

# Update on the EURADCLIM gauge-adjusted radar precipitation dataset

ID: 6

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EURADCLIM<sup>1</sup> is a publicly available climatological dataset of 1-h and 24-h precipitation accumulations covering 78% of geographical Europe at a 2-km grid. The current version 3 includes the period 2013–2023. The most severe outliers have been removed or substantially reduced in V3. EURADCLIM is based on the surface rain rate composites from the EUMETNET programme OPERA. Algorithms are applied to remove remaining non-meteorological echoes (clutter) as much as possible. The 1-h accumulations are merged with accumulations from potentially 9000 stations from the European Climate Assessment & Dataset<sup>2</sup> (ECA&D). EURADCLIM fills a gap in pan-European climatological precipitation datasets, since it combines the accuracy of rain gauges with the coverage of ground-based weather radars. Current work on EURADCLIM is funded through the Copernicus contract C3S2\_311\_bis.

## Datasets and processing

EURADCLIM V3 is publicly available at the KNMI Data Platform in ODIM-HDF5 format (<https://doi.org/10.21944/1rxx-ev62> & <https://doi.org/10.21944/hk1t-8p07>). Fig. 1 shows the coverage and availability for the radar and rain gauge data. Fig. 2 provides an overview of the processing. V3 changes with respect to V1 and V2:

- 15-min rain rates over  $150 \text{ mm h}^{-1}$  are deemed outliers and are set to  $0 \text{ mm h}^{-1}$ .
- More local weighting is applied for merging of radar and rain gauge data.
- The 1-h EURADCLIM accumulations are capped at 300 mm.
- Much better rain gauge coverage above Spain.
- Period: 2013–2023 instead of 2013–2020 (V1) or 2013–2022 (V2).

