

# Homogenisation of Swedish monthly precipitation from 1880

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## Background

In the late 19<sup>th</sup> century the backbone of the current Swedish precipitation observation stations was set up. As the standard measurement equipment, observation method and sites have changed over the decades, the homogeneity of the observational time series should be tested in order to draw climatological conclusions from the observational data set. If the time series are found to be inhomogeneous, the data set should be homogenised.

## Method

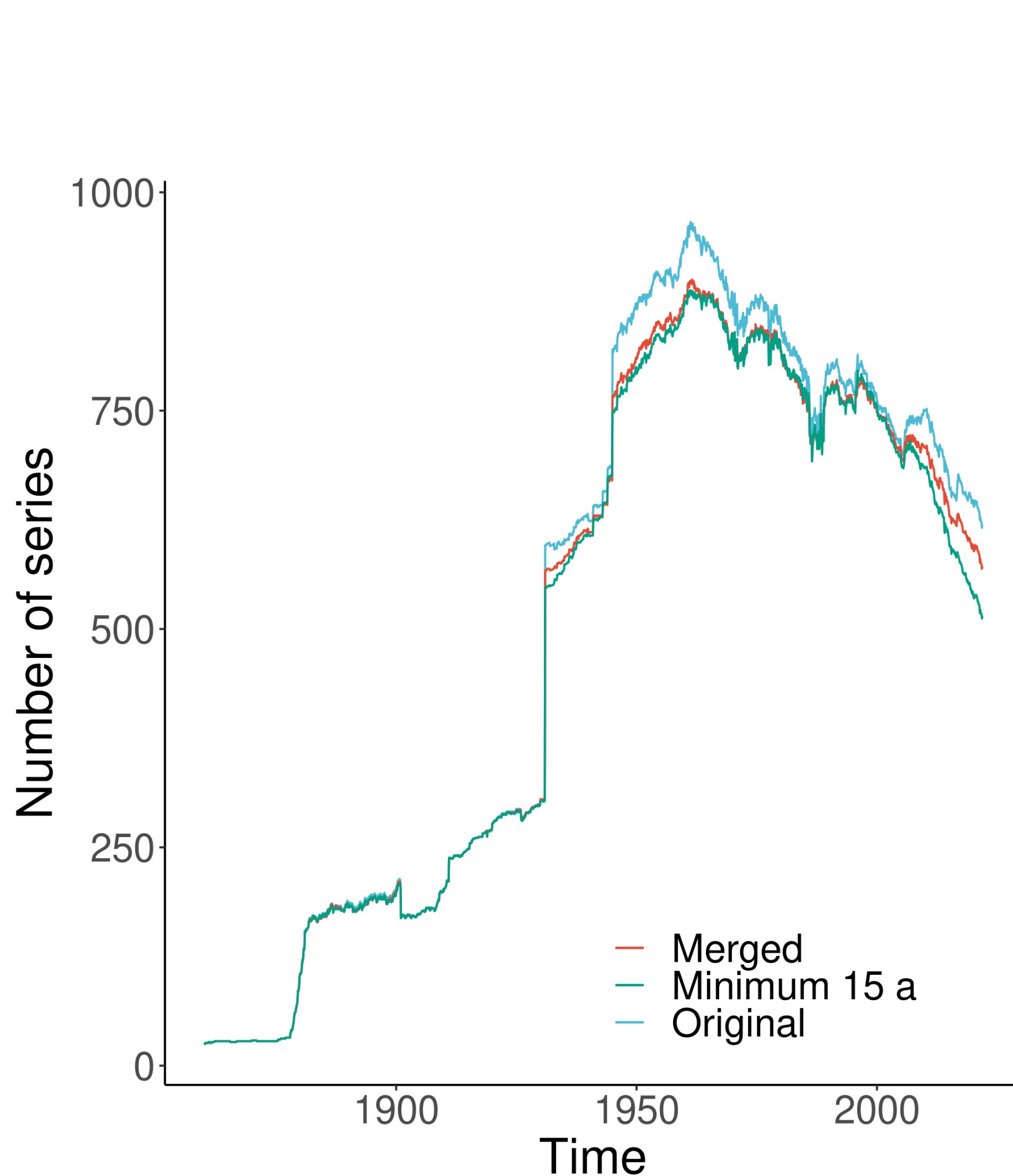
Recently, the Swedish monthly temperature time series was automatically merged and homogenised (Joelsson 2022, Joelsson et al. 2023). A novel merging script and an automated version of HOMER called Bart (Joelsson et al. 2022) were used.

HOMER has previously been used to homogenise the Irish (Noone et al. 2015, Coll et al. 2018), Belgian (Bertrand et al. 2021), and Iberian (Prohom et al. 2015) monthly precipitation observational records.

As a first attempt, the Swedish monthly precipitation records will be automatically merged and homogenised with HOMER-Bart and Climatol.

