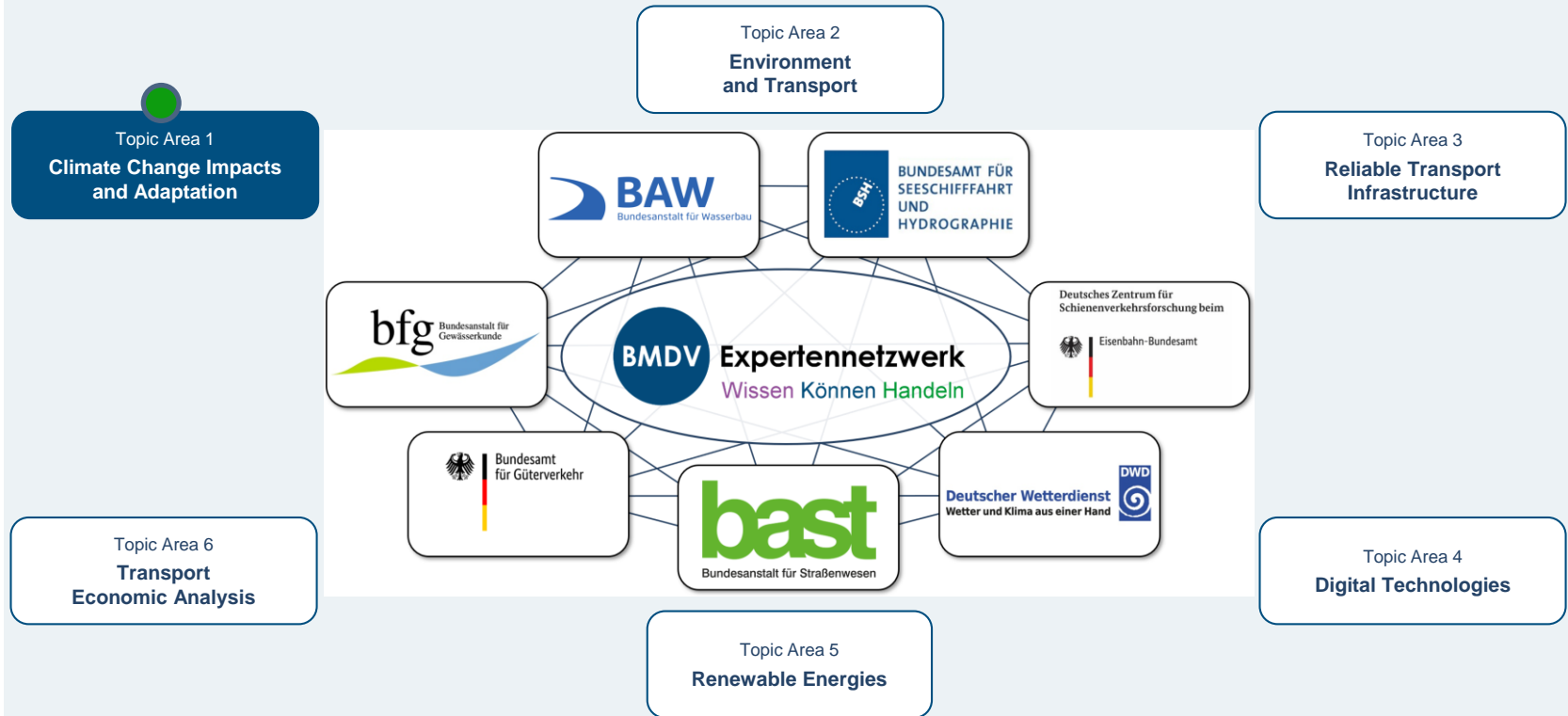


## Short-duration precipitation extremes detected by the DWD radar network and associated circulation patterns

Angelika Palarz, Thomas Junghänel, Jennifer Ostermöller, Ewelina Walawender,  
Paul James, Thomas Deutschländer

Deutscher Wetterdienst, Offenbach am Main, Germany

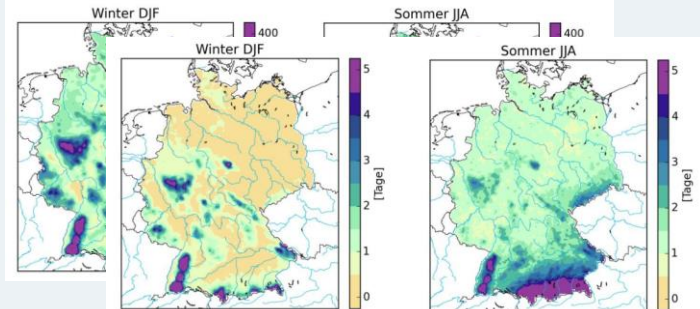
## BMDV Network of Experts



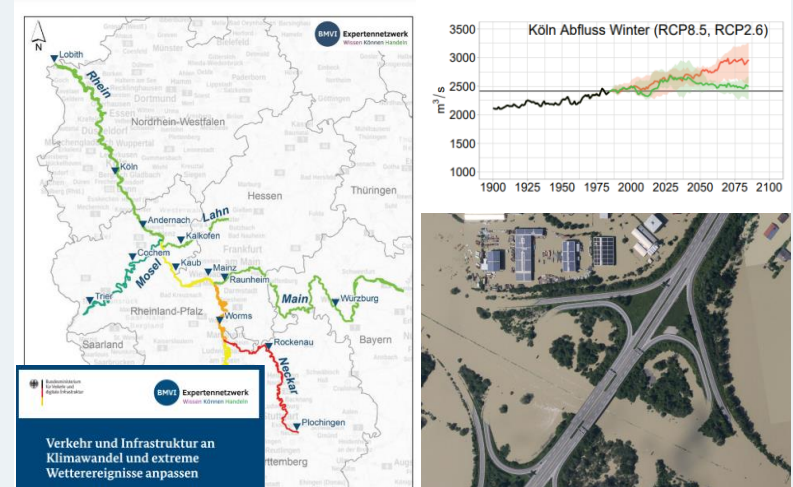
# BMDV Network of Expert: precipitation and its extremes

## High-resolution gridded datasets, HYRAS

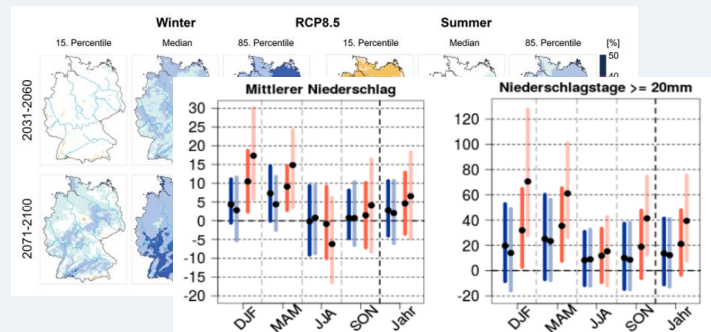
## Climate impact analysis



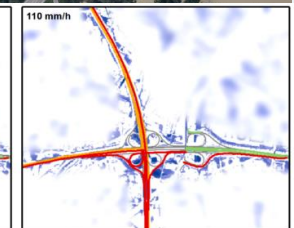
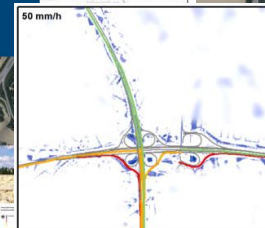
Brienen et al. 2020



