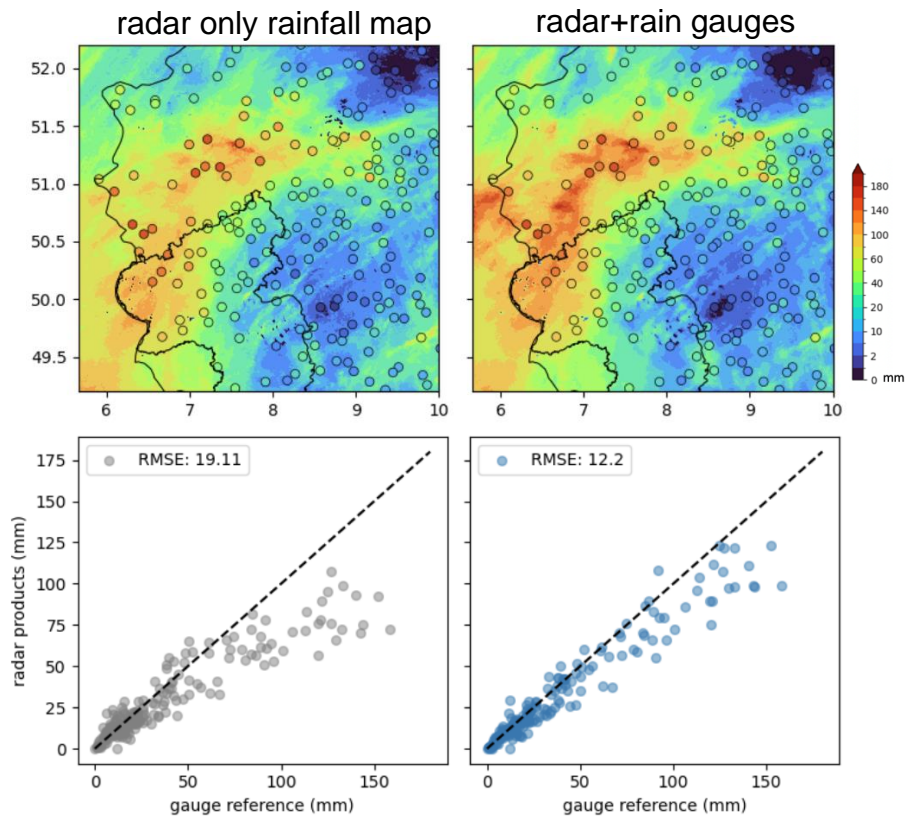




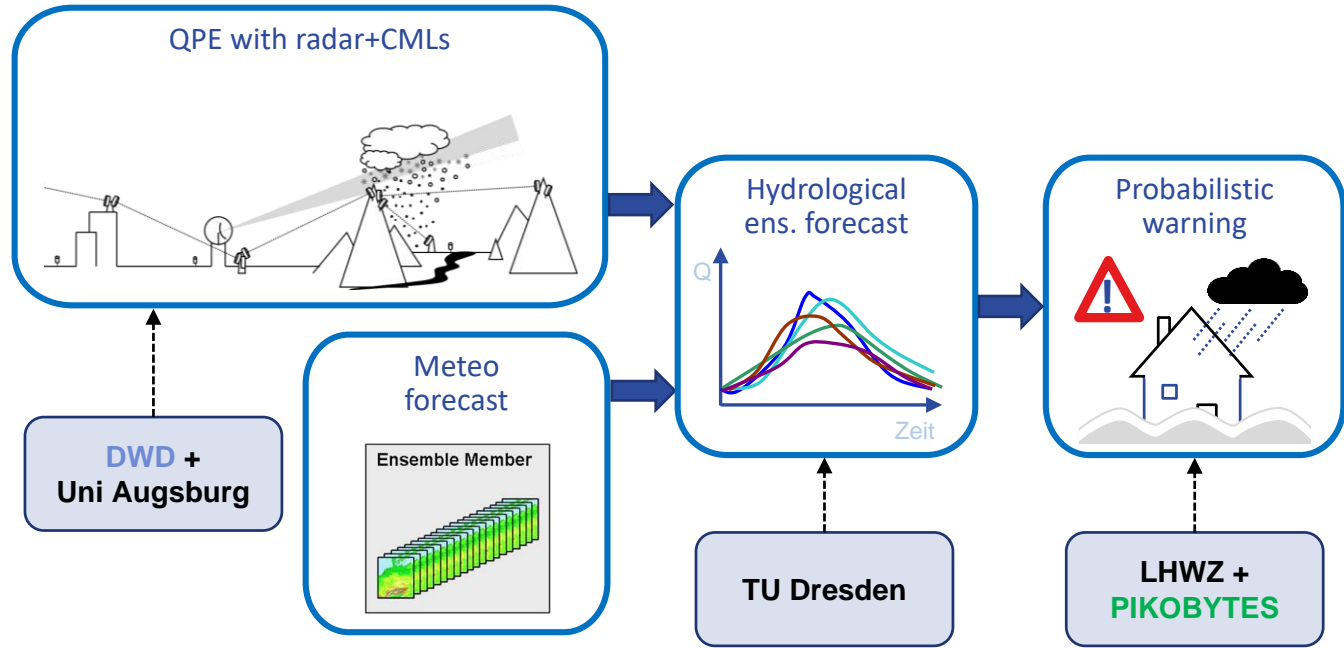
Weather radar adjustment with commercial microwave links at DWD

