**RESEARCH ARTICLE**

How well modelled rainfall datasets represent observational point-rainfall climatologies?

Fatima M. Pillosu1,2, Florian Pappenberger2, Christel Prudhomme2,3,4, Elisabeth Stephens1,5,6, Hannah L. Cloke1,5,7,8

1 Department of Geography and Environmental Science, University of Reading, Reading, UK

2 Forecast Department, European Centre for Medium-range Weather Forecasts, Reading, UK

3 Department of Geography and Environment, University of Loughborough, Loughborough, UK

4 UK Centre for Ecology and Hydrology, Wallingford, United Kingdom

5 Department of Meteorology, University of Reading, Reading, UK

6 Red Cross Red Crescent Climate Centre, The Hague, The Netherlands

7 Department of Earth Sciences, Air, Water and Landscape Science, Uppsala University, Sweden

8 Centre of Natural Hazards and Disaster Science, CNDS, Sweden

**Correspondence:** Fatima M. Pillosu(fatima.pillosu@ecmwf.int)

**Abstract.**

**Keywords.**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Introduction

# Data

# Methods

# Results

ERA5-ecPoint provides the best representation of point rainfall climatologies than the other tested datasets. In all continents, ERA5-ecPoint is representative of the observation climatology in more than 95% of the locations (see pie charts in Figure 1d). Only in South-America the representation of point observational climatologies reaches only 75%. Lower resolution datasets, i.e. ERA5\_EDA (Figure 1a), ERA5 (Figure 1b), and Reforecast\_46r1 (Figure 1c), reach a smaller percentage of representativeness. Overall, the worst representations are over the Americas and Asia with less than 25% of representativeness of observational climatologies. Over Europe and Africa, the representativeness improves for higher resolution datasets (ERA5\_EDA < ERA5 < Reforecast\_46r1). Australia is an outlier as the three lower-resolution datasets represent the point observational climatologies in at least 95% of the locations with the exception of the north and east coast. ERA5-ecPoint improves the representation at those locations. Figure 2 shows the comparison of the cumulative distribution functions for the observed (dotted line) and modelled climatologies (solid lines).

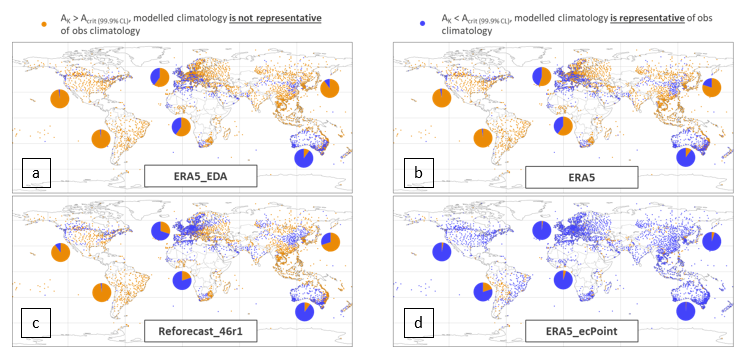


Figure – Values of the Anderson-Darling statistic (Ak) for (a) ERA5-EDA, (b) ERA5, (c) Reforecasts\_46r1, and (d) ERA5\_ecPoint. The locations where Ak is greater than the critical value of the Anderson-Darling statistic (Acrit) are coloured in orange; they are coloured in blue otherwise.

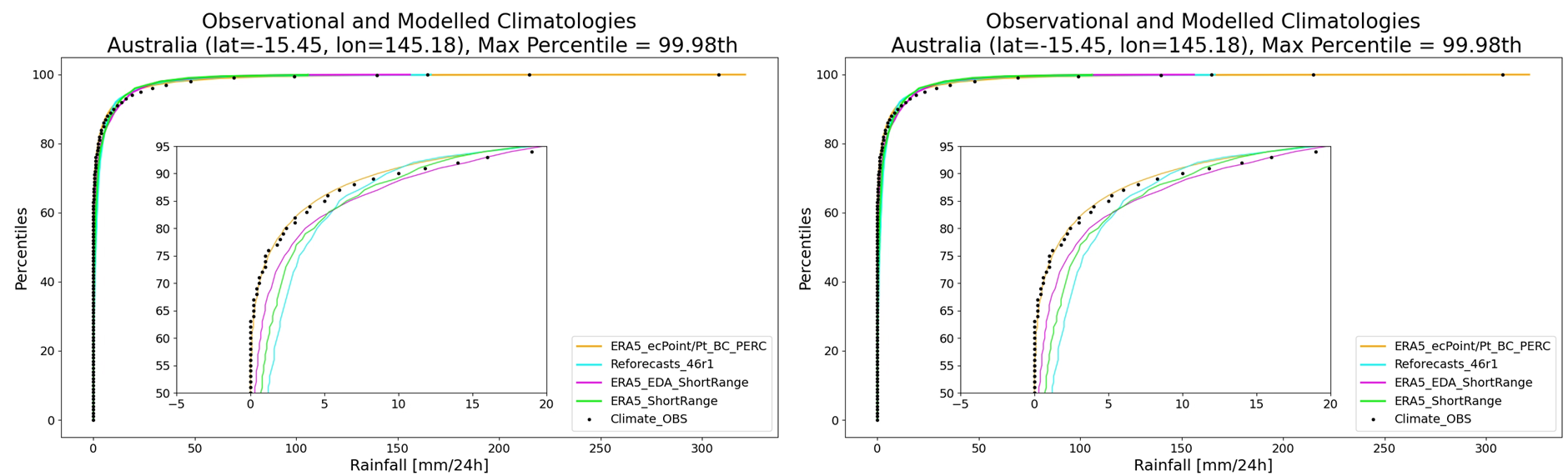


Figure 2 – Cumulative distribution functions (CDF) for the 24-hourly rainfall climatologies Observational climatology is represented with a dotted line, while modelled climatologies are represented with coloured solid lines (ERA5\_EDA in green, ERA5 in pink, Reforecast\_46r1 in cyan, and ERA5-ecPoint in orange). Panel (a) represents CDFs for a location in Europe; panel (b) for Australia.

# Discussions

# Conclusions

# References