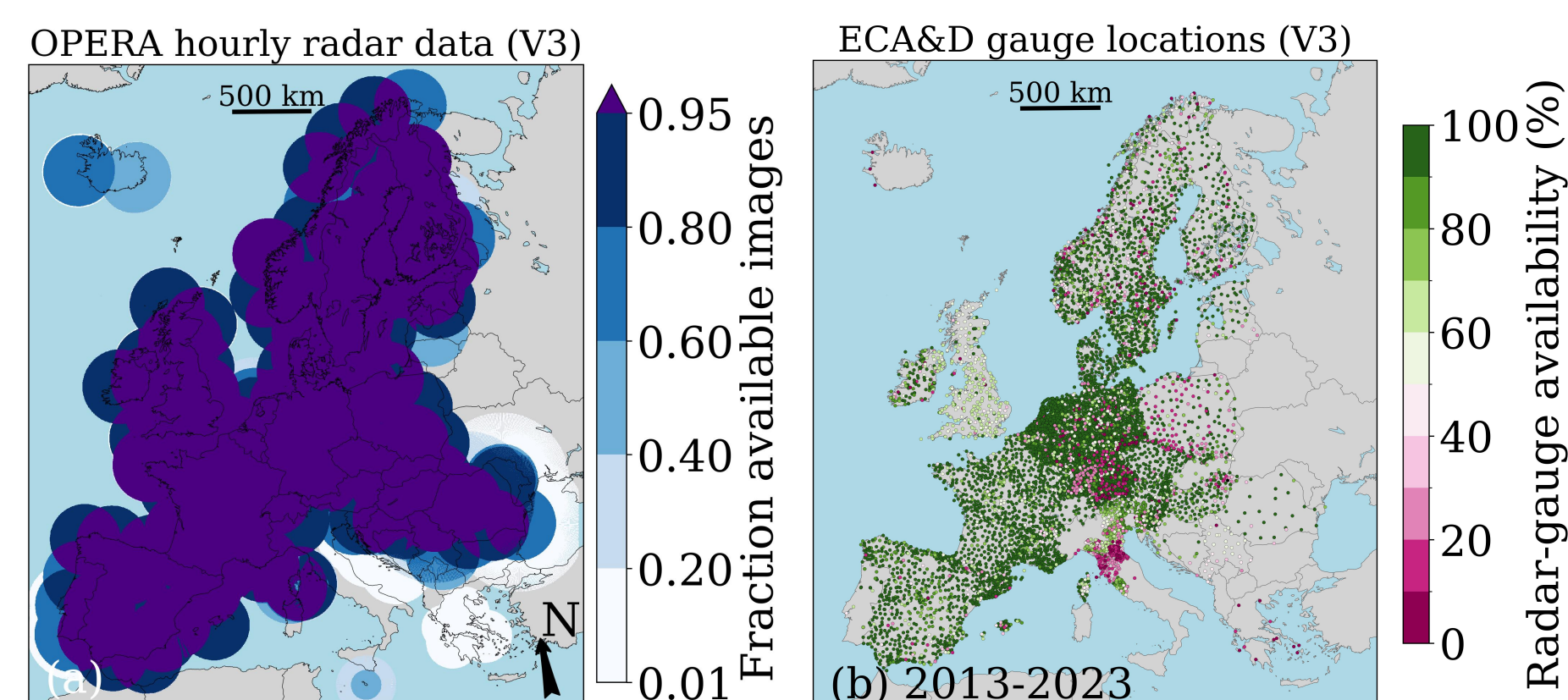


Figure 1: (a) Map of the OPERA domain with fraction of available radar composites. (b) Map with combined radar-gauge availability over the period 2013–2023. Maps made with Natural Earth. ©naturalearthdata.com.

## Evaluation

The scatter density plot (Fig. 3) gives an overview of the performance of EURADCLIM daily precipitation accumulations against rain gauges. Next, the performance for 1-h rainfall is investigated. Underestimation becomes generally larger and correlation lower for increasing gauge threshold values, but results improve for V3 with respect to V1 (Fig. 4).

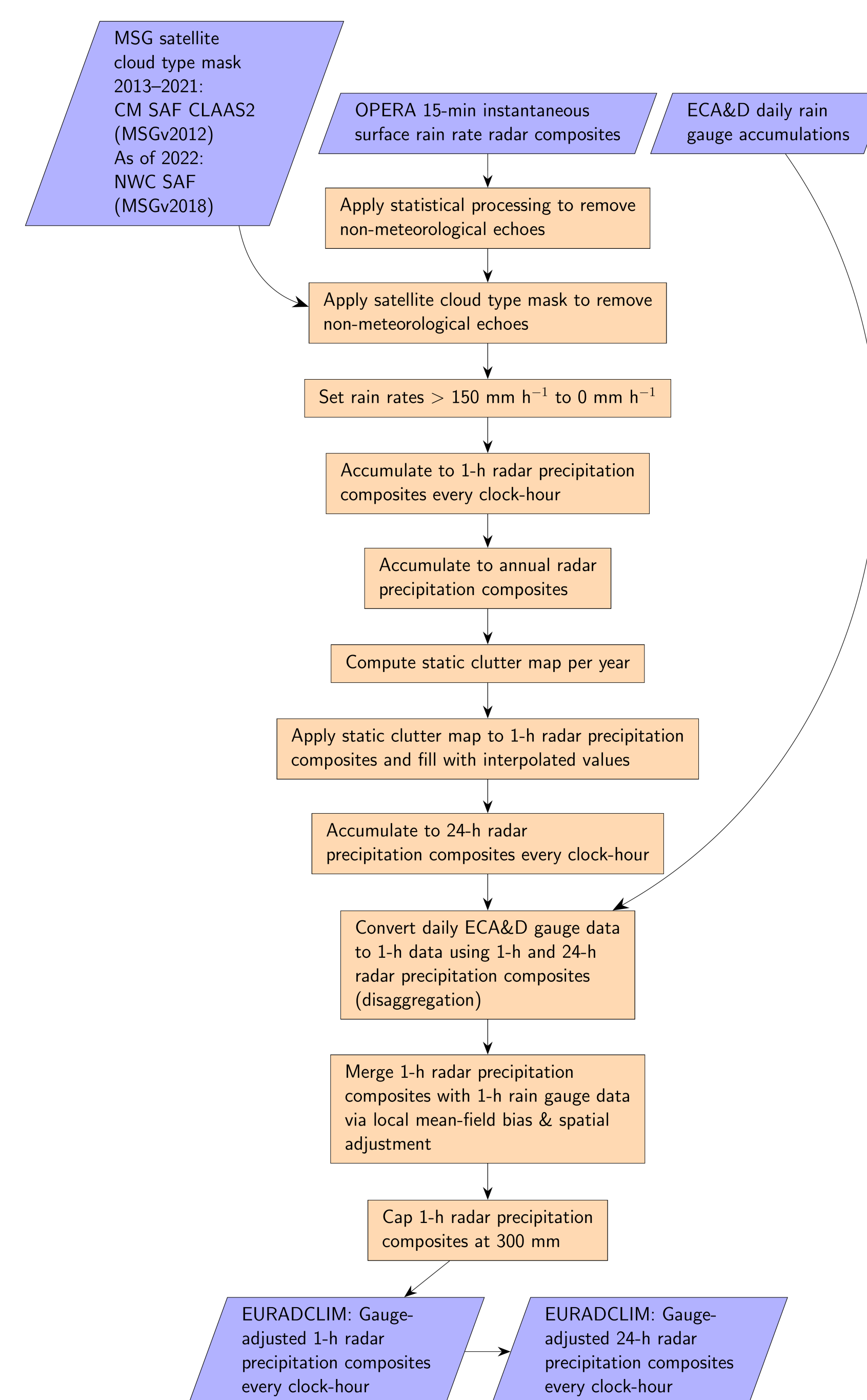


Figure 2: Flowchart of radar and gauge data processing for EURADCLIM version 3.

