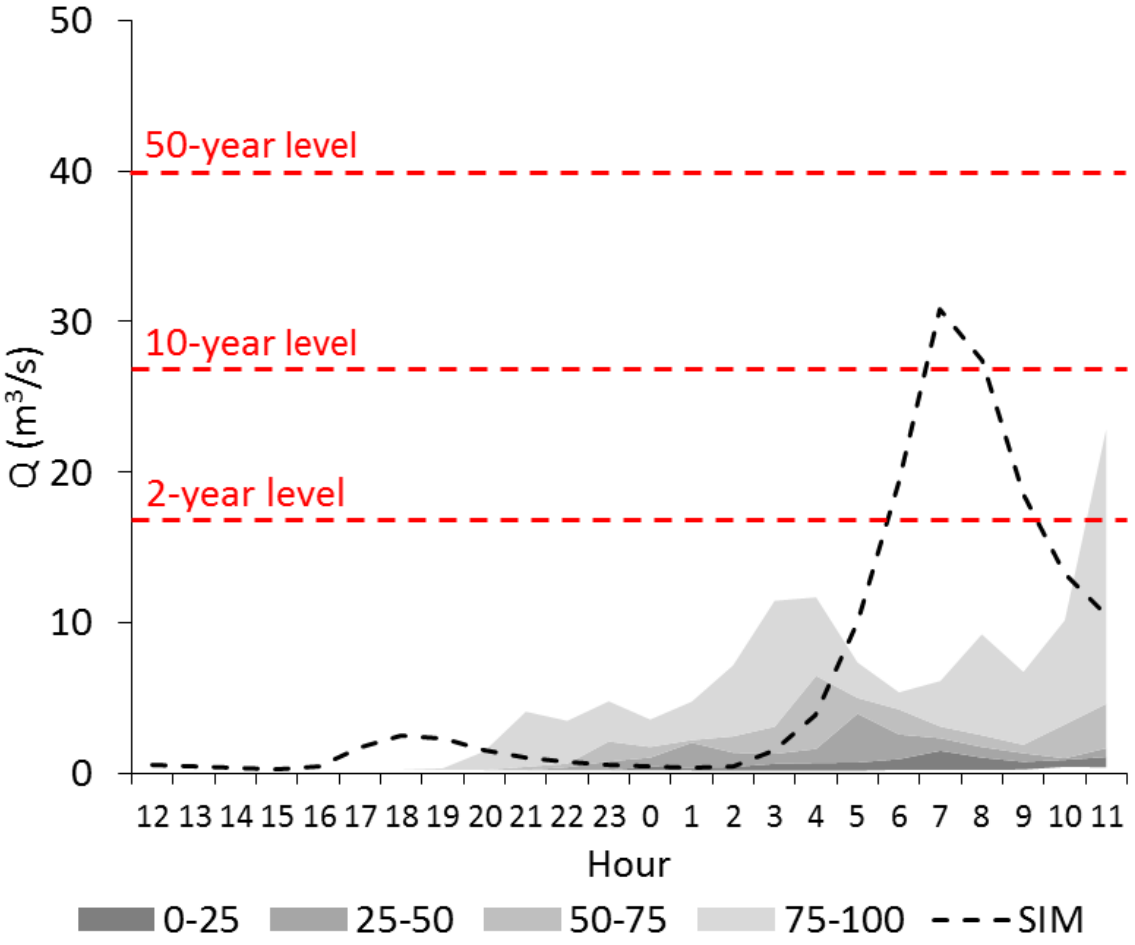


Flödesprognoser med HarmonEPS

Prognoser för centrala Malmö



Neighbourhood approach: UK example

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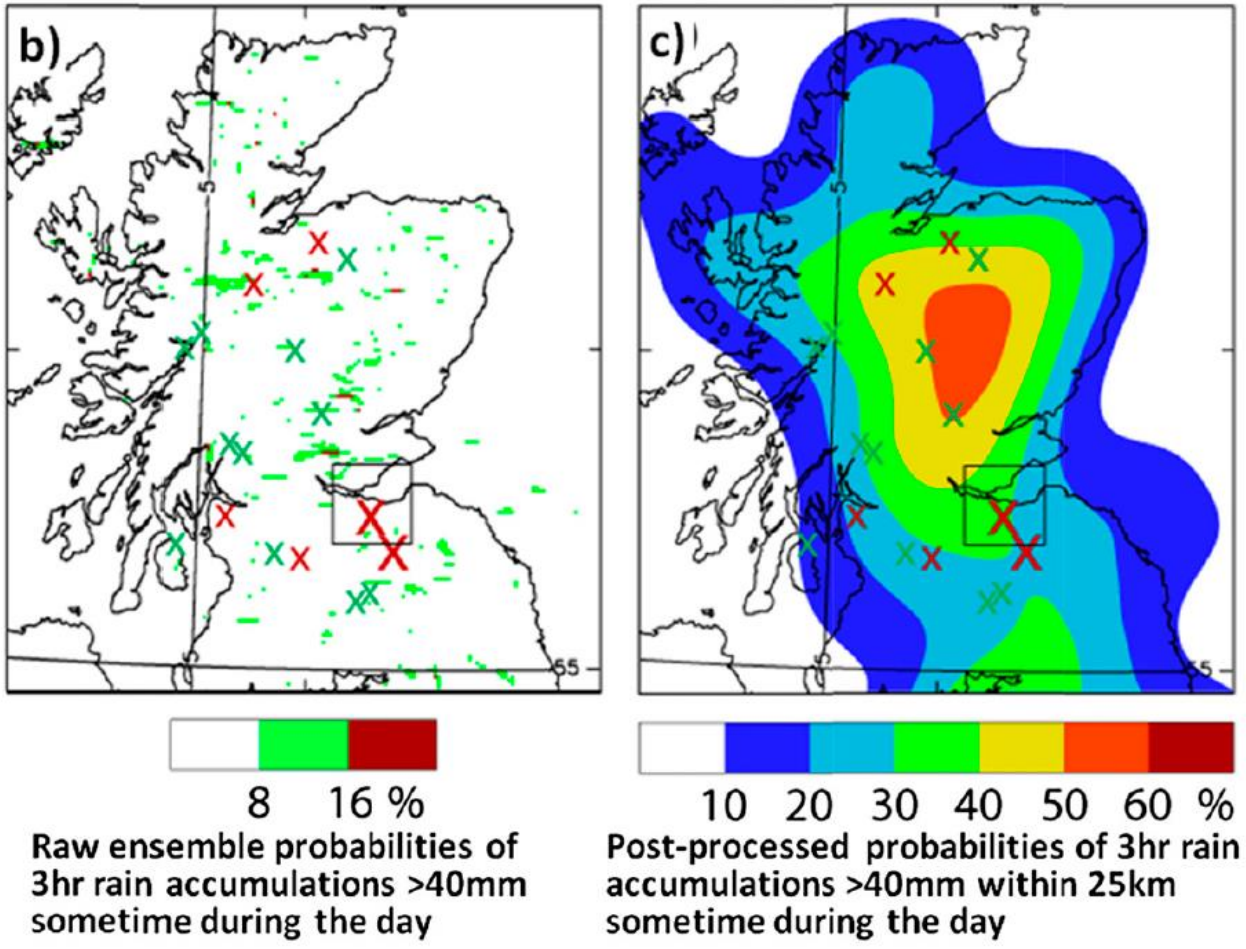
”Probability maps”



Raw ensemble probabilities of 3hr rain accumulations >40mm sometime during the day

Post-processed probabilities of 3hr rain accumulations >40mm within 25km sometime during the day

Golding, B., Roberts, N., Leoncini, G., Mylne, K., Swinbank, R., 2016. MOGREPS-UK convection-permitting ensemble products for surface water flood forecasting: rationale and first results. J. Hydrometeor 17, 1383–1406. http://dx.doi.org/10.1175/JHM-D-15-0083.1.

