



PROGRAMME OF
THE EUROPEAN UNION



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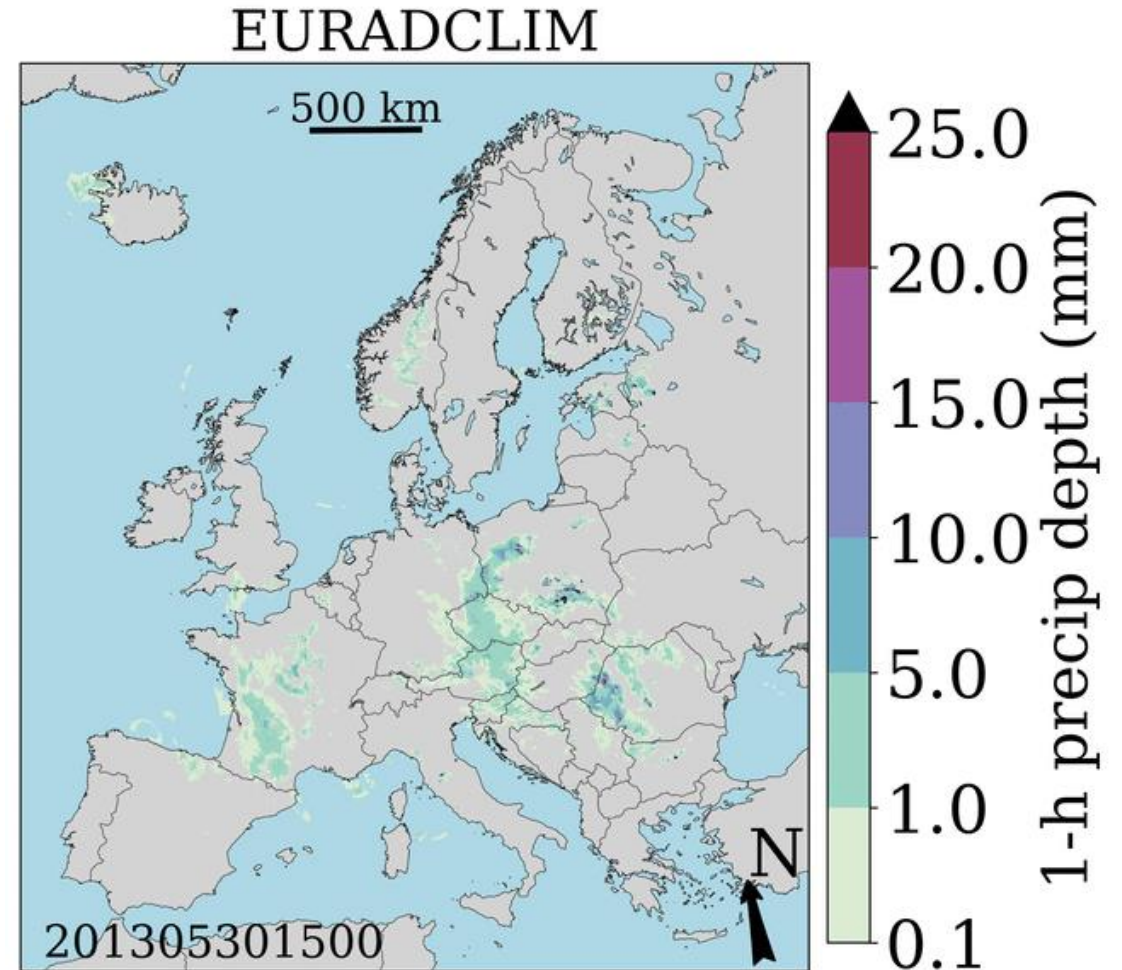
The EURADCLIM gauge-adjusted radar precipitation dataset version 4

Aart Overeem, Else van den Besselaar, Gerard van der Schrier, Jan Fokke Meirink, Emiel van der Plas, Izzy Hendriks, Hidde Leijnse (KNMI)

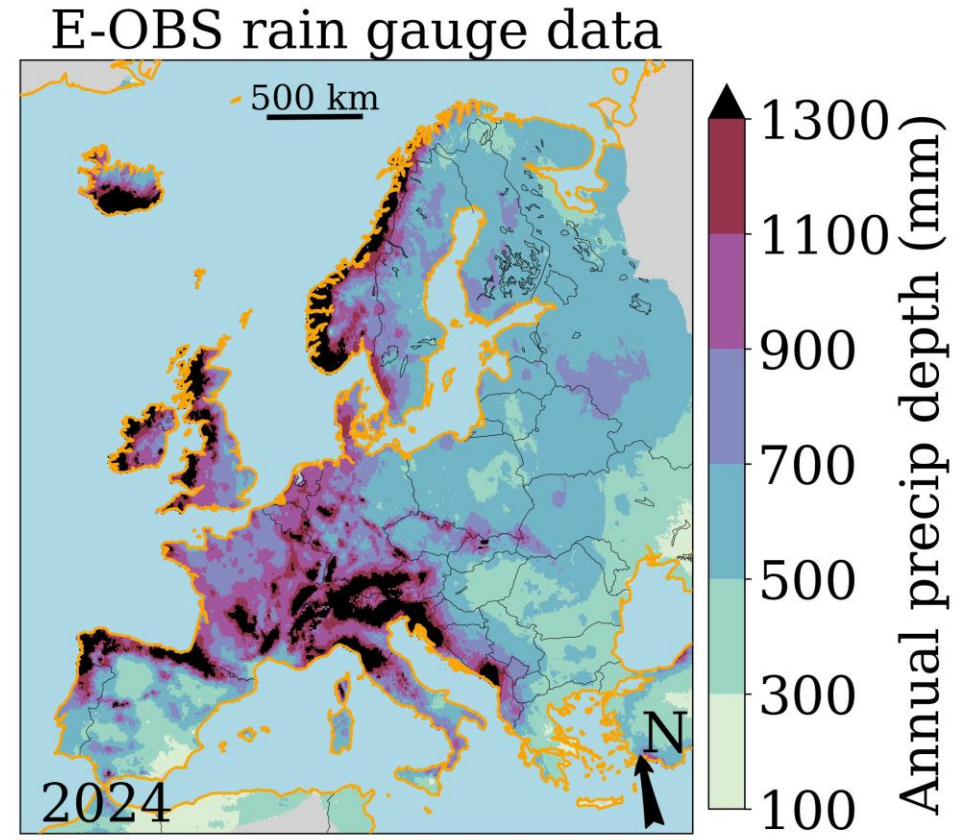
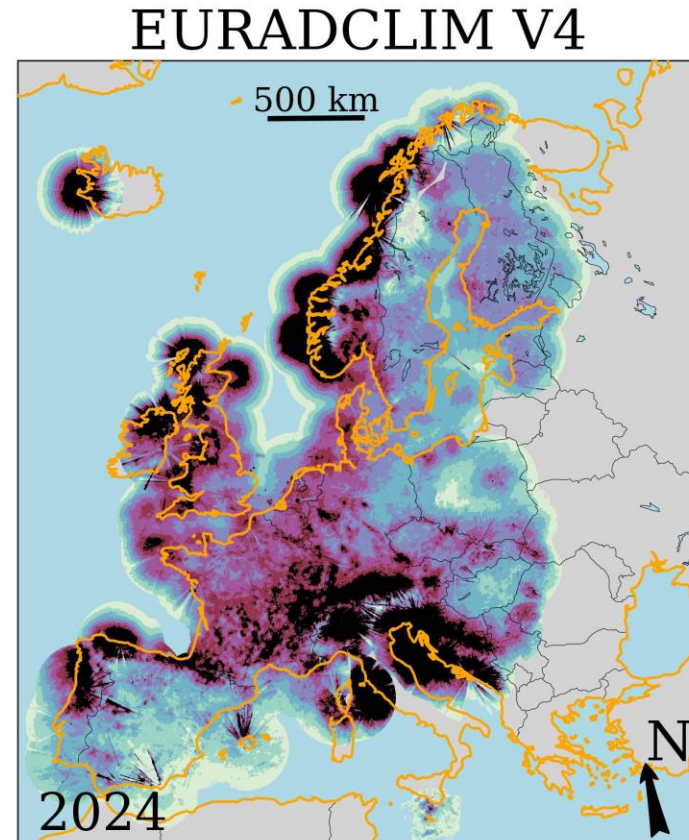
EMS Annual Meeting, 10 Sep 2026, Utrecht, the Netherlands