## Regional climate projections



Brienen et al. 2020



Meine, Lohregel 2021

## BMDV Network of Expert: short-term precipitation and its extremes

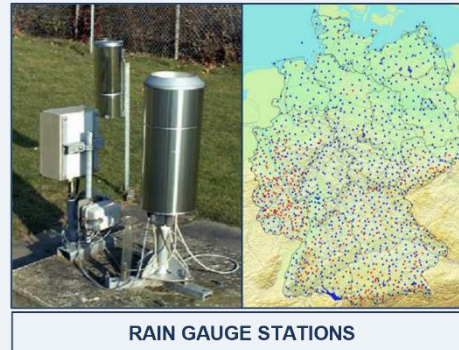
### RADKLIM (Winterrath et al. 2018)

[https://opendata.dwd.de/climate\\_environment/CDC/help/landing\\_pages/doi\\_landingpage\\_RADKLIM\\_RW\\_V2017.002-de.html](https://opendata.dwd.de/climate_environment/CDC/help/landing_pages/doi_landingpage_RADKLIM_RW_V2017.002-de.html)



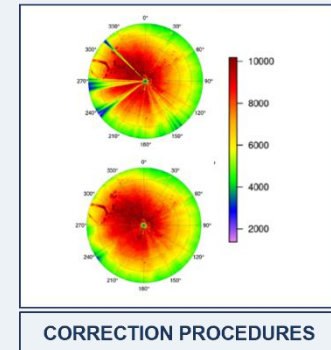
RADAR NETWORK

+



RAIN GAUGE STATIONS

+



CORRECTION PROCEDURES



### Catalogue of Radar-based heavy Rainfall Events, CatRaRE (Lengfeld et al. 2021)

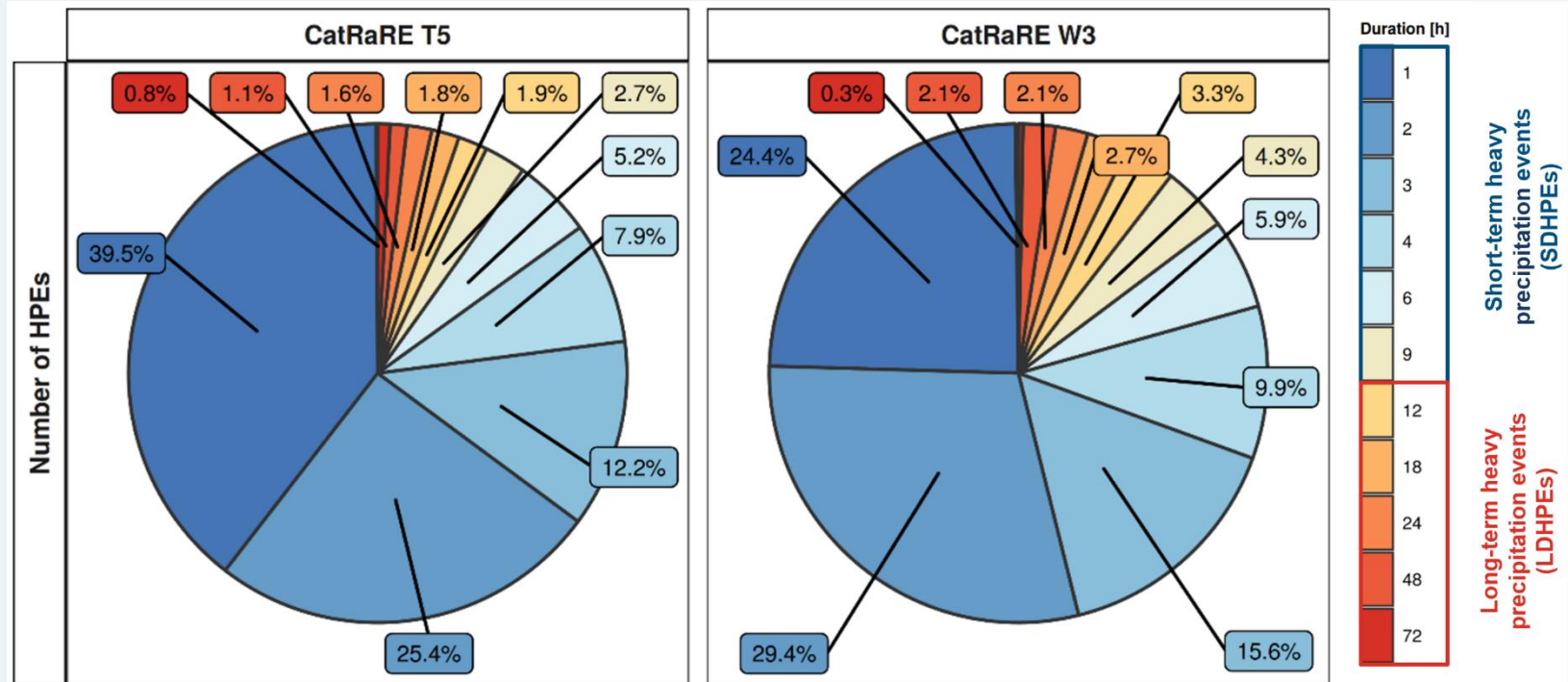
[https://opendata.dwd.de/climate\\_environment/CDC/help/landing\\_pages/doi\\_landingpage\\_CatRaRE\\_V2021.01-en.html](https://opendata.dwd.de/climate_environment/CDC/help/landing_pages/doi_landingpage_CatRaRE_V2021.01-en.html)

There are **two CatRaRE versions**, which differ terms of the thresholds used to define a heavy precipitation event:

- (1) **CatRaRE T5** - applies locally valid precipitation values with return period of 5 years
- (2) **CatRaRE W3** - applies absolute precipitation values equal to DWD Warning Level 3