Neighbourhood approach: SMHI

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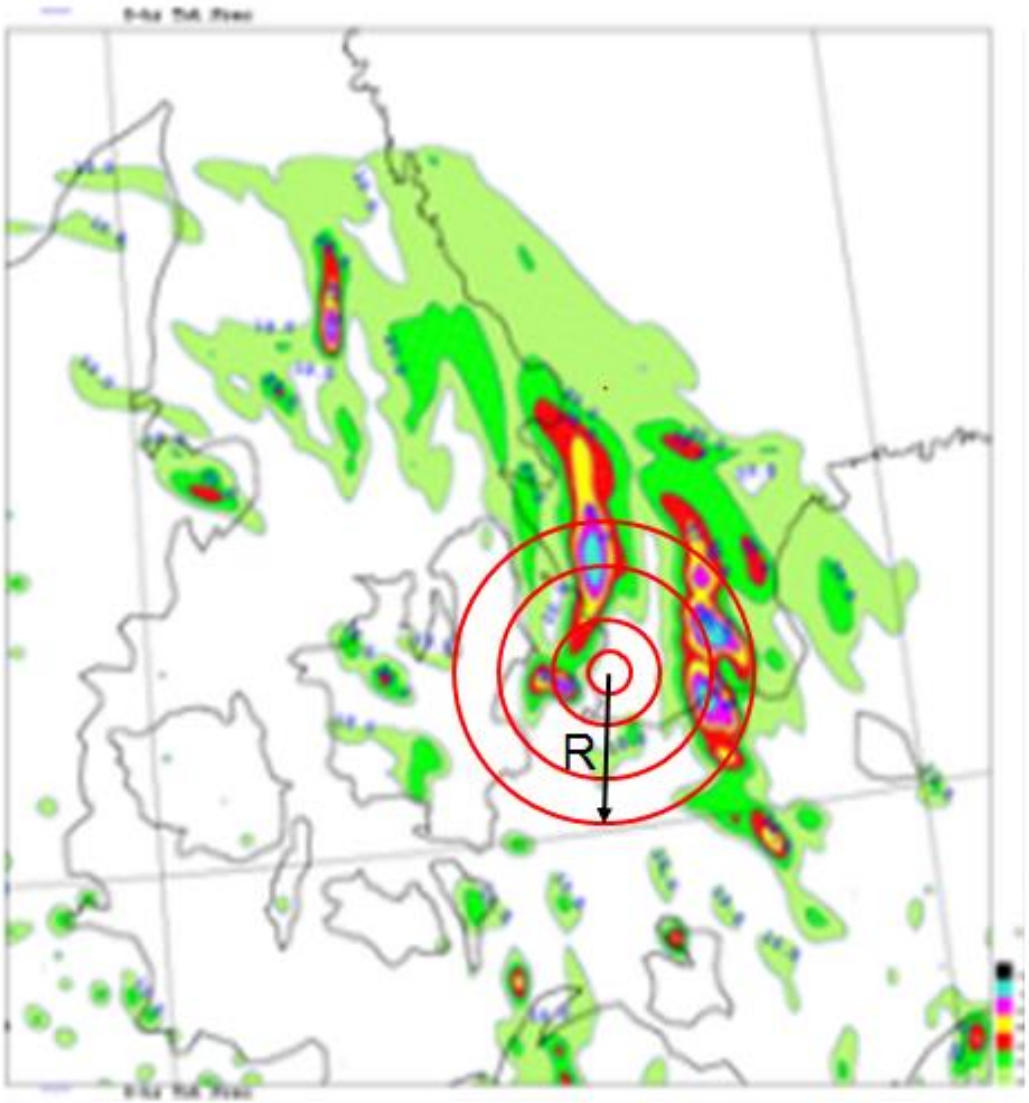