What is EURADCLIM?

- A former project (Apr 2019 – Dec 2022) of KNMI's Multiannual Strategic Research Program (MSO).
- Climatological gauge-adjusted radar precipitation dataset of 1-h & 24-h accumulations (every clock-hour), covering Europe at a 2 km grid from 2013-~~2020~~2025 (v1v4)
- [EURADCLIM website](#)
- <https://doi.org/10.5194/essd-15-1441-2023> (V1; scientific article)
- Current work on EURADCLIM is funded through the Copernicus contract C3S2_311_bis.



Why EURADCLIM?



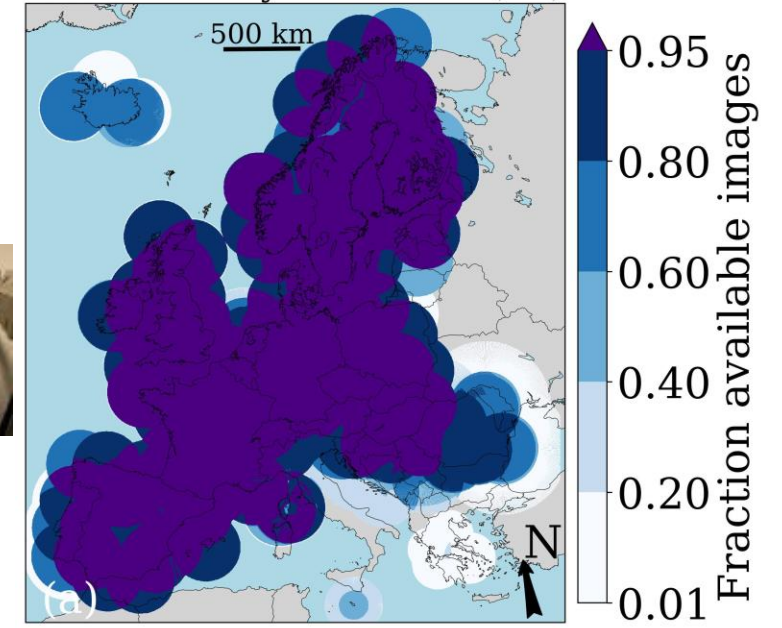
- Fills a gap: E-OBS provides daily & EURADCLIM provides hourly climatological pan-European precipitation accumulations (and daily measurement interval of rain gauge data in E-OBS varies across Europe).
- Covering Europe with a much higher spatial resolution (2 km), instead of interpolating values from rain gauges that miss most of the precipitation.

Radar and rain gauge datasets

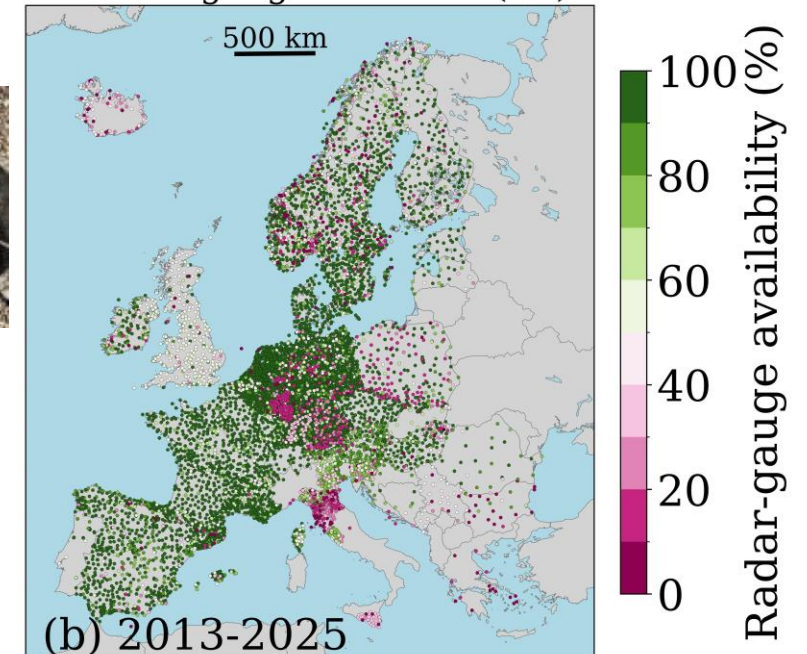
- EUMETNET OPERA radar archive of 15-min instantaneous surface rain rates @4 km².
- European Climate Assessment & Dataset (ECA&D) daily rain gauge accumulations from potentially ~9600 stations (<https://www.ecad.eu>).