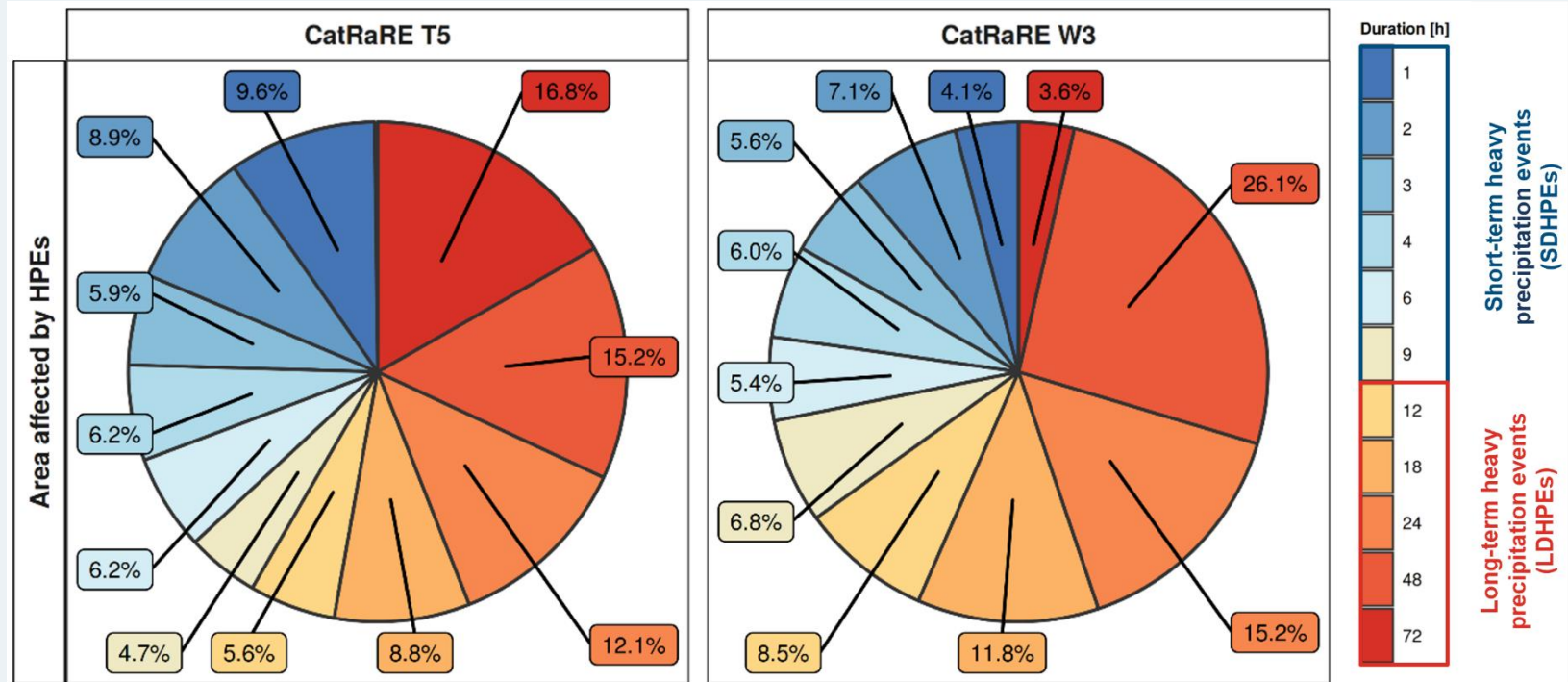
## CatRaRE (2001-2020)

### Number of heavy precipitation events (HPEs)



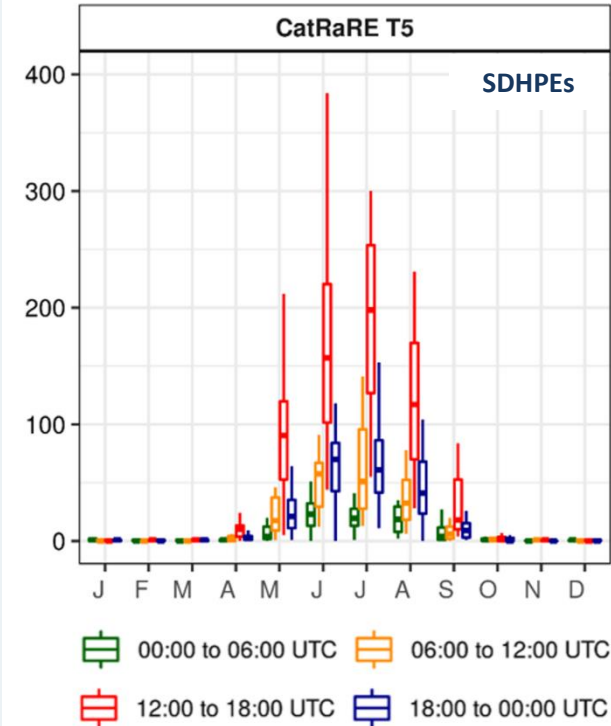
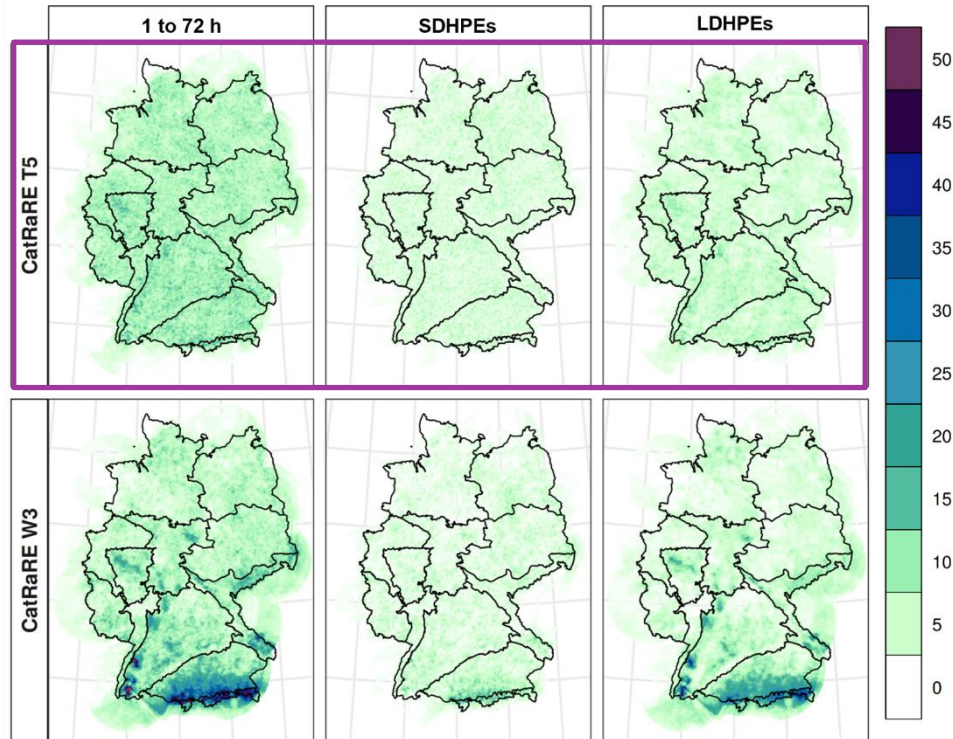
## CatRaRE (2001-2020)