Motivation – Ahrtal July 2021

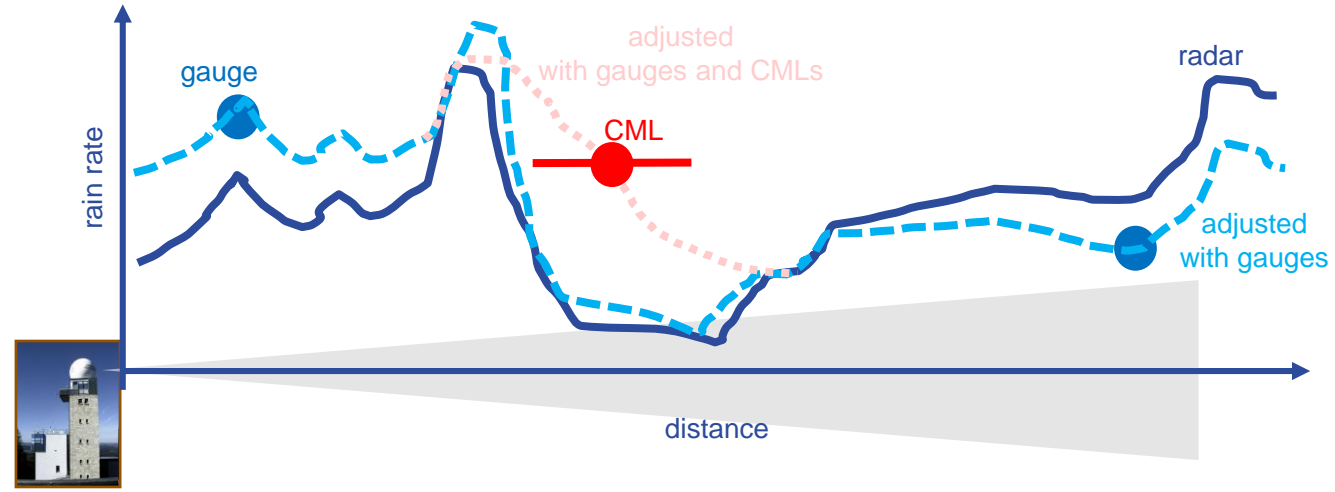
Three day rainfall sum



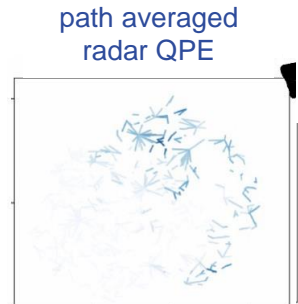
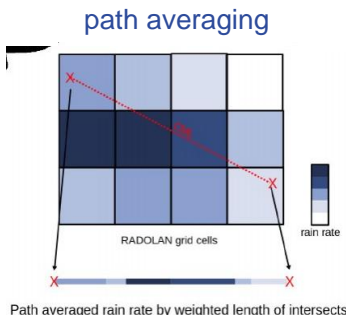
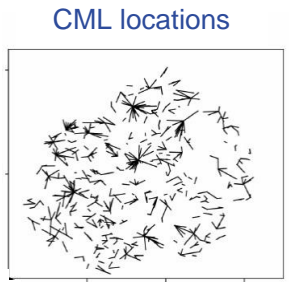
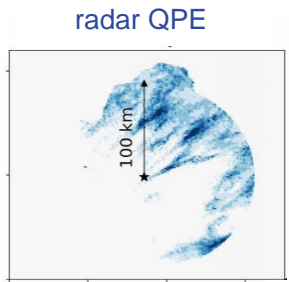
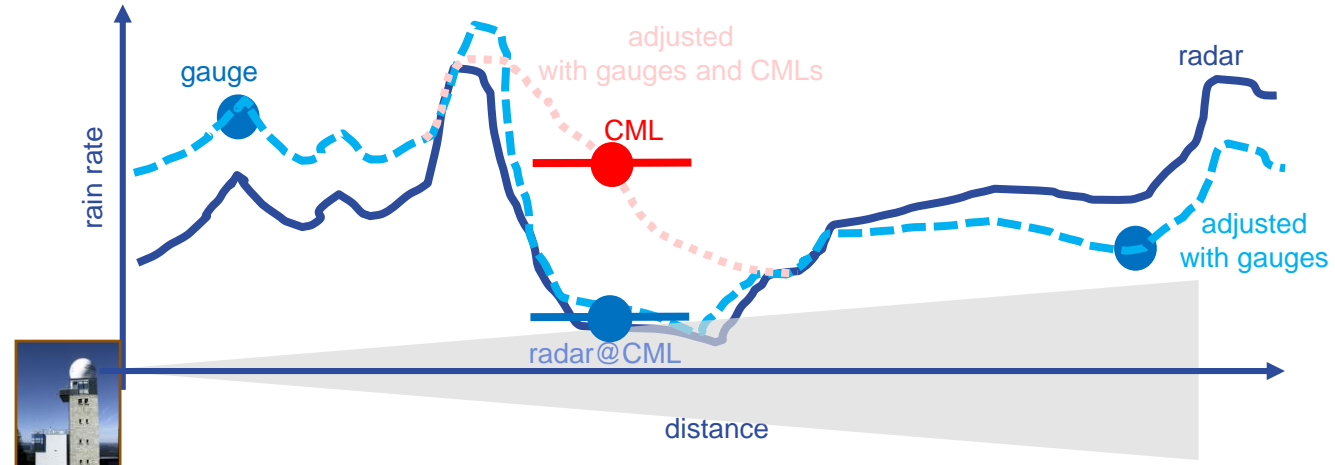
HoWa-PRO