OPERA hourly radar data (V4)



ECA&D gauge locations (V4)

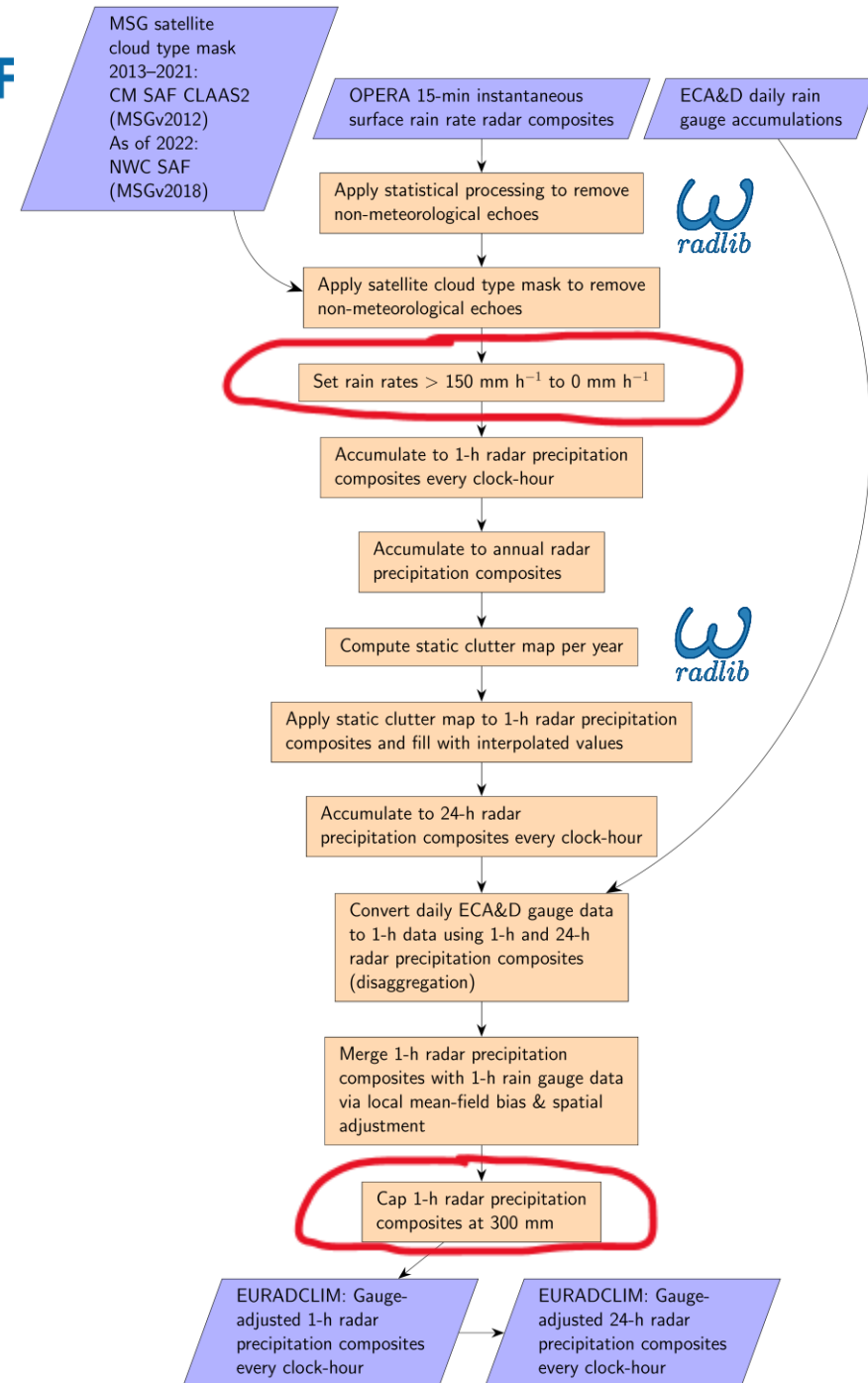


EURADCLIM processing

- Additional removal of non-meteorological echoes (2 statistical methods from open-source library wradlib & satellite cloud type mask).

Combine the best of 2 worlds:

- OPERA radar data: high spatiotemporal resolution, less accurate.
- ECA&D rain gauge data: accurate, but limited coverage and highly varying network density.
- On average 520 radar-gauge pairs for merging.



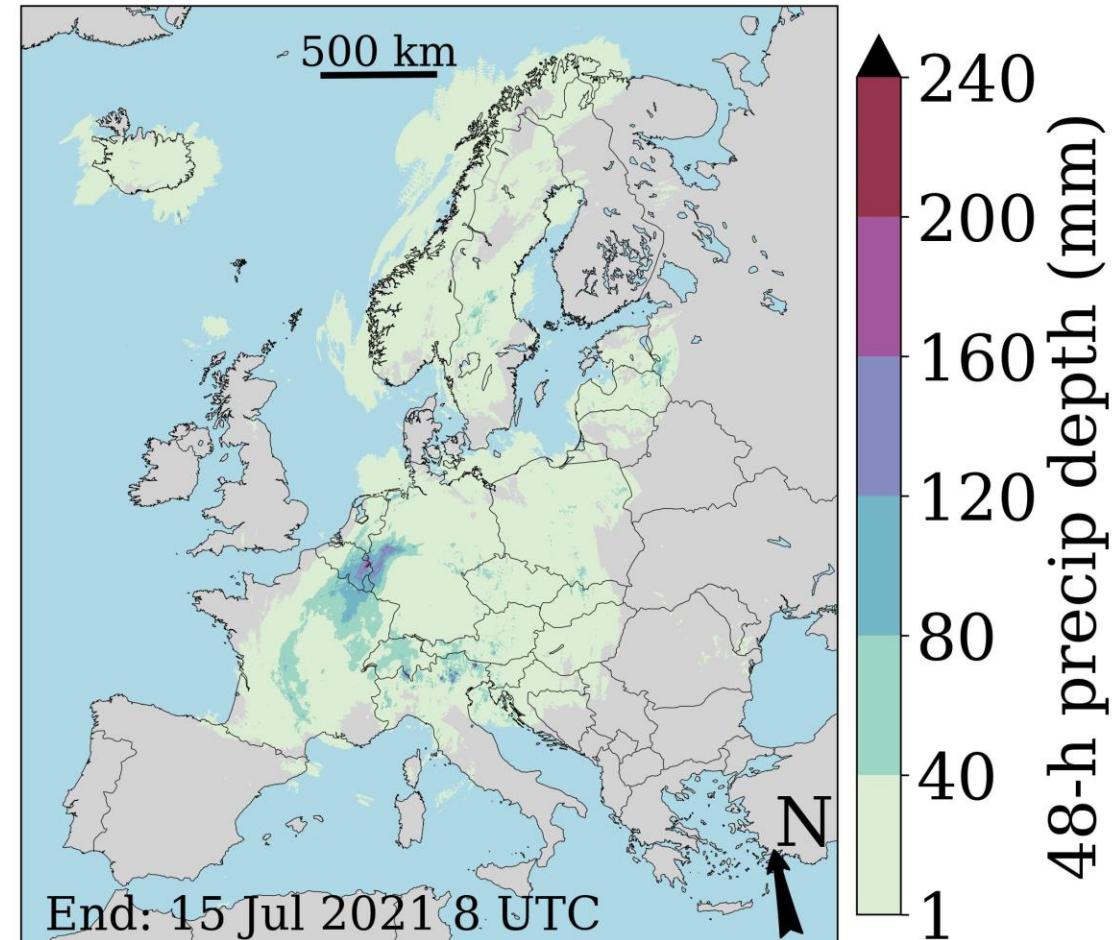
New as of
V3

EURADCLIM datasets V3 & V4

Changes w.r.t. V1 & V2:

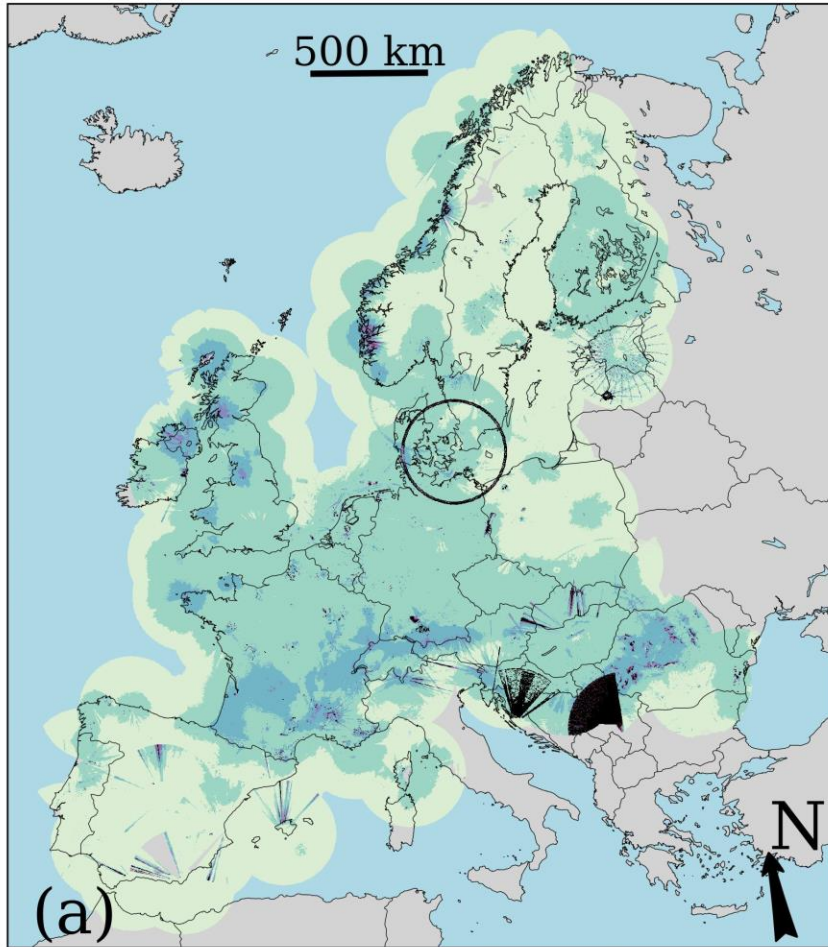
- 15-min rain rates > 150 mm/h are set to 0 mm/h.
- More local weighting is applied in the merging of radar and rain gauge data (second adjustment step uses rain gauges < 25 km instead of 33 – 95 km depending on DOY).
- The 1-h EURADCLIM accumulations are capped at 300 mm.
- Much better rain gauge coverage for Spain (V3 & V4) and for Iceland (V4).
- Rain gauge data Bulgaria added (V4).
- Years 2021 - 2025 added (2023 w.r.t. V2; 2024 & 2025 w.r.t. V3).

EURADCLIM V4

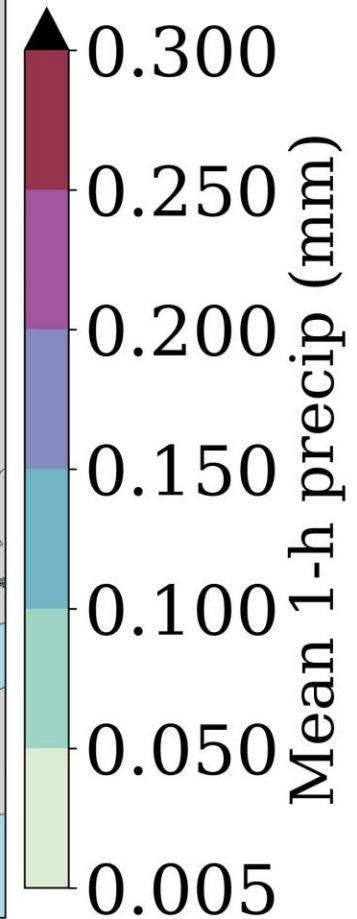
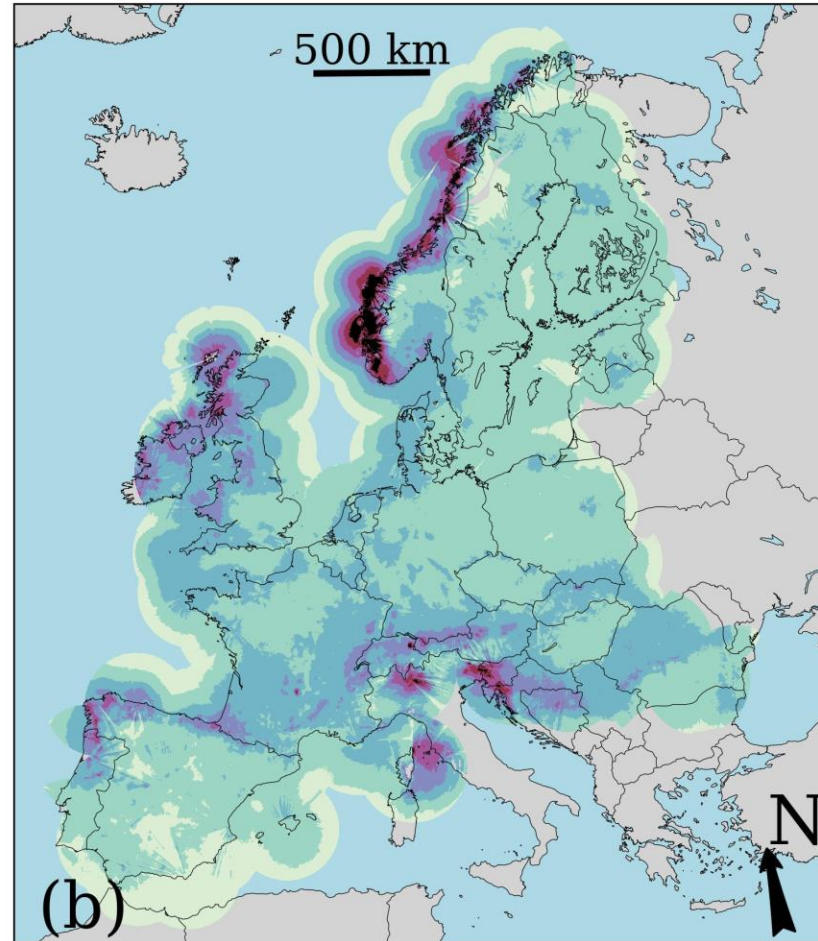