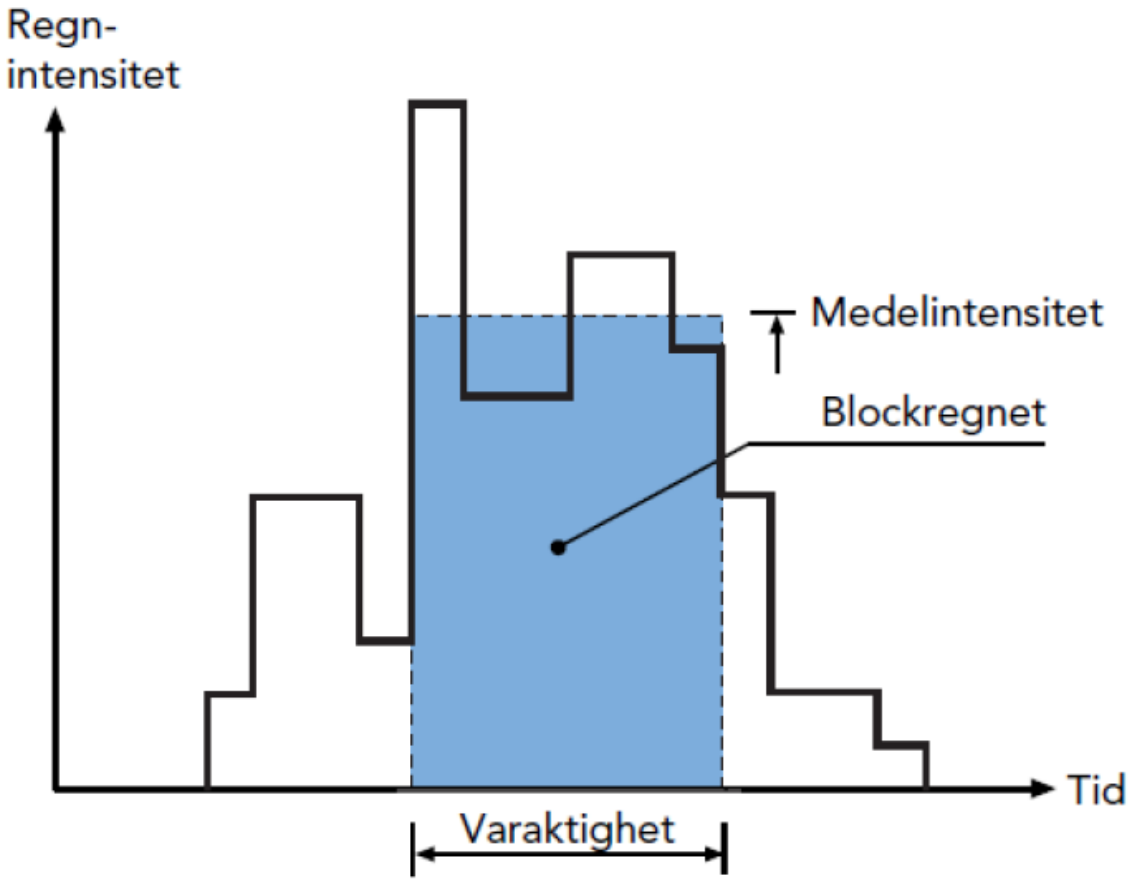
Find the ”worst” forecasts within different distances from the location