Finally, Fig. 5 shows the mean 1-h precipitation over 2013–2023 for the original OPERA data and for EURADCLIM. The gauge adjustment has resulted in much higher values for EURADCLIM, whereas at the same time many artifacts have been removed or reduced considerably. Hence, Fig. 5 shows the potential of EURADCLIM as pan-European precipitation climatology.

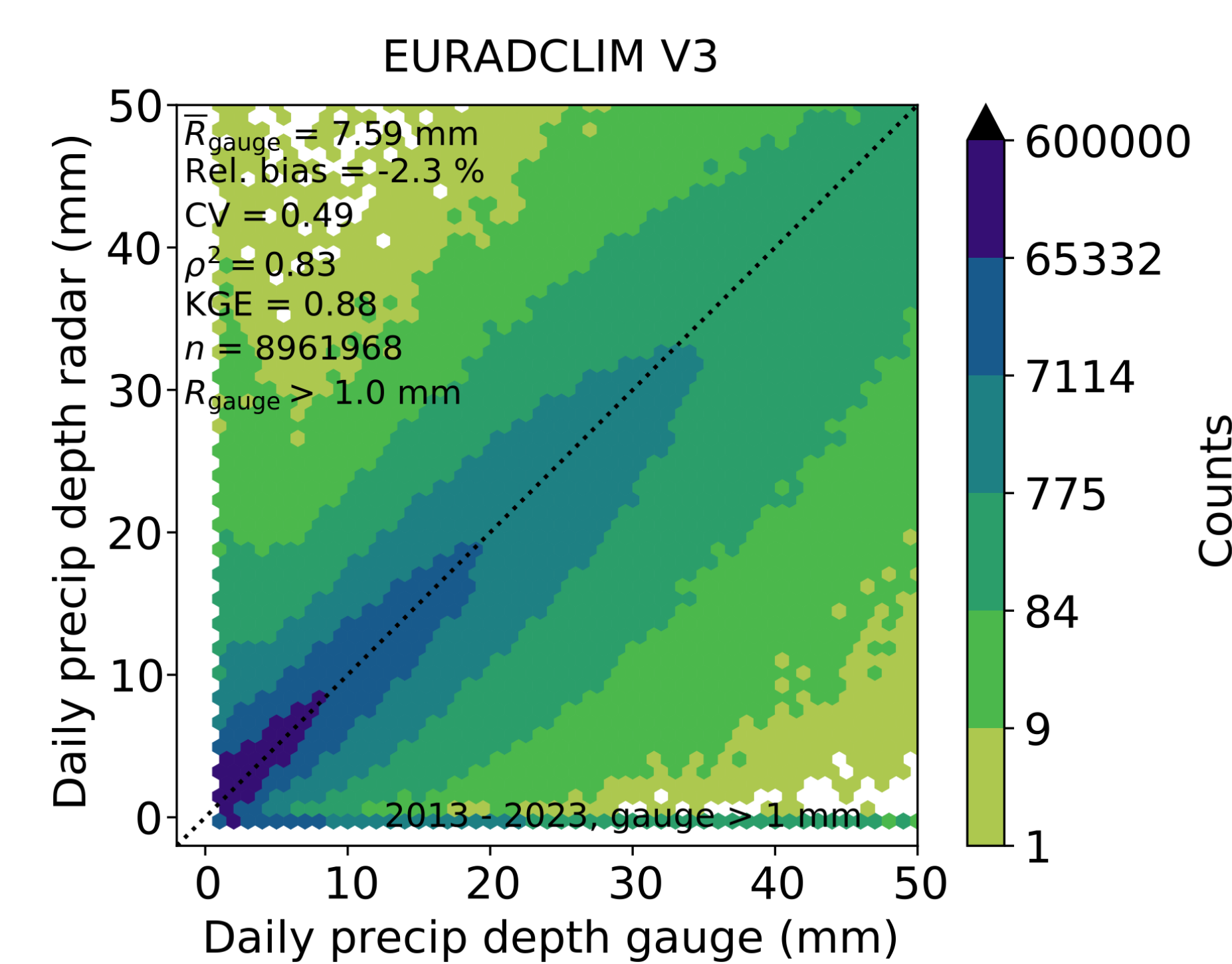


Figure 3: Scatter density plot of daily radar precipitation accumulations from EURADCLIM against rain gauges. Dependent verification.