Clutter removal

OPERA



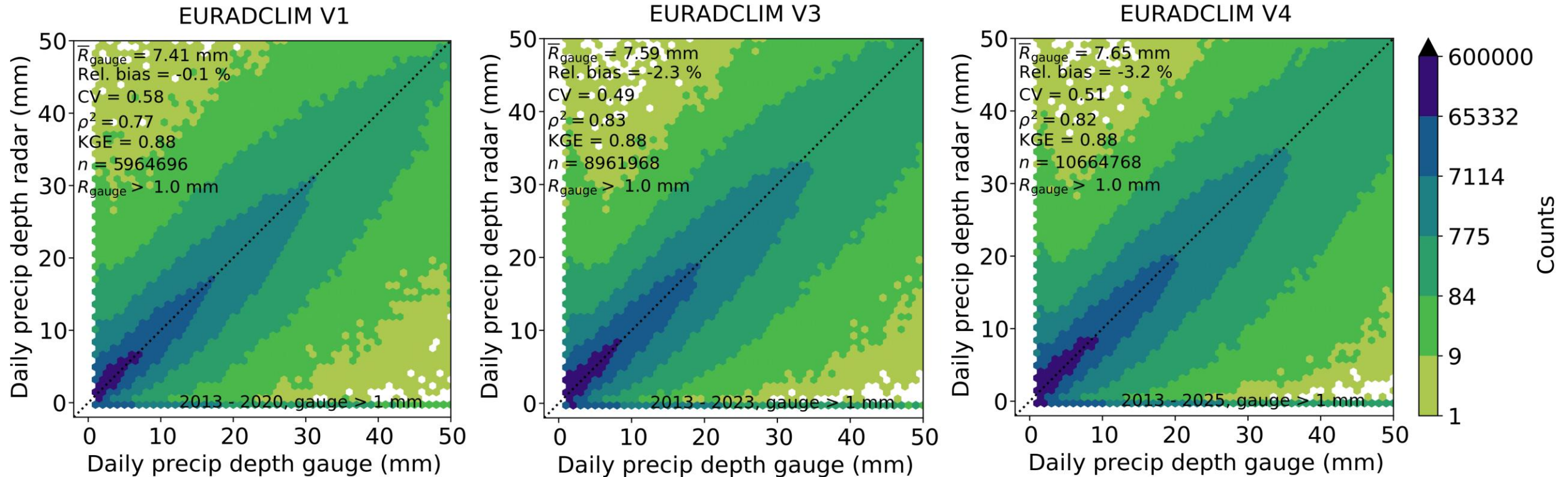
EURADCLIM V4



- Many non-meteorological echoes in OPERA radar data (overestimation), which are often removed or suppressed for EURADCLIM.



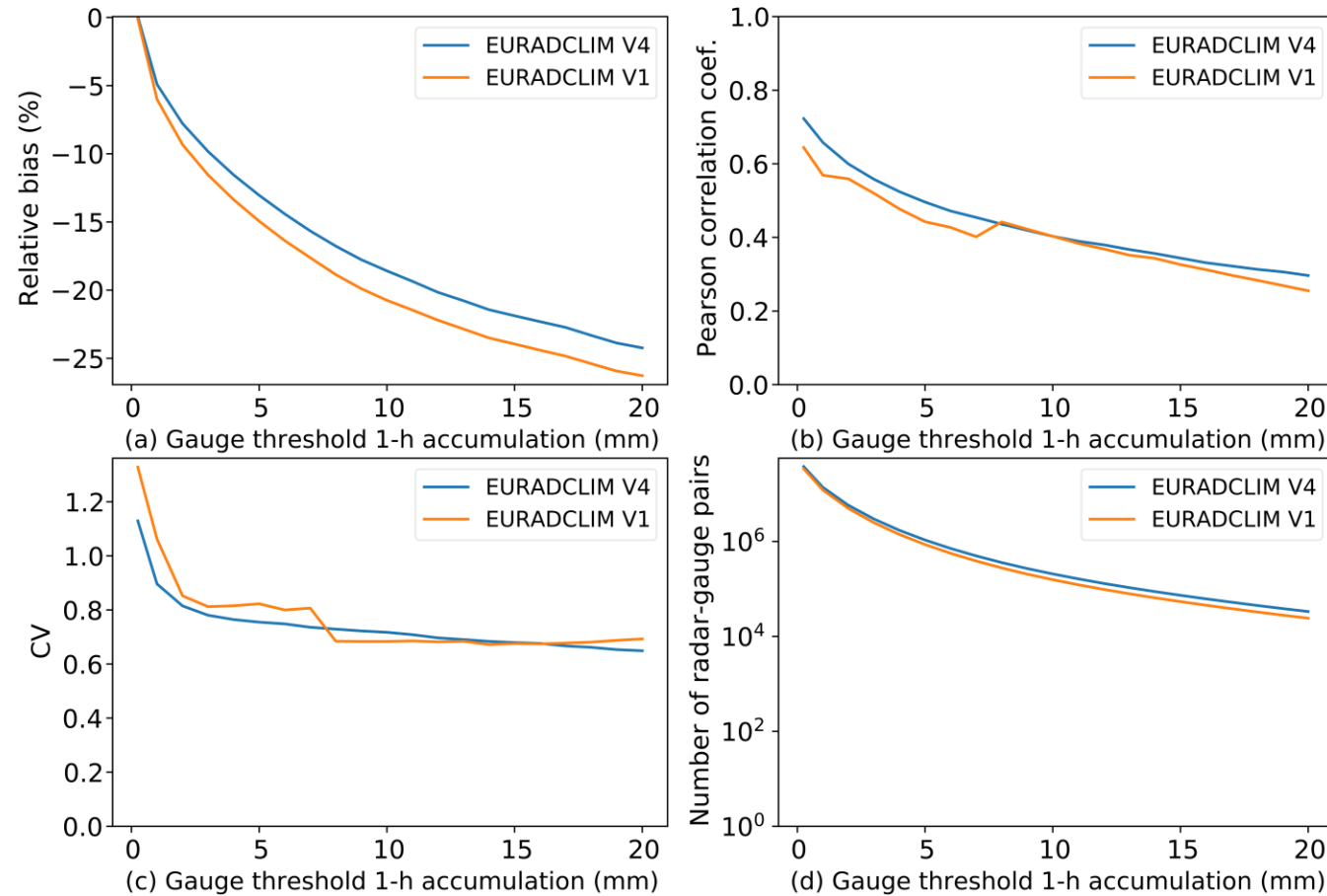
EURADCLIM V1 vs V3 vs V4 – evaluation (daily)



- Except for relative bias, improvement w.r.t. V1.