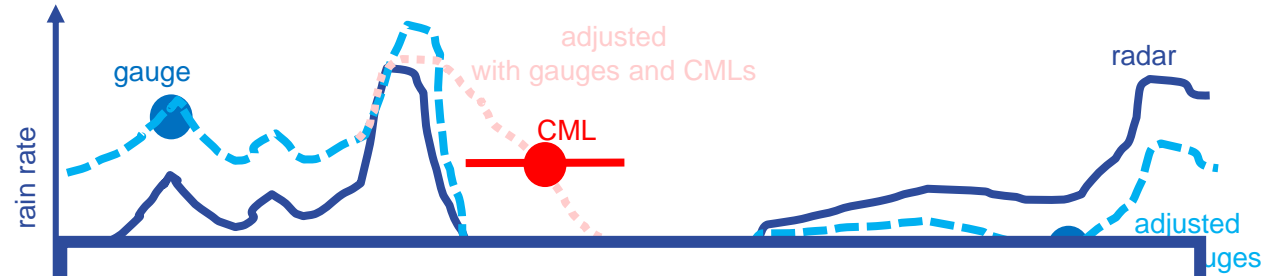
Radar adjustment



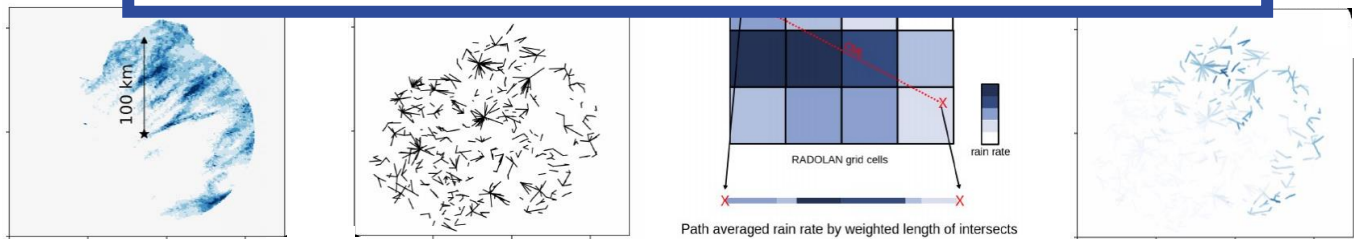
Radar adjustment