### Area affected by of heavy precipitation events (HPEs)



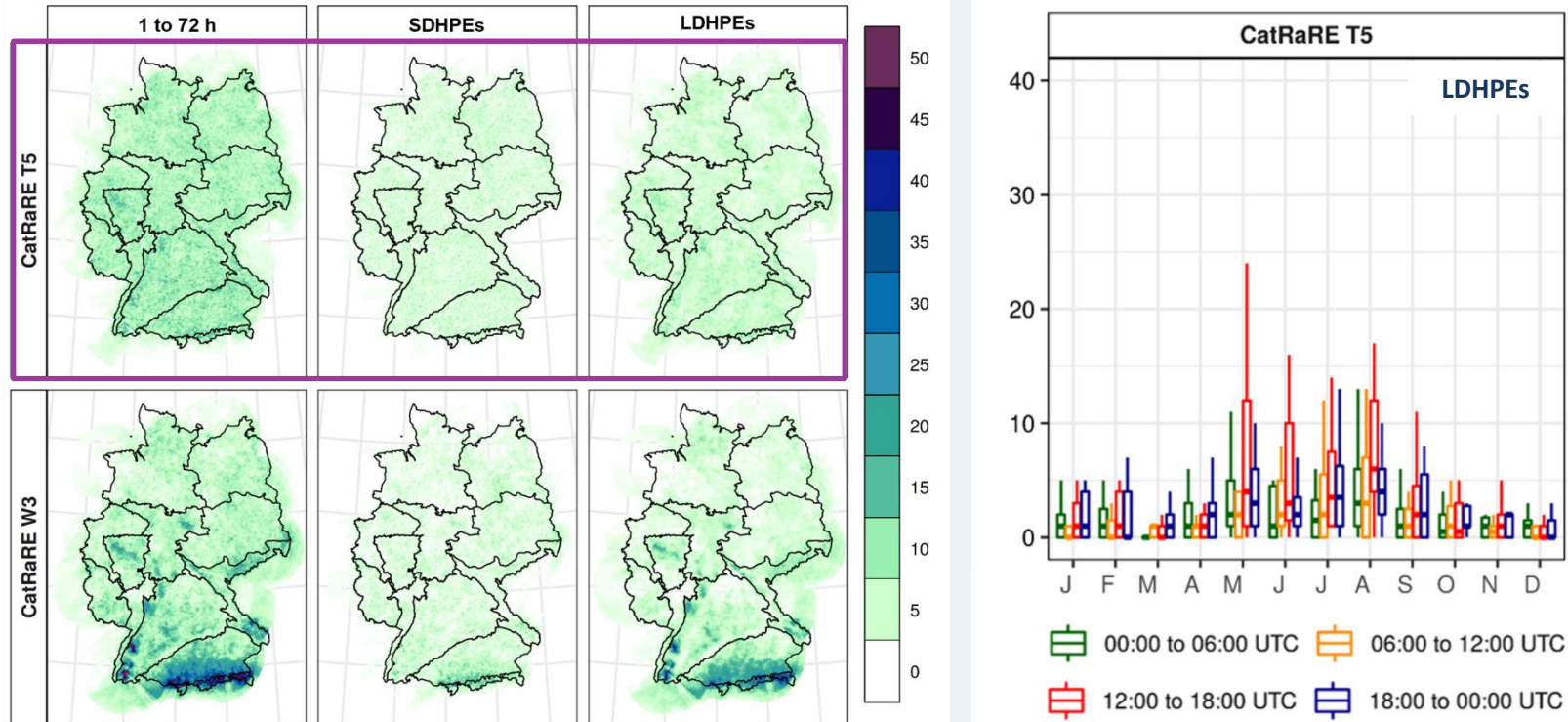
# CatRaRE (2001-2020)

## Spatial and temporal distribution of HPEs number



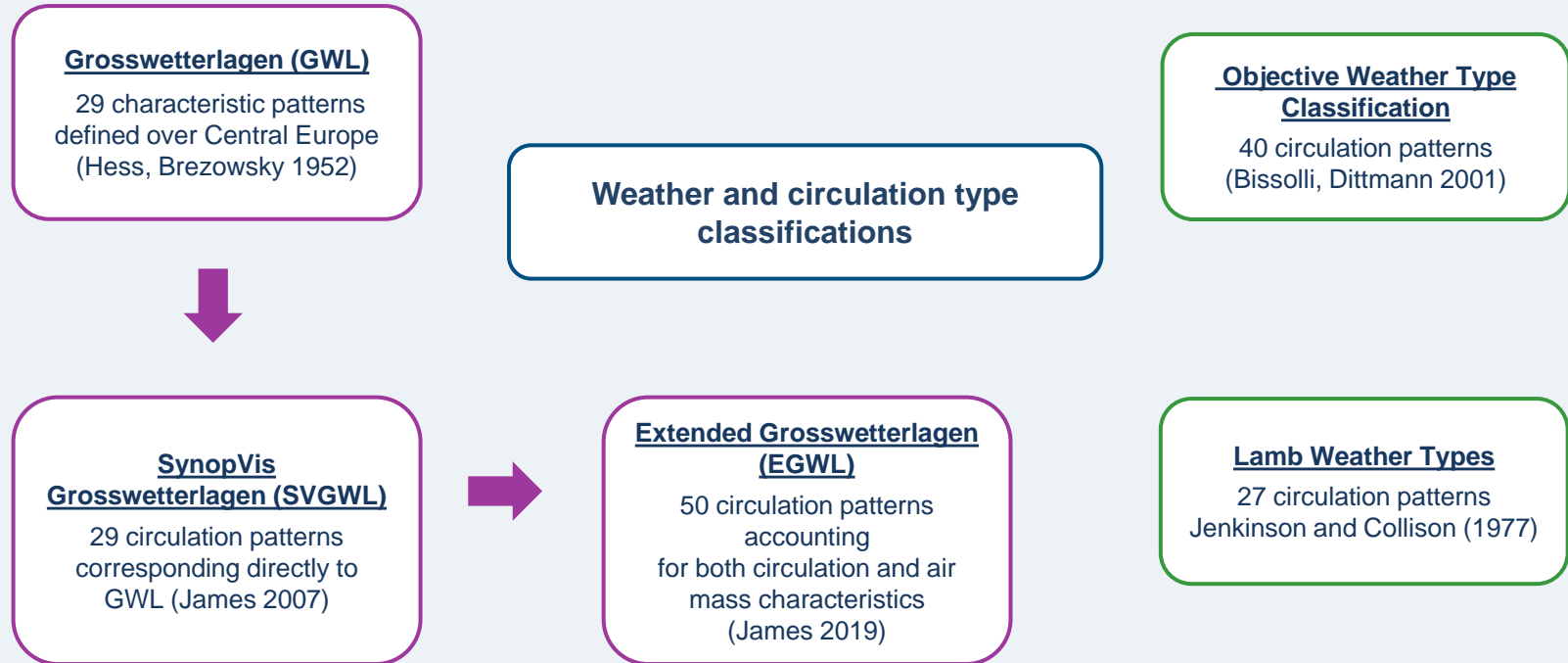
# CatRaRE (2001-2020)