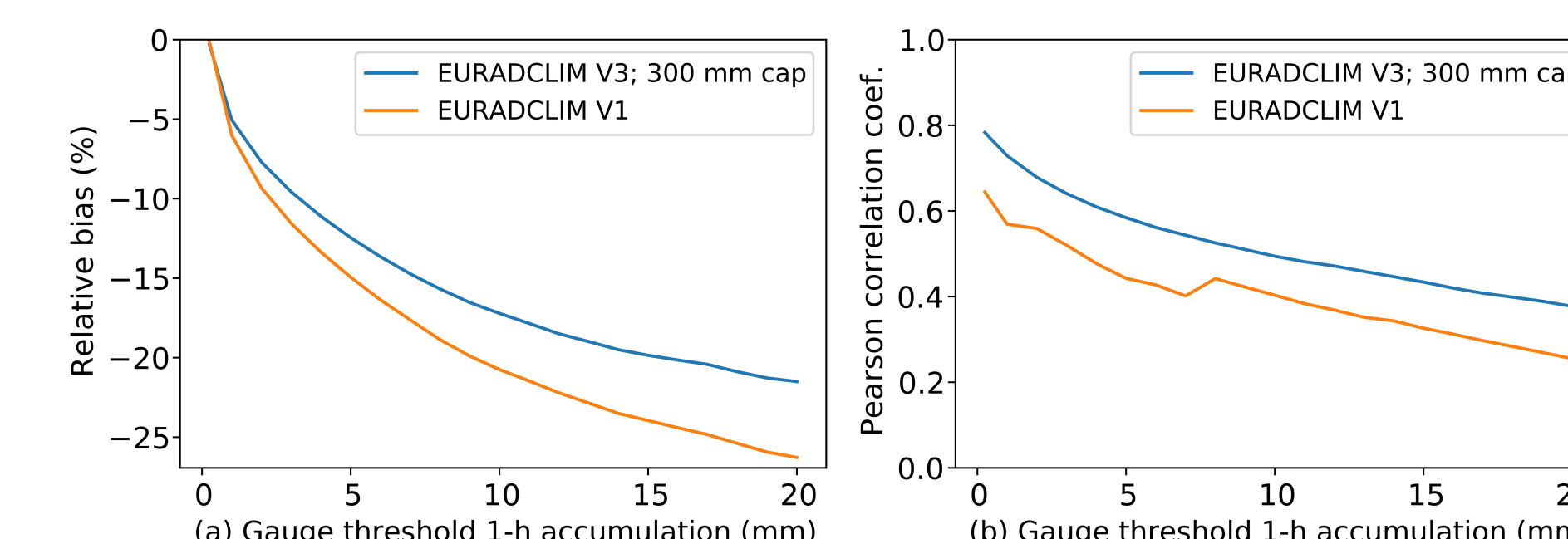


Figure 4: An independent (leave-one-out-statistics) evaluation of 1-h radar precipitation accumulations against the disaggregated rain gauge accumulations for EURADCLIM V1 (orange lines) and V3 (blue lines) for gauge threshold values ranging from 0.25 mm to 20 mm over the period 2013–2020.

A PDF file with extensive comparisons of data sources, processing and evaluation results for EURADCLIM versions 1, 2 & 3 can be found at KNMI's GitLab ([https://gitlab.com/KNMI-OSS/radar/datasets/-/tree/main/euradclim?ref\\_type=heads](https://gitlab.com/KNMI-OSS/radar/datasets/-/tree/main/euradclim?ref_type=heads)). EURADCLIM could serve as a reference dataset for precipitation estimates from opportunistic sensing. The ultimate goal would be to integrate it with data from opportunistic sensors.

## Outlook

- Version 3 data and documentation will also become available via the Copernicus Climate Data Store.
- Data format will change from ODIM-HDF5 to netCDF4 CF-1.8 (but with same coordinates & projection).
- Version 4 will employ the same methods as version 3, but will add the year 2024 and will rerun the merging with ECA&D rain gauge data that were downloaded mid-May 2026.
- Version 4 and later will only be available in the Climate Data Store.
- A Jupyter notebook will become available.
- Future research should focus on further reducing clutter.