Depth-duration function 1

Find the maximum accumulation (or depth) for different durations



Depth-duration function 2

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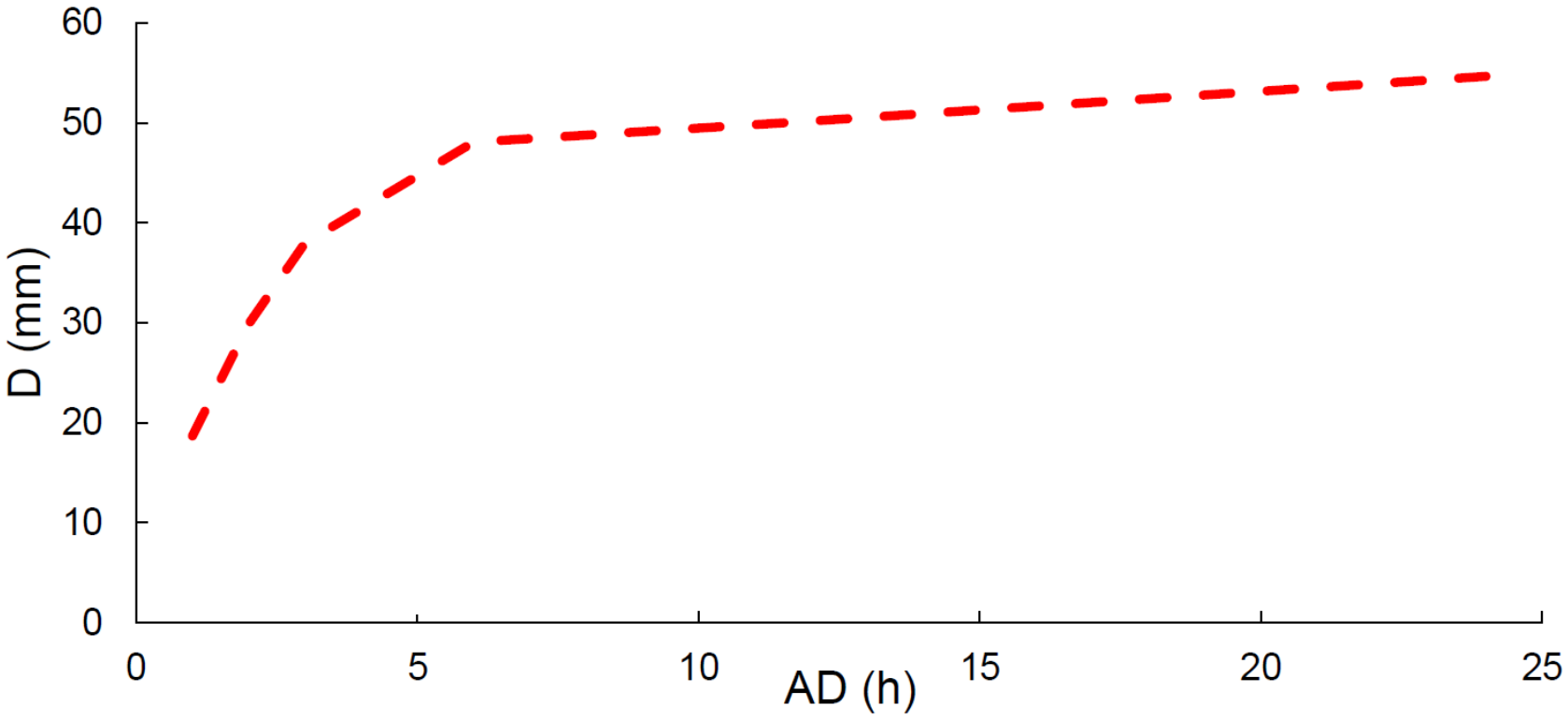
Plot the maximum accumulation (or depth) as a function of duration