## Spatial and temporal distribution of HPEs number



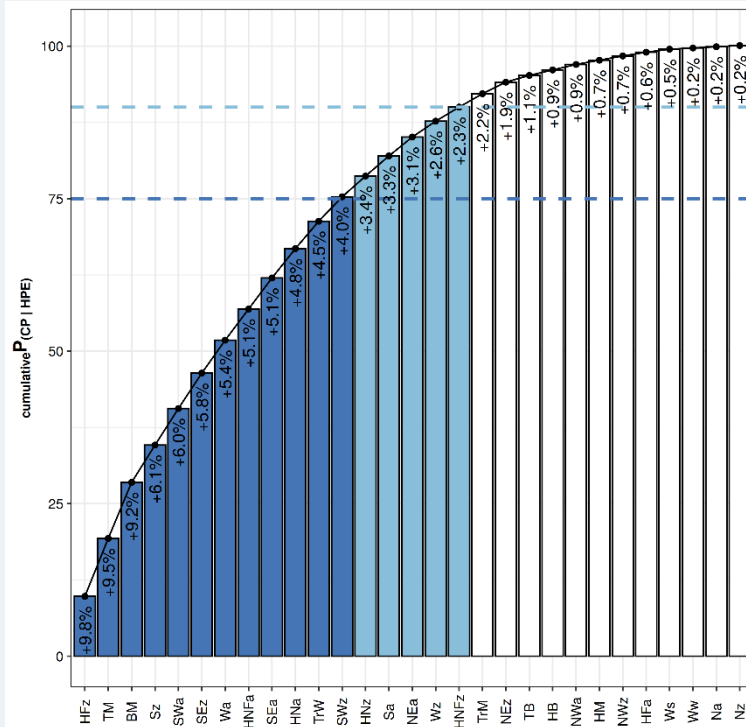


## Weather and circulation type classifications



# SDHPEs and associated circulation patterns

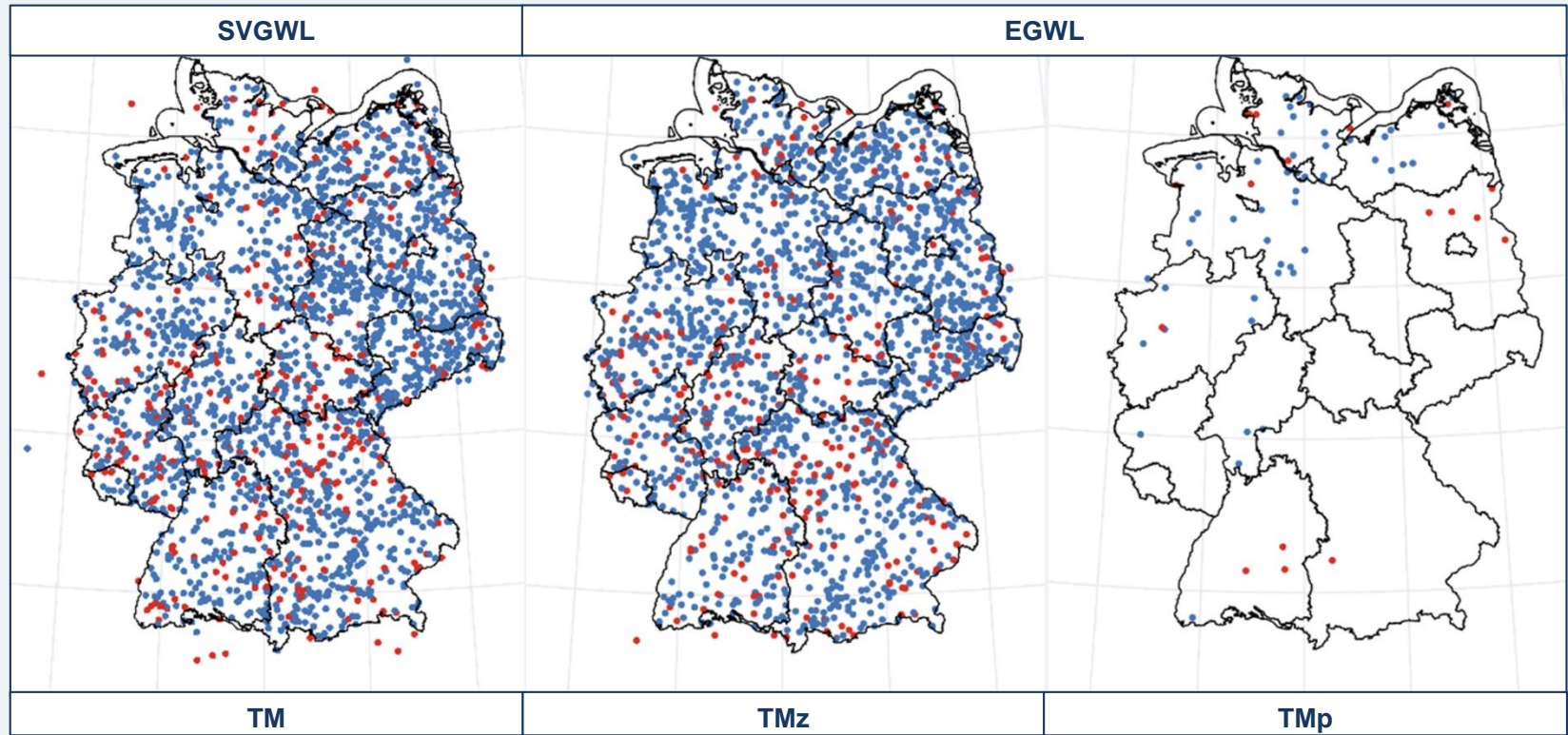
Probability of a particular circulation pattern given the occurrence of SDHPEs [%]



	SVGWL	EGWL
cumulative $P(CP   HPE) \geq 75\%$	HFz	HFr
	TM	TrWa
	BM	TMz
	Sz	Sz
	SWa	Sa
	SEz	SEz
	Wa	BMa
	HNFa	HNr
	SEa	HNg
	HNa	HNFa
	TrW	TrWr
	SWz	SWz
	Wa	Wa
cumulative $P(CP   HPE) \geq 90\%$	HNz	SEg
	Sa	SWa
	NEa	BMg
	Wz	SEa
	HNFz	TrMw
	Wz	Wz
TrWz	TrWz	