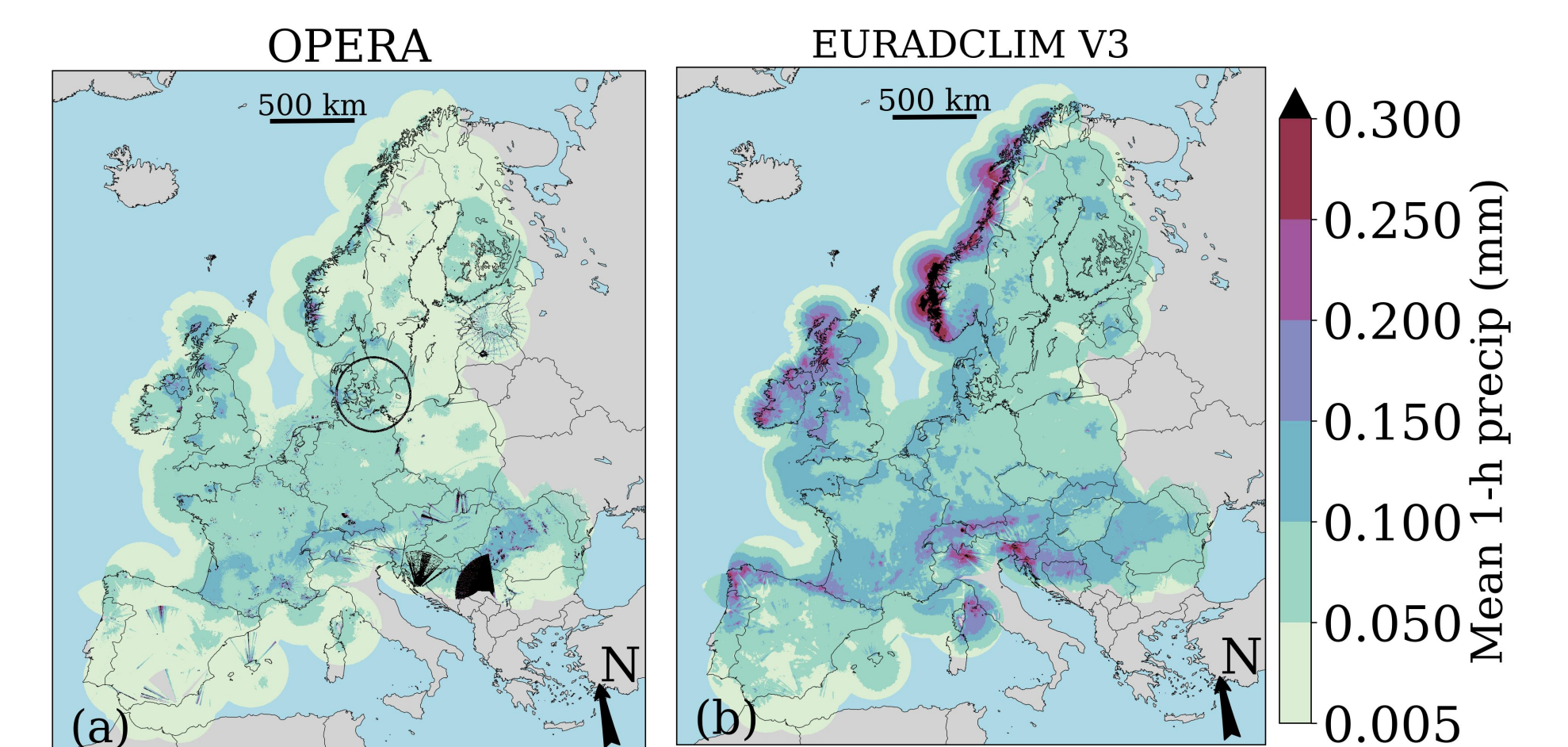


Figure 5: OPERA versus EURADCLIM version 3 showing the overall effect of methods to remove non-meteorological echoes and merging. (a)–(b) Map of mean hourly precipitation over the period 2013–2023. Maps made with Natural Earth. ©naturalearthdata.com.

## References

- Overeem A, van den Besselaar E, van der Schrier G, Meirink JF, van der Plas E, Leijnse H., 2023. EURADCLIM: the European climatological high-resolution gauge-adjusted radar precipitation dataset. *Earth Syst Sci Data*, 15, 1441–1464, <https://doi.org/10.5194/essd-15-1441-2023>.
- Klein Tank A, coauthors, 2002. Daily dataset of 20th-century surface air temperature and precipitation series for the European Climate Assessment. *Int J Climatol*, 22, 1441–1453, <https://doi.org/10.1002/joc.773>.

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