Forecast Severity Index FSI

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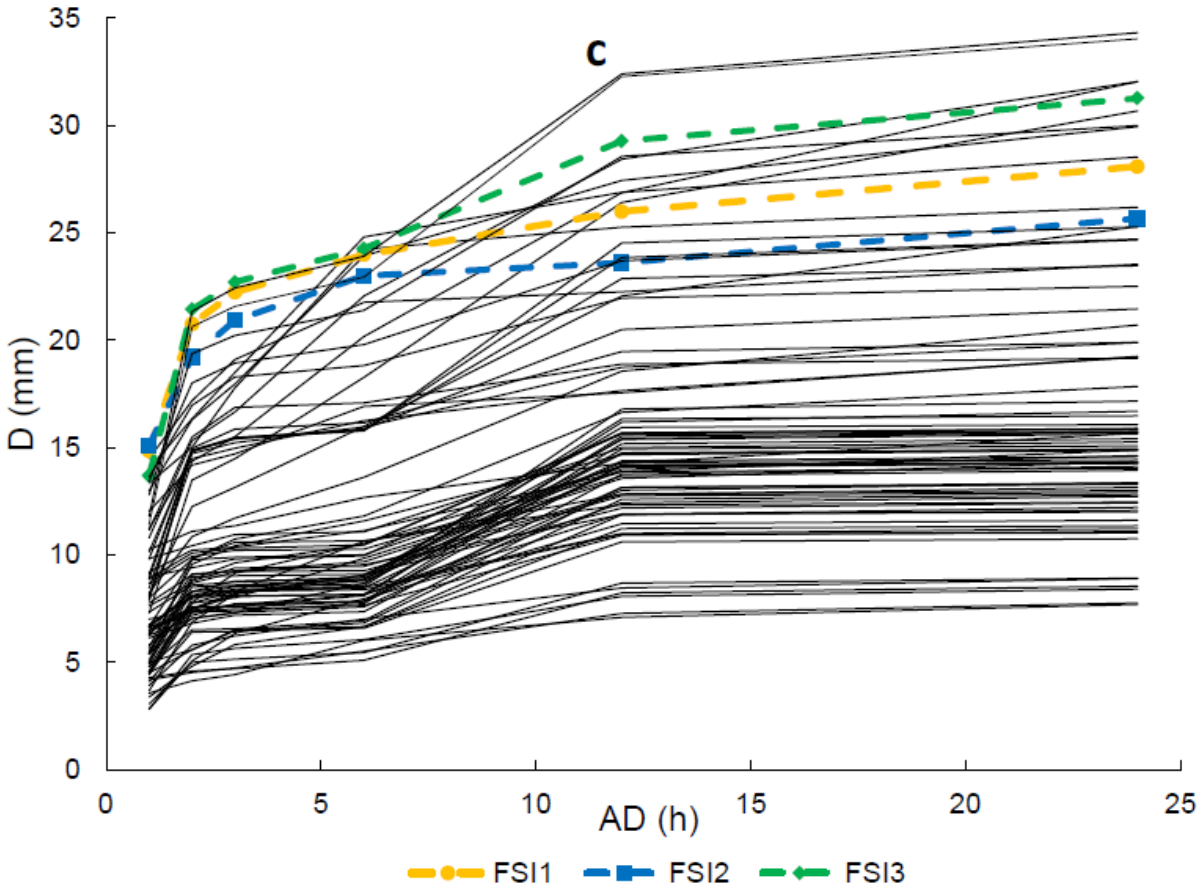
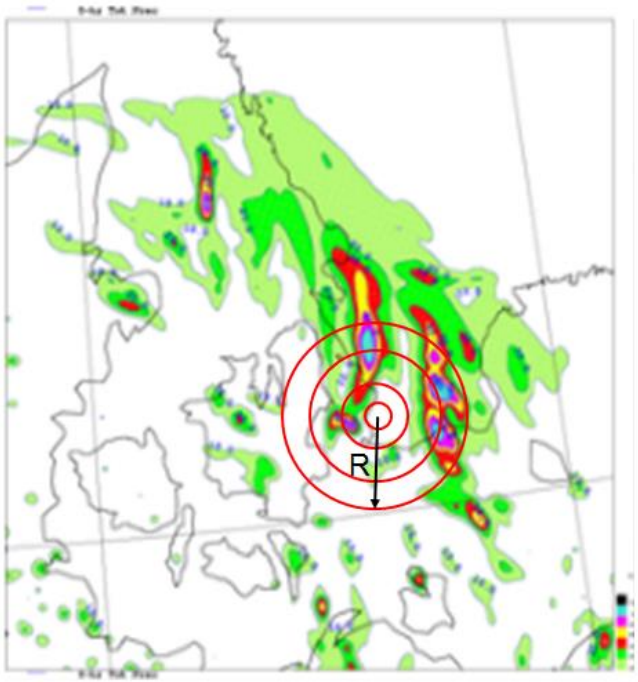
Find the most severe forecasts in the neighbourhood



$$FSI = \left(\frac{24}{48}\right) rank_{\,1} + \left(\frac{12}{48}\right) rank_{\,2} + \left(\frac{6}{48}\right) rank_{\,3} + \left(\frac{3}{48}\right) rank_{\,6} + \left(\frac{2}{48}\right) rank_{\,12} + \left(\frac{1}{48}\right) rank_{\,24}$$