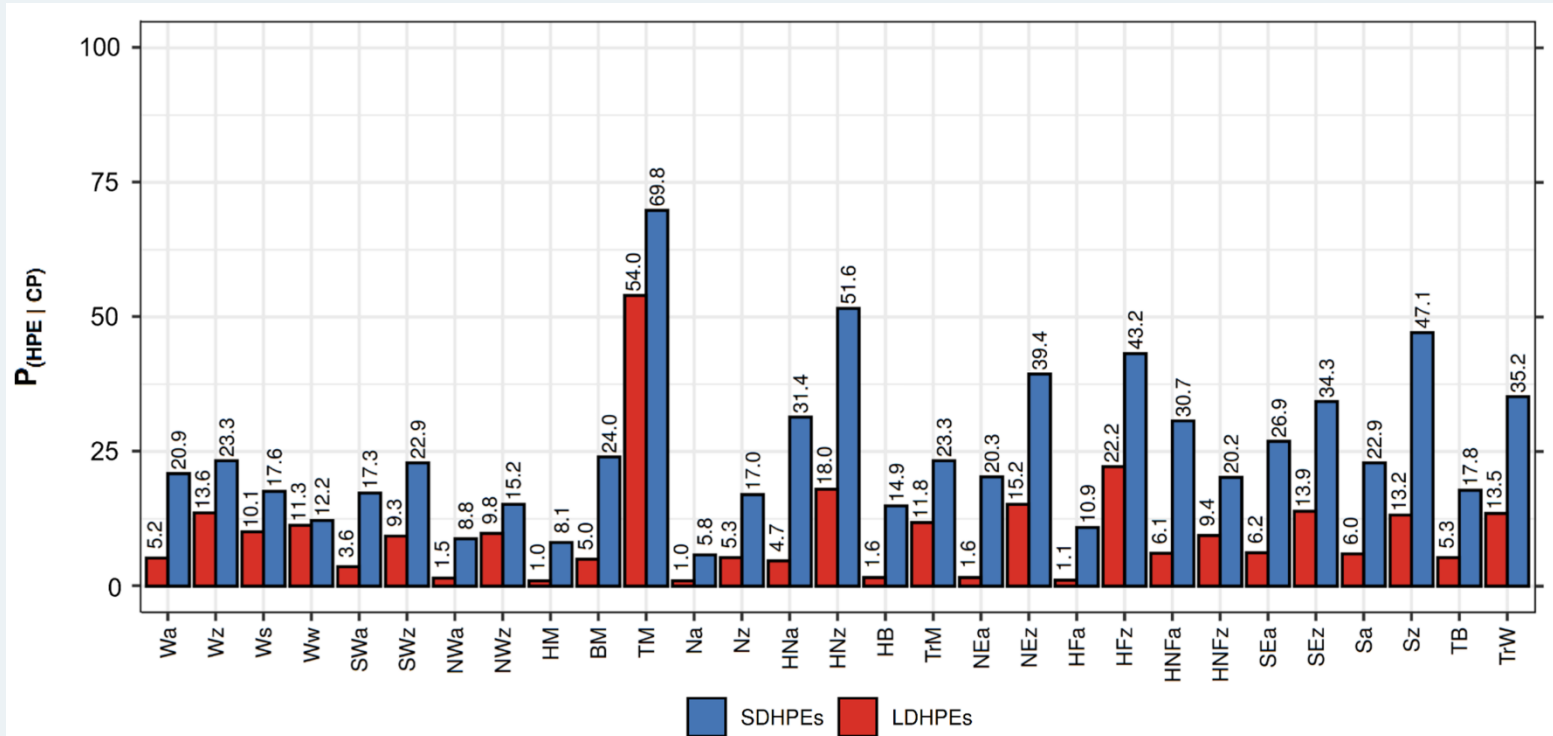
## SDHPEs and associated circulation patterns

Low over Central Europe



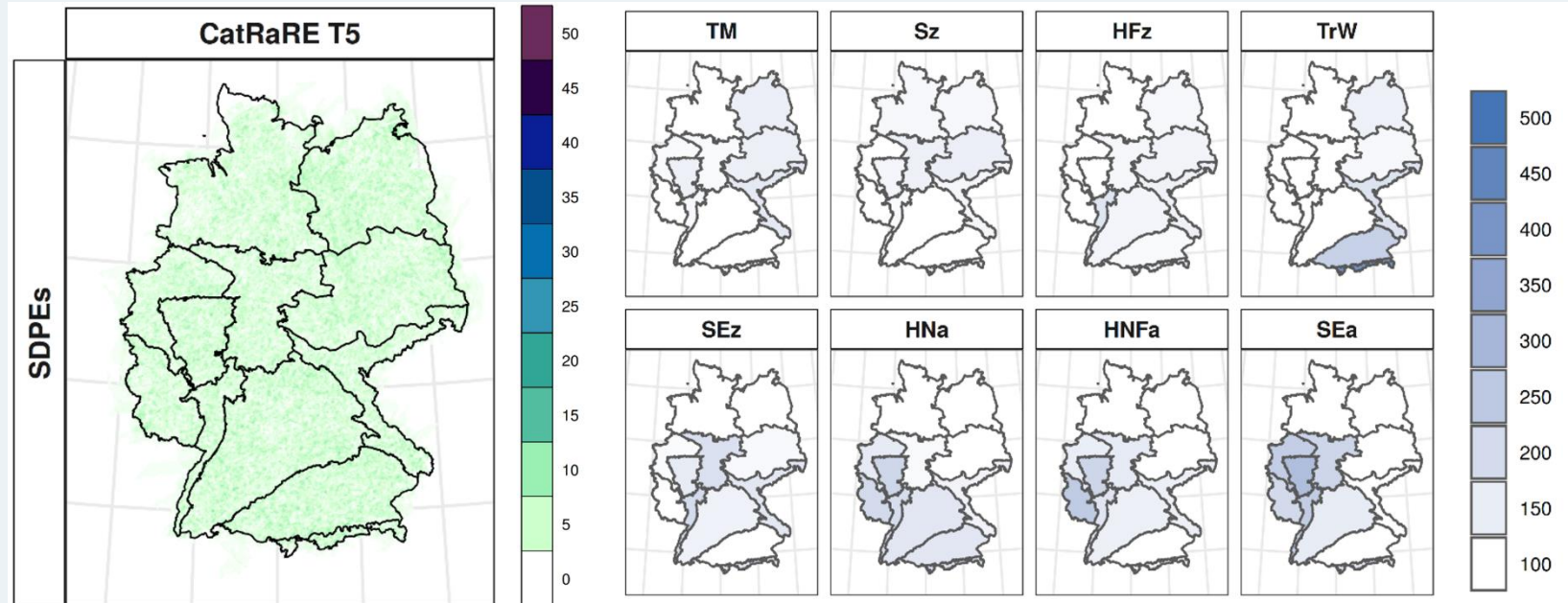
## SDHPEs and associated circulation patterns

Probability of SDHPEs given the occurrence of a particular circulation pattern [%]