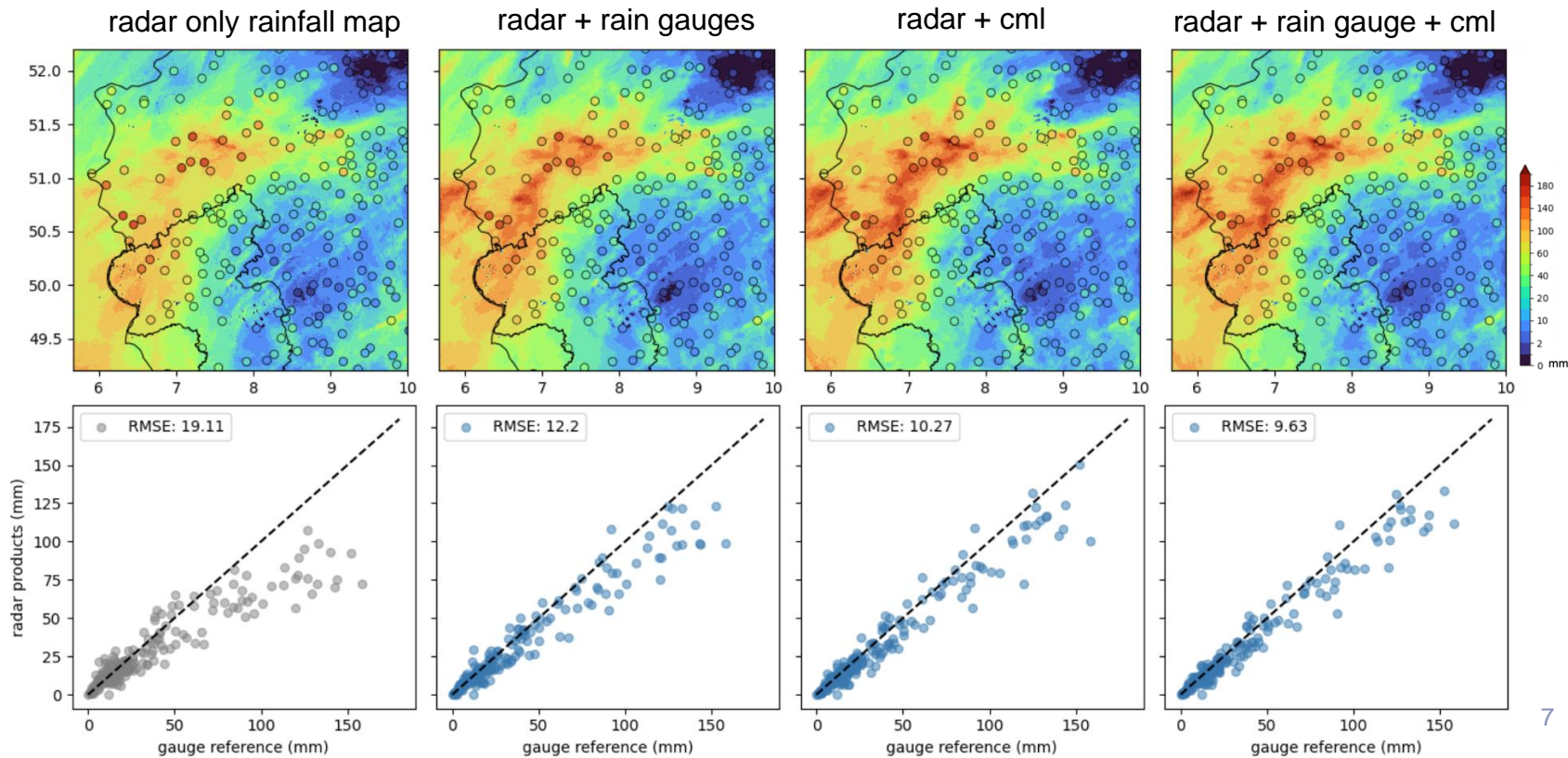
Radar adjustment



→ Use CML and ,radar@cml' analog to a rain gauge in RADOLAN adjustment (pyRADOLAN)