EURADCLIM V1 vs V4 – evaluation (1 h)

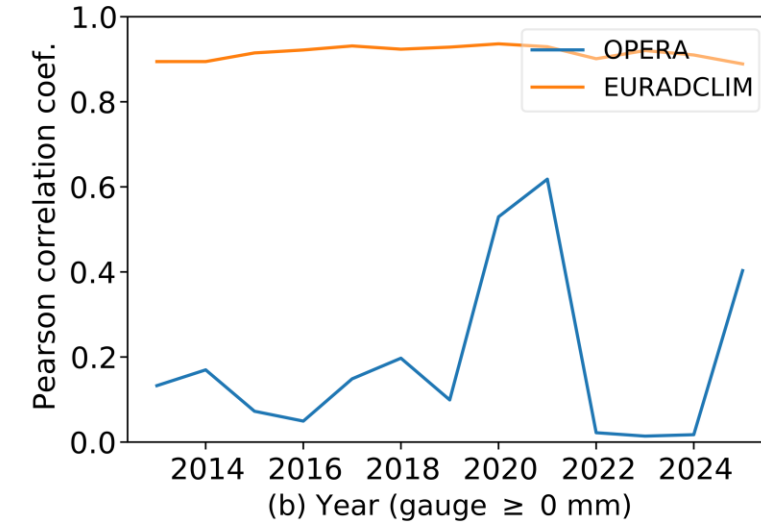
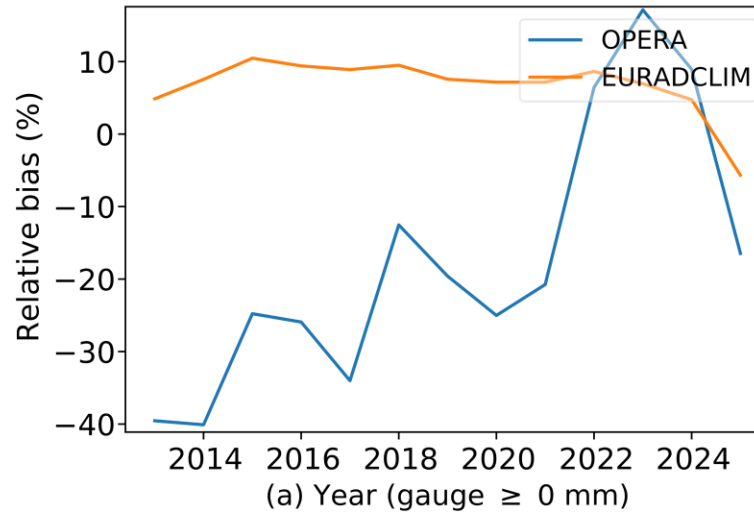
2013-2020 (V4, 300 mm cap; V1), LOOS



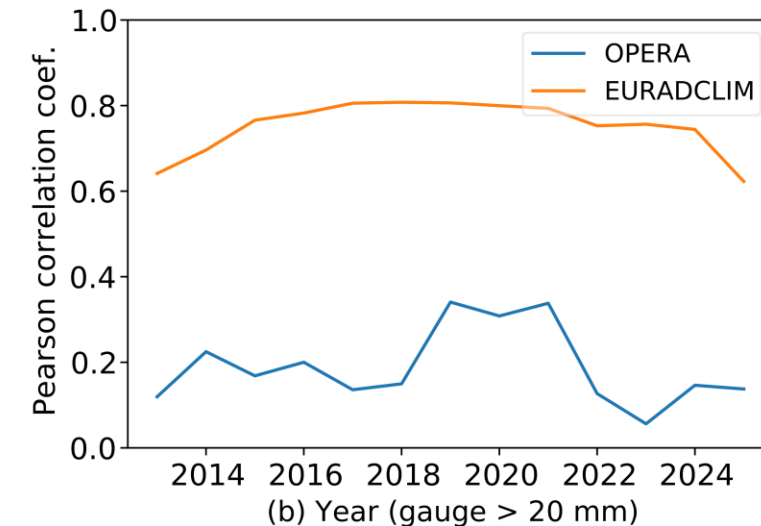
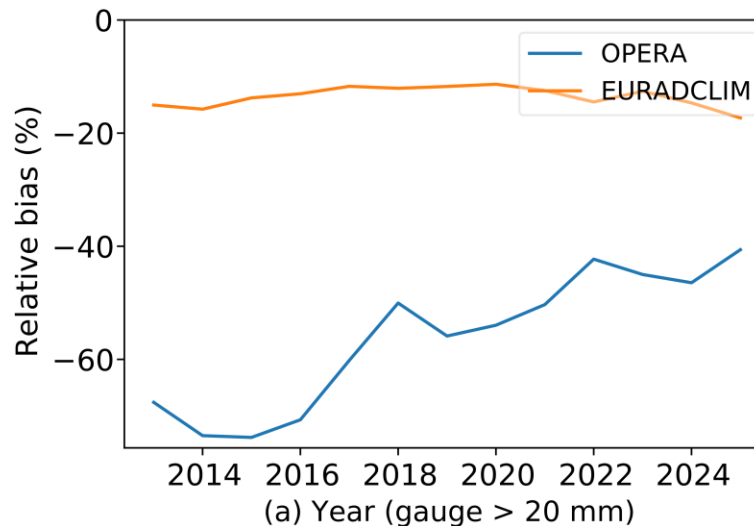
- Generally, small improvements w.r.t. V1.
- LOOS: leave-one-out-statistics (independent verification).

Performance OPERA 2013-2025

- OPERA clearly improves in time for relative bias (ind. verification), but many fluctuations in metrics, probably related to outliers.
- Performance of EURADCLIM relatively stable over the years (but dep. verification).