”Worst-case ensembles”

- For every radius R
- Find the most severe forecast in each of the 10 MEPS members
- → 10-member ”worst-case rainfall ensemble”
- Use as input for making 10-member ”worst-case hydrological forecasts”
- Calculate percentiles and plot



”Distance-dependent” flood forecasts

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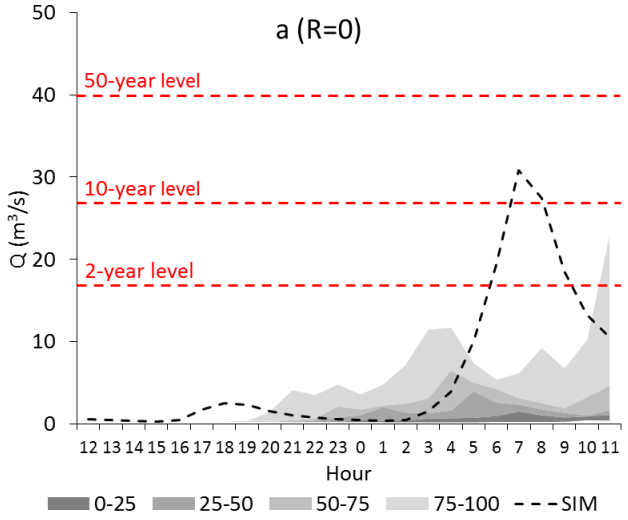