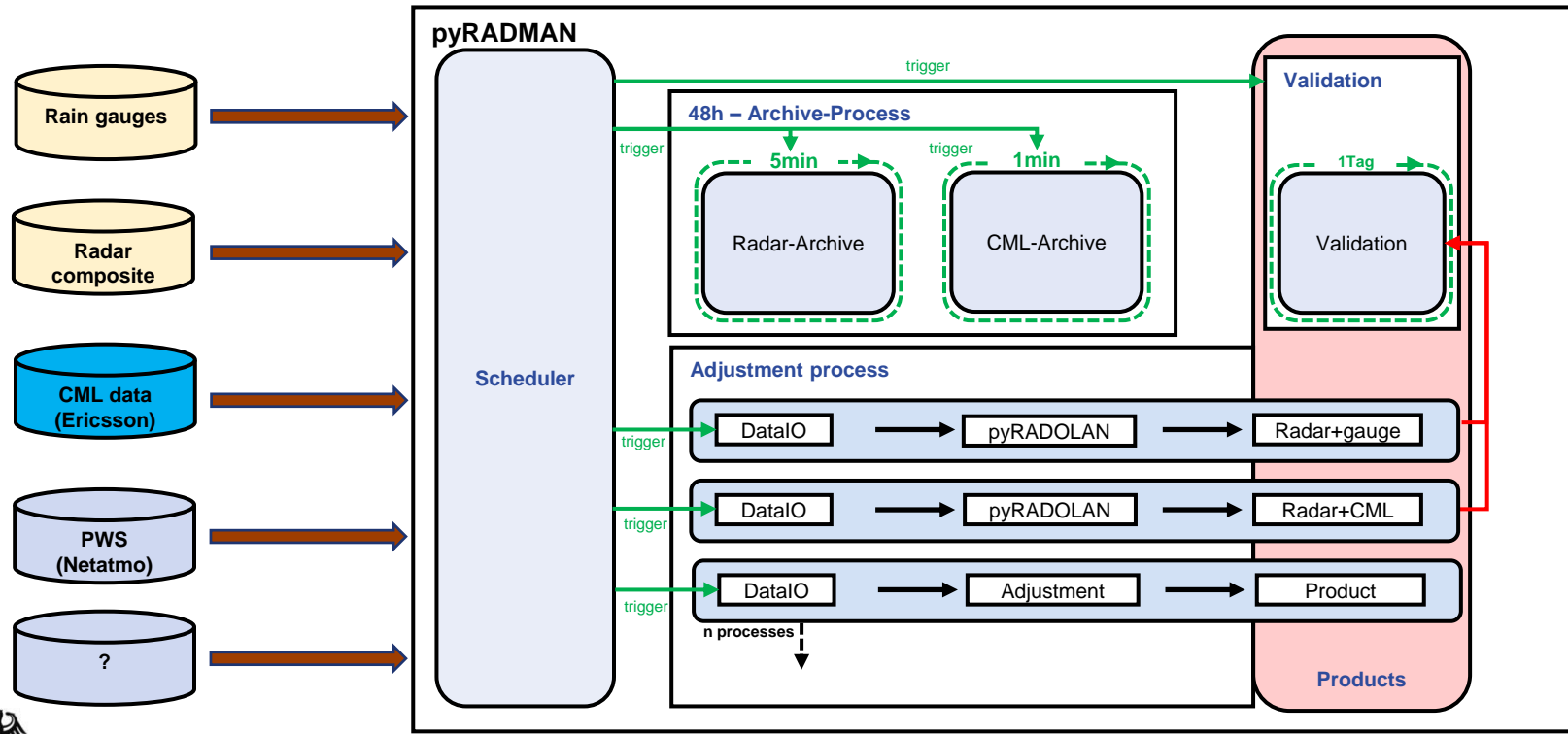
Results Ahrtal



pyRADMAN – a modulare adjustment software at DWD



pyRADMAN – a modulare adjustment software at DWD



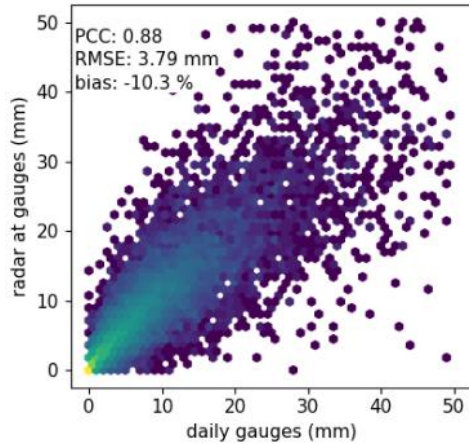
Results

- Experiments with CMLs
- Experiments without CMLs

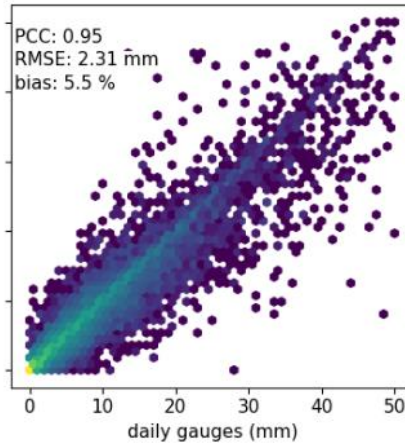