# SDHPEs and associated circulation patterns

## Regional peculiarities

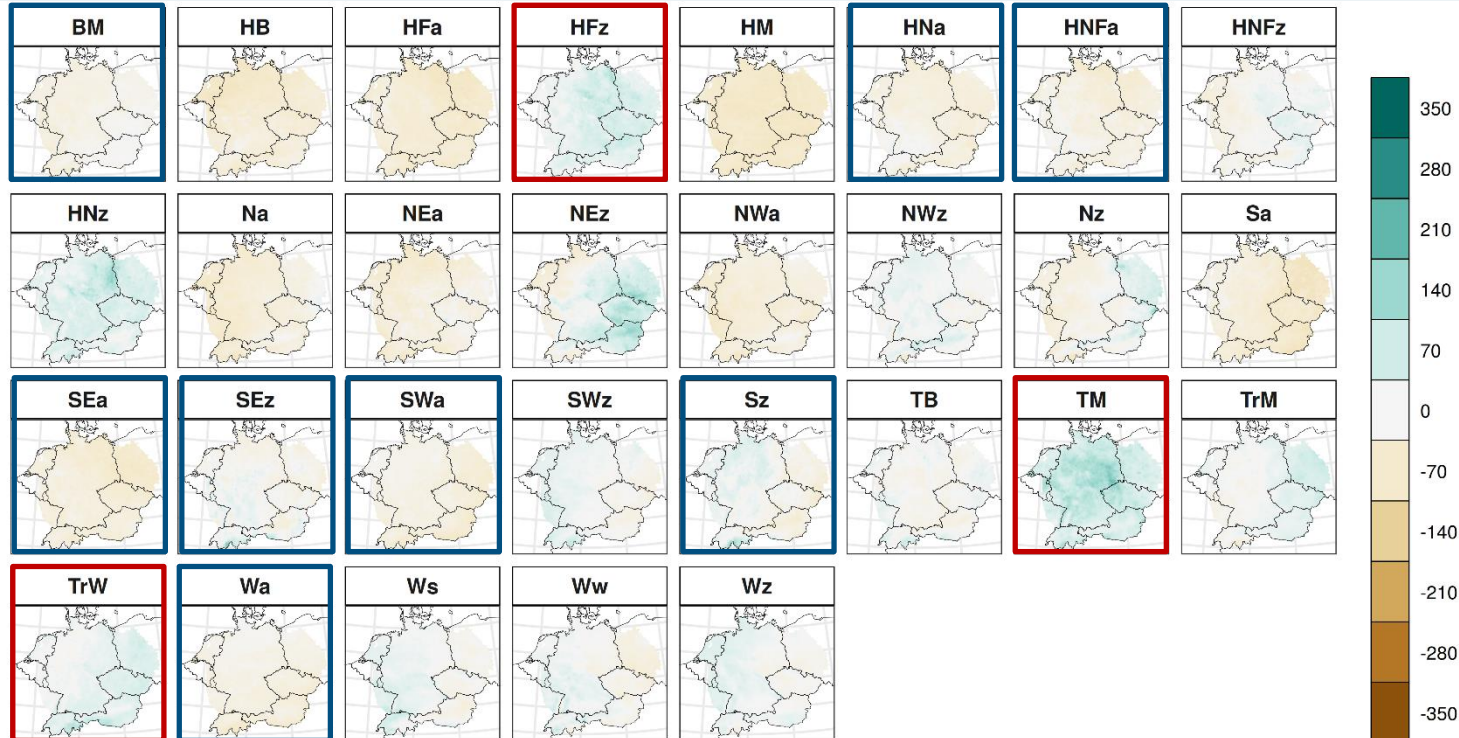


$$SI = \frac{\overline{SDHPE}_{RE}}{\overline{SDHPE}_{GE}} \cdot 100\%$$

$\overline{SDHPE}_{RE}$  is the mean number of SDHPEs per 1000 km<sup>2</sup> in a particular natural region  
 $\overline{SDHPE}_{GE}$  is the mean number of SDHPEs per 1000 km<sup>2</sup> throughout the whole area of Germany

# High-resolution gridded datasets, HYRAS

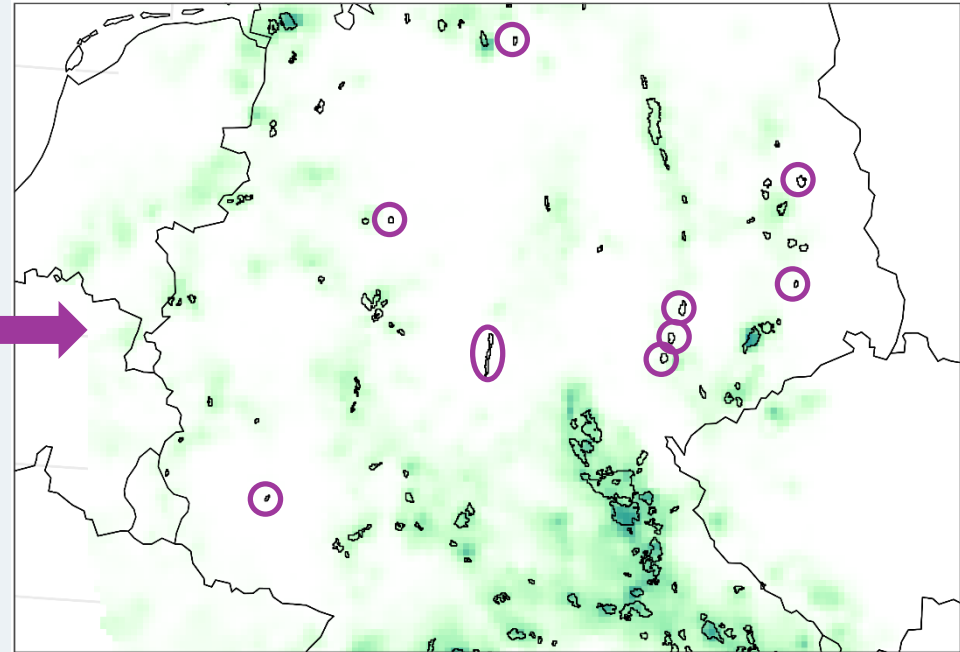
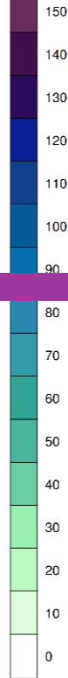
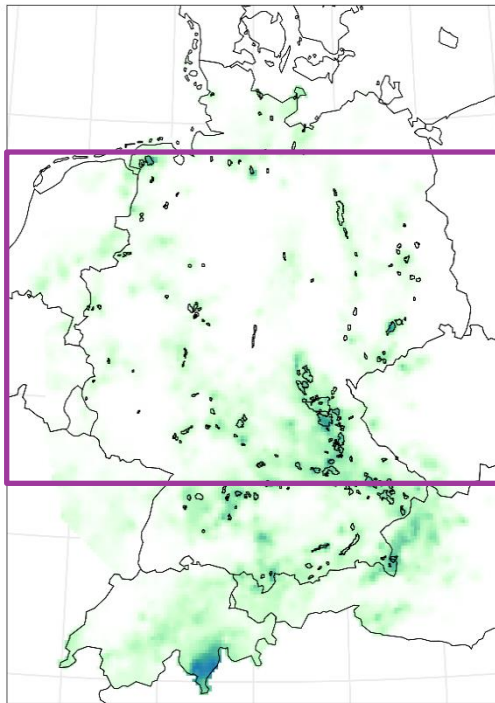
Deviation from mean daily precipitation sum [%] for SVGWL (1951-2015)