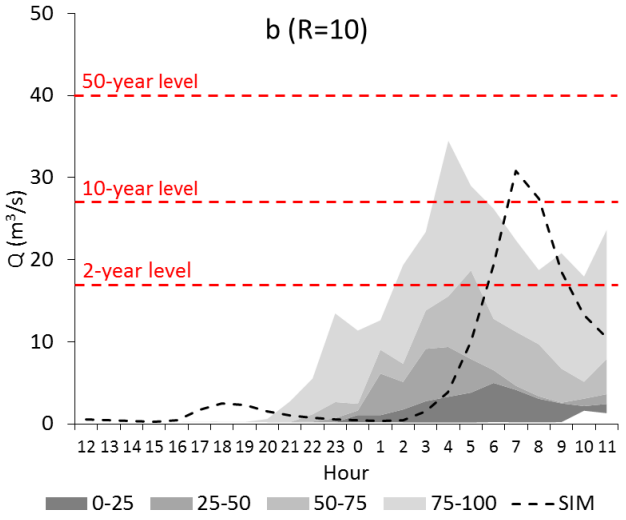

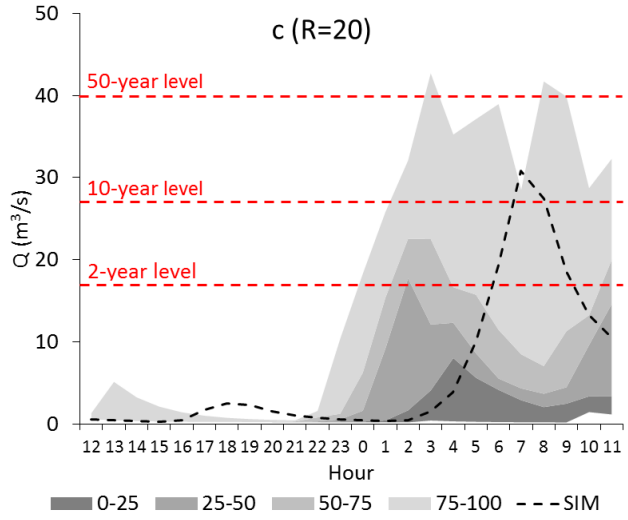

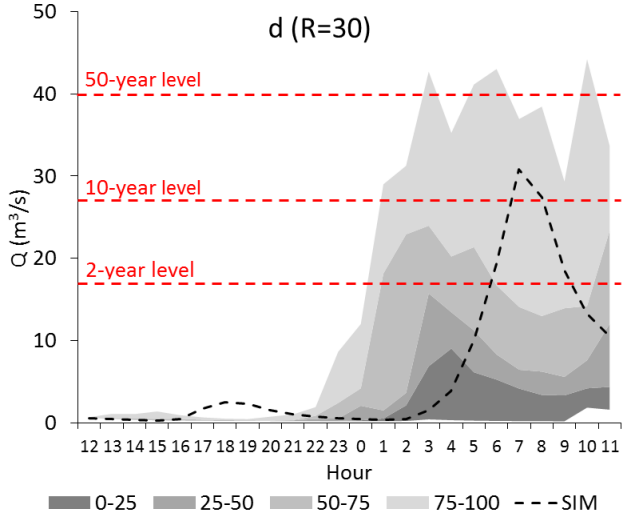

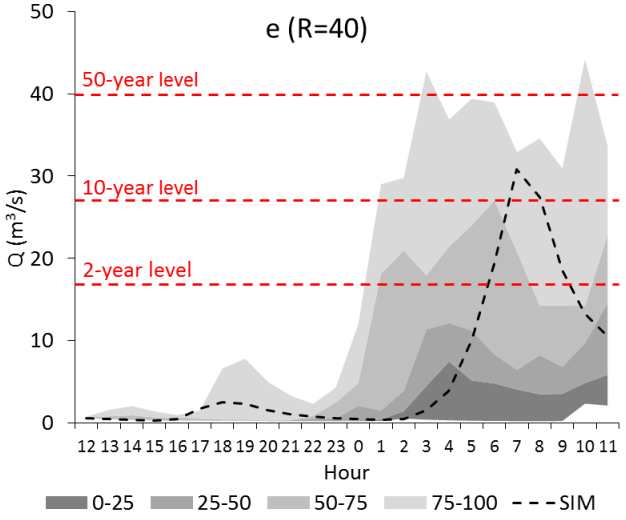

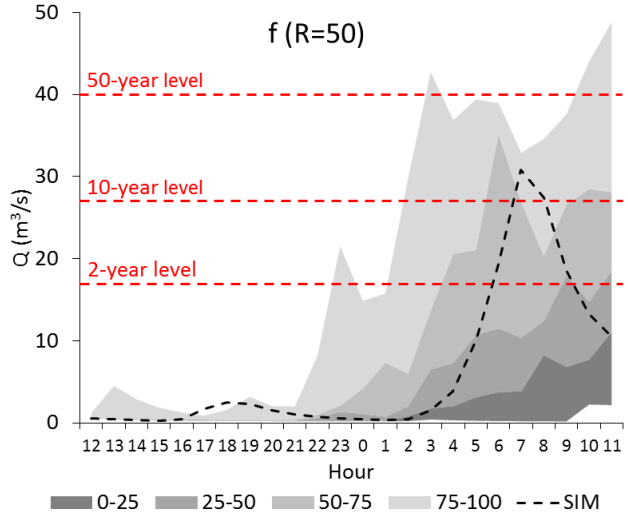

Om du missade något ☺

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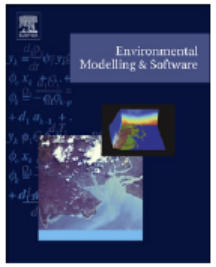

Distance-dependent depth-duration analysis in high-resolution hydro-meteorological ensemble forecasting: A case study in Malmö City, Sweden

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Tack för att ni lyssnade!