pyRADMAN product validation (daily reference, direct pixel, August 2023)

Radar (not adjusted)

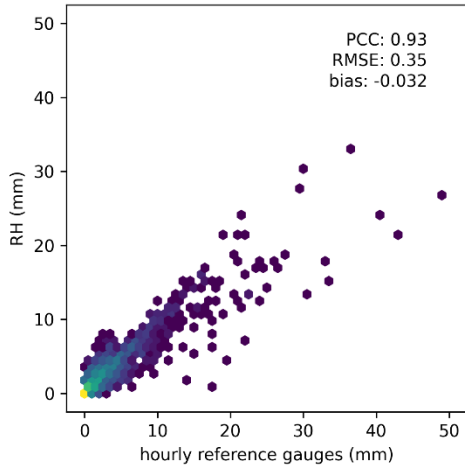


Radar + Station
as RADOLAN-RW

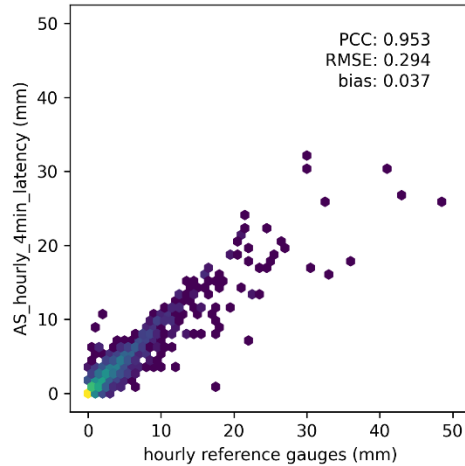


pyRADMAN product validation (hourly reference, best-of-9 pixel, August 2023)

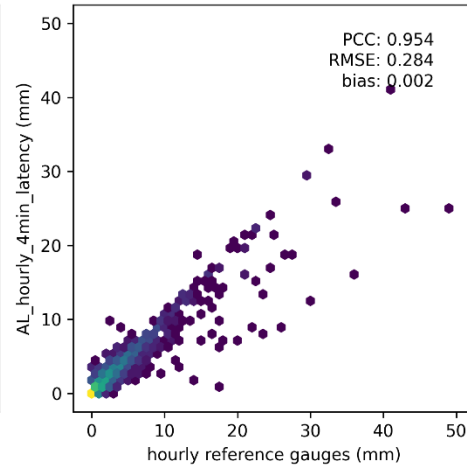
radar (unadjusted)