OPERA & EURADCLIM vs daily gauges (2013 - 2025)

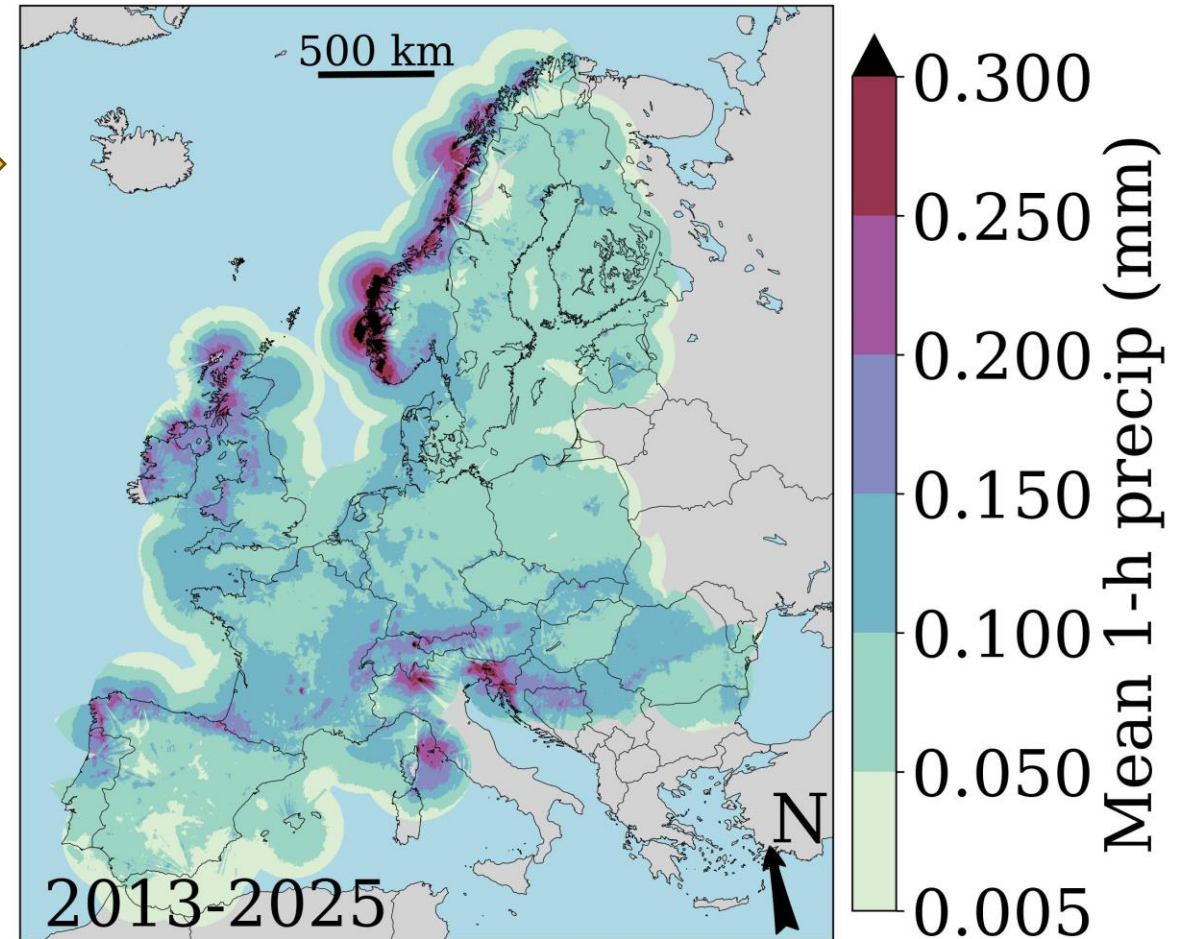


Summary EURADCLIM

- Allows for pan-European precipitation climatology.
- Is not expected to outperform national climatological radar datasets, but these are often not available or do not exist.
- V3 publicly available at KNMI's Data Platform: <https://doi.org/10.21944/1rxx-ev62> & <https://doi.org/10.21944/hk1t-8p07> (ODIM-HDF5 format).

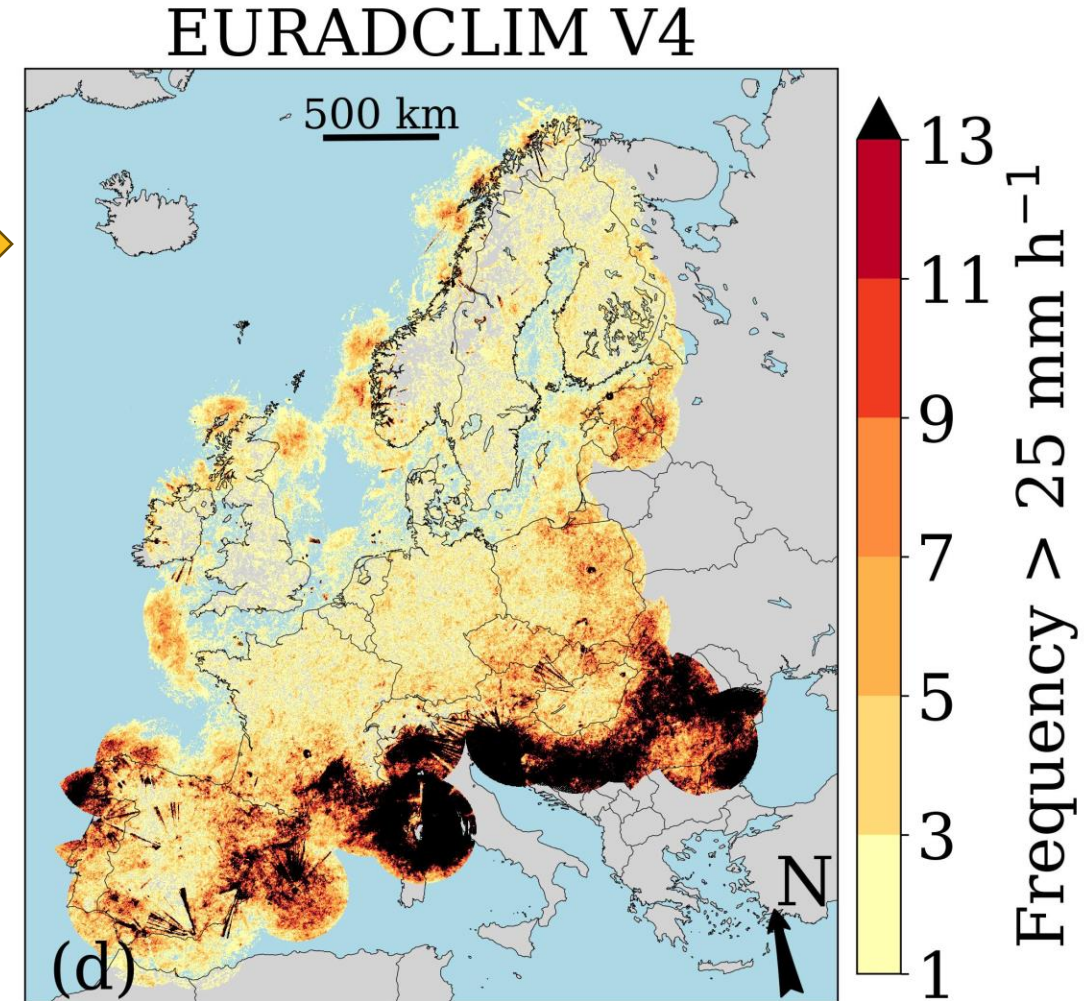
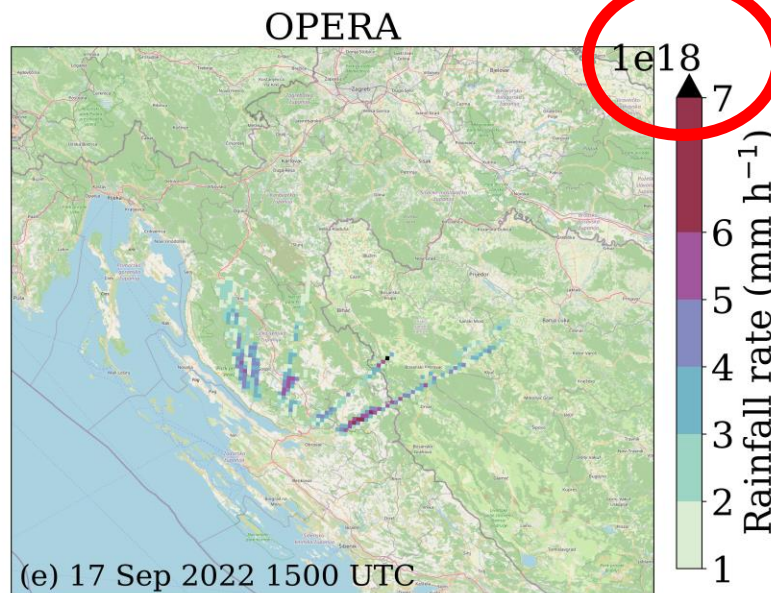