## CatRaRE versus HYRAS

Daily precipitation sum [mm] on July 6, 2006

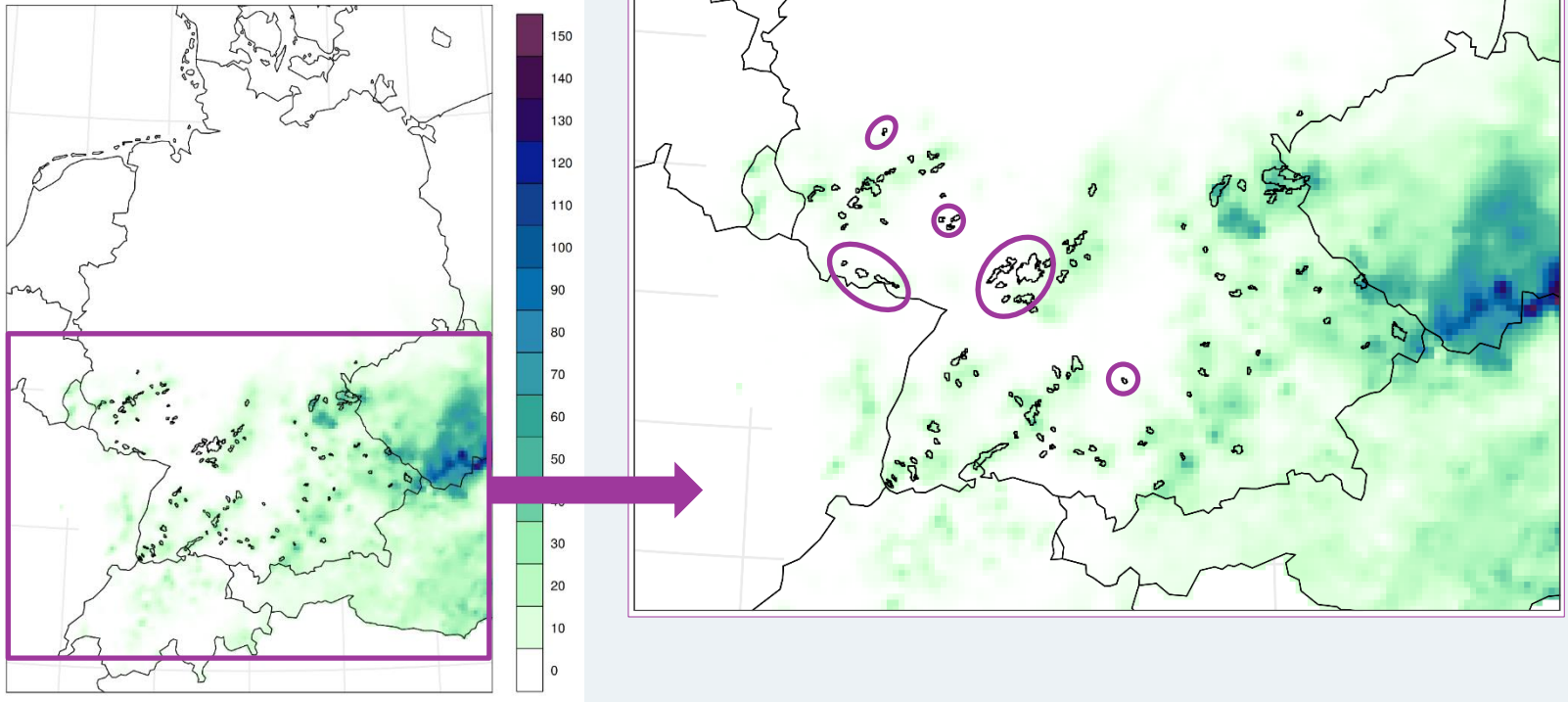
2006-07-06 SVGWL: SWa



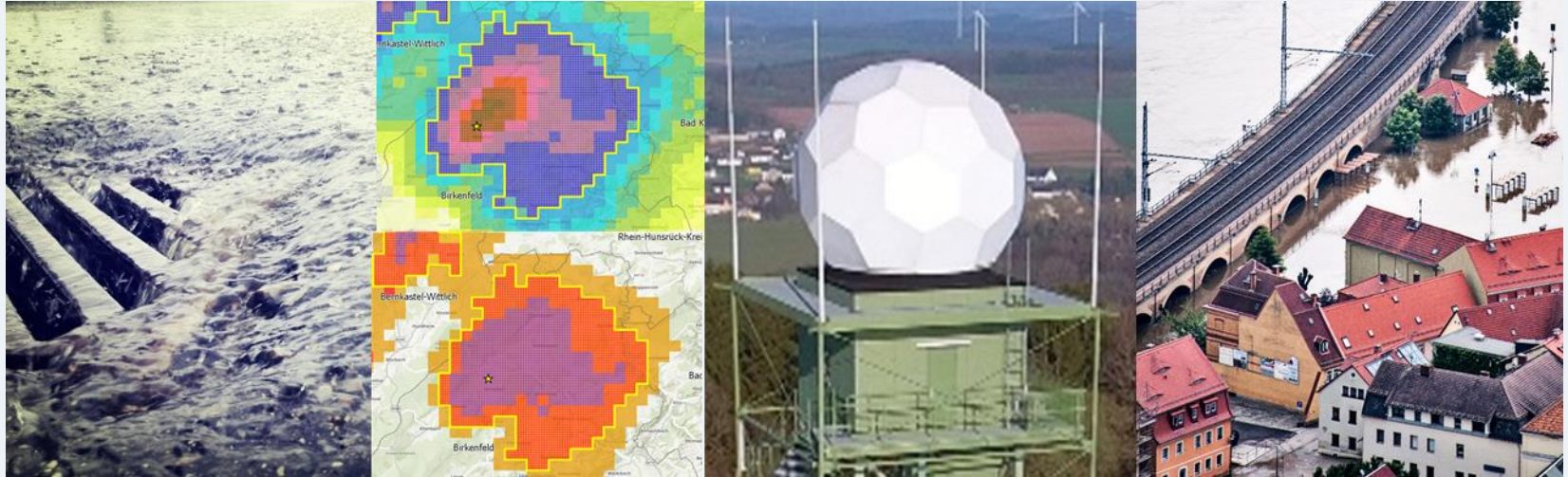
## CatRaRE versus HYRAS

Daily precipitation sum [mm] on June 29, 2006

2006-06-29 SynopVis-GWL: BM







**Thanks for your attention**

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