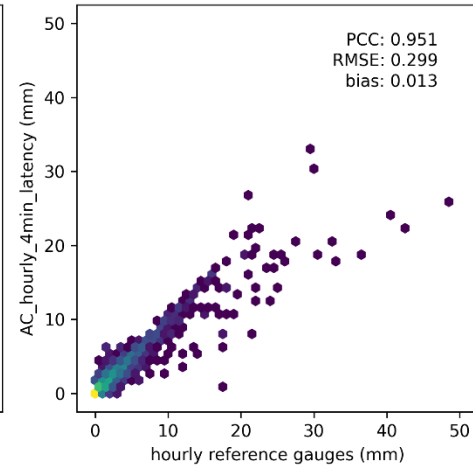
radar + gauges



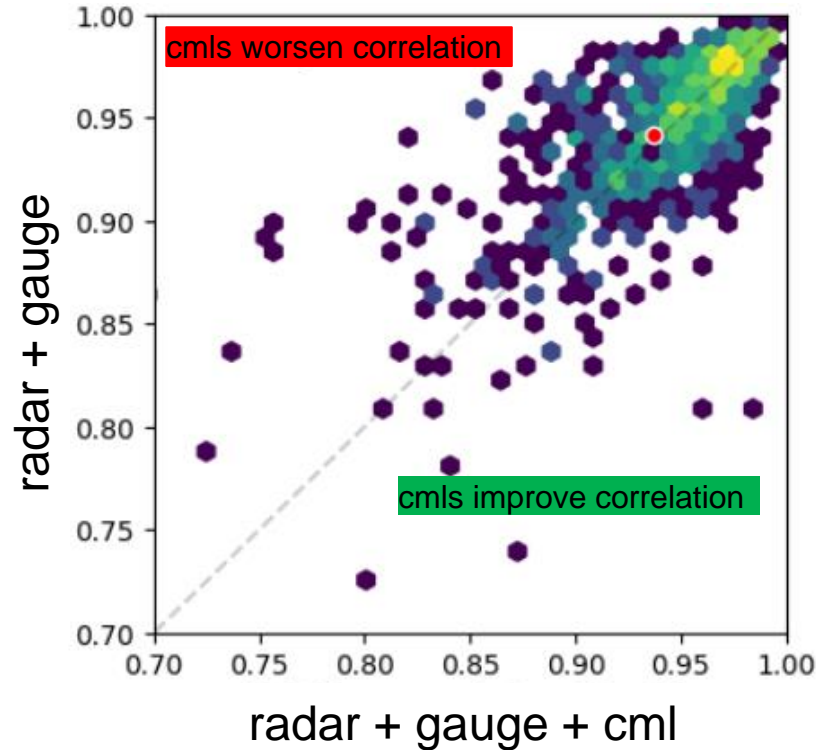
radar + cml



radar + gauge + cml

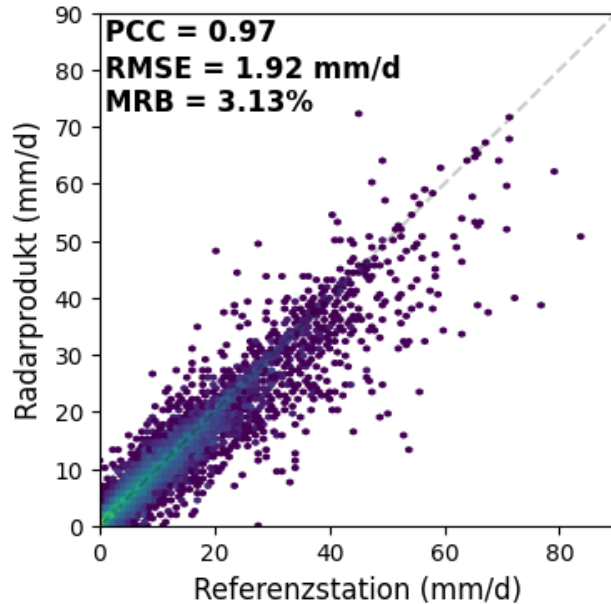


Correlation, daily evaluation, same latency

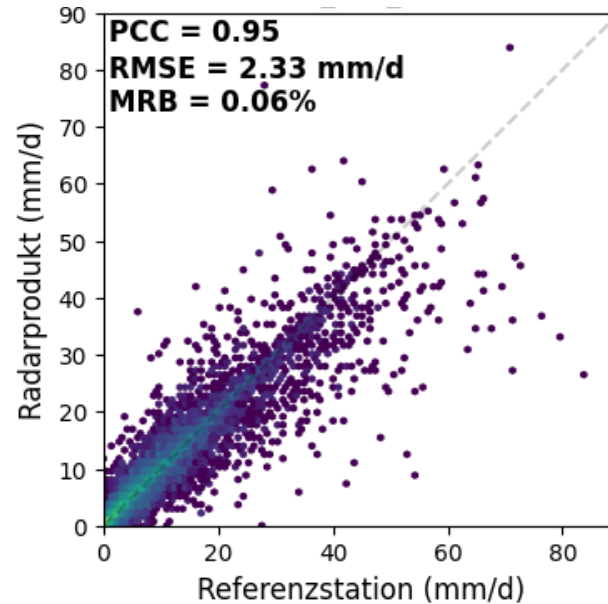


pyRADMAN product validation (daily reference, best-of-nine pixel, 2023&2024)

Radar + gauges
~ 25 min latency



Radar + gauges (available ones) + cml
~ 5 min latency



Results

→ pyRADMAN products for seamless hydrological prediction

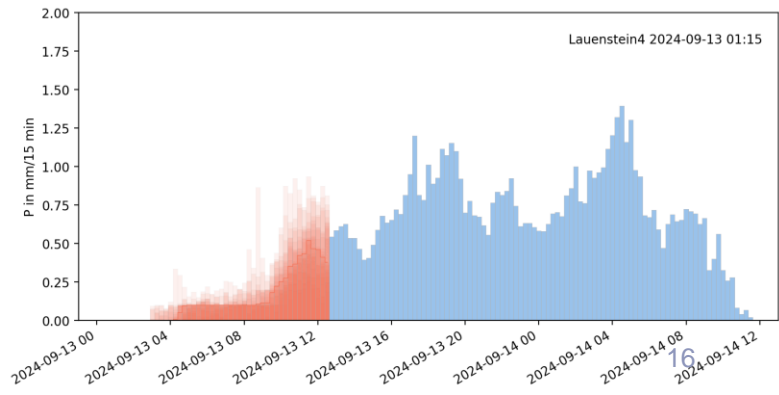
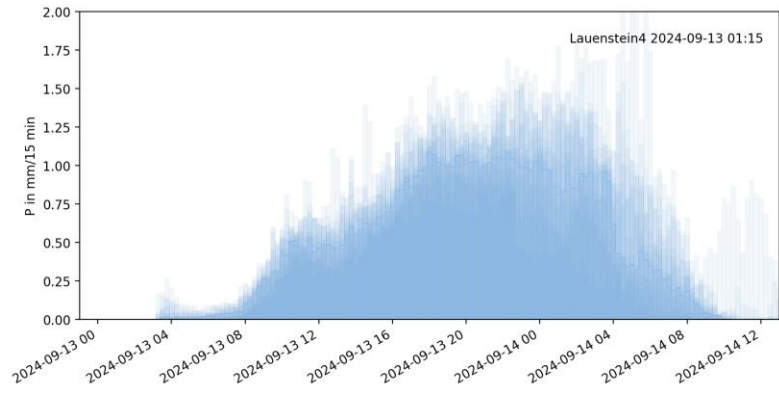


pyRADMAN products for seamless hydrological prediction

product	dx	dt	update	forecast	latency
RadolanRW	~1 km	1 h	30 min	-	26 min
pyRADMAN	~1 km	15 min	15 min	-	6/11 min
RadolanRV	~1 km	5 min	5 min	2 h	4 min
IconD2	~2 km	15 min	3 h	48 h	75 min
IconD2EPS	~2 km	15 min	3 h	48 h	140 min
IconEU	~4 – 7 km	1 – 6 h	3 – 6 h	48 – 120 h	230 min
Sinfony INTENSE	~2 km	15 min	0.5 – 2 h	12 h	25 min

RADOLAN-RW (operational, radRW, radRV, IconD2EPS)
 updated every 30 min with 60 min rainfall sums

pyRADMAN (experimental, pyRADMAN, INTENSE, IconD2)
 updated every 15 min with 15 min rainfall sums



Summary

- pyRADMAN offers a modular merging framework
- pyRADMAN offers products in a quality of RADOLAN-RW with lower latency
- CMLs offer
 - Lower latency products
 - Improved QPE compared to unadjusted products
 - Potential to improve
- Next steps:
 - Understand when (and why) CMLs improve QPE
 - Include PWS in pyRADMAN

Thank you very much – Questions?