EURADCLIM V4



Summary EURADCLIM

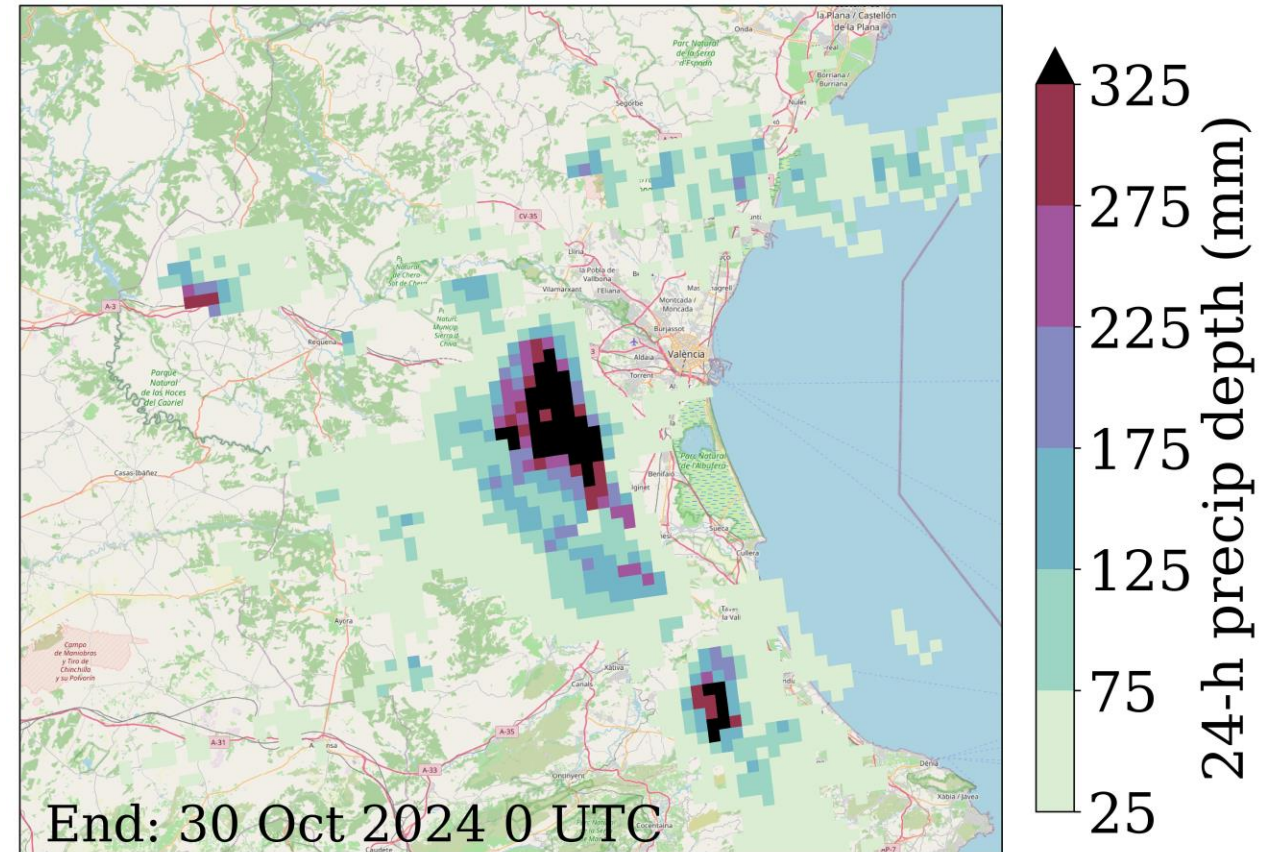
- Still quite some overestimation for some areas due to non-meteorological echoes.
- And underestimation in some areas due to beam blockage.
- The most severe outliers have been removed or substantially reduced as of V3.



Outlook EURADCLIM

- 2026 & 2027: EURADCLIM will be put and documented at [Copernicus Climate Data Store](#). V3: ~Sep – Oct 2026. Newer versions will only become available in CDS. V4: ~ Oct – Nov 2026.
- For now: [PDF file](#) with comparison of data sources, processing and evaluation results for EURADCLIM versions 1, 2 & 3.
- Data format will become **netCDF4 CF-1.8** (but with same coordinates & projection).
- Jupyter notebook will become available.
- One update per year, rerunning radar-gauge merging with newest ECA&D data over whole period + extension of EURADCLIM with 1 year.

EURADCLIM V4





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Thank you



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