## Data

There are 2 113 time series of monthly precipitation sums in Swedish Meteorological and Hydrological Institutes (SMHI) digital database. A part of the physical archives still remains to be digitalised. In 1880 there are about 100 time series available. In the beginning of the 1960's the number of available time series has increased to almost 970, see Figure 1. Less than 25 % of the time series are longer than 60 years.



**Figure 1:** The number of time series with data in the months from January 1880 to December 2022.

## Preliminary results — Merging

Data from 1 821 of the total 2 113 stations are preliminary merged into 1 235 time series, see Figures 1 and 2. HOMER cannot use time series shorter than 15 years. The largest dataset that can be used without merging, represented in the figure as the “Minimum 15 a”-line, includes 1 525 time series.

The merging decreases the total share of missing data 1880–2022 from 68 % in the “Minimum 15 a”-dataset to 60 % in the merged data set.

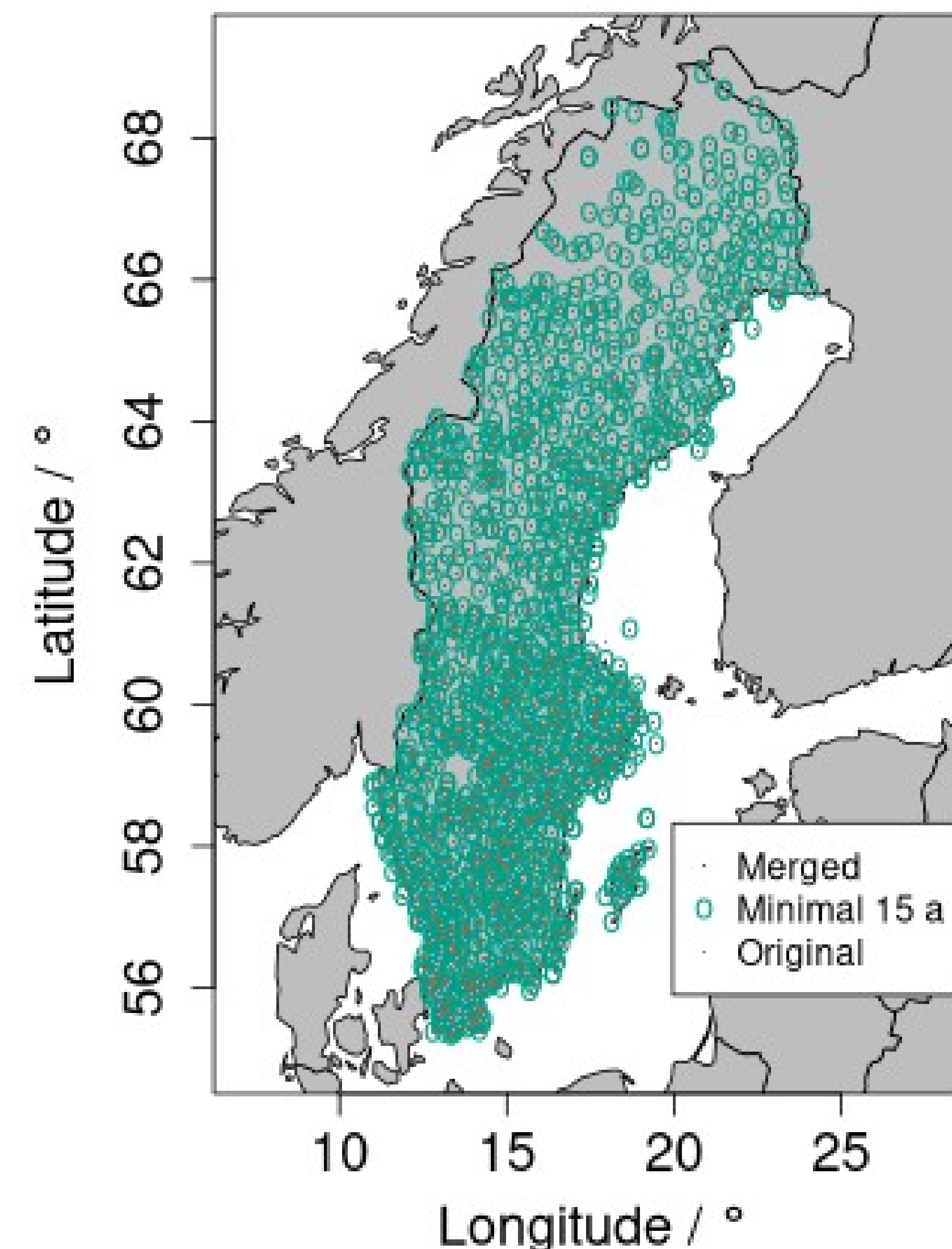
The number of series with at least 60 years of data is increased from 478 in the original data set to 607 series in merged data set, see Figure 3.

## OUTLOOK

Possible wind corrections and corrections regarding missing small precipitation sums in the 19<sup>th</sup> century will be evaluated and potentially be applied to the data set.

The merged monthly precipitation data set will be homogenised with HOMER/Bart and Climatol.

The first application of the selected final data set will be SMHI's precipitation climate indicator.



**Figure 2:** Map over stations included in the data sets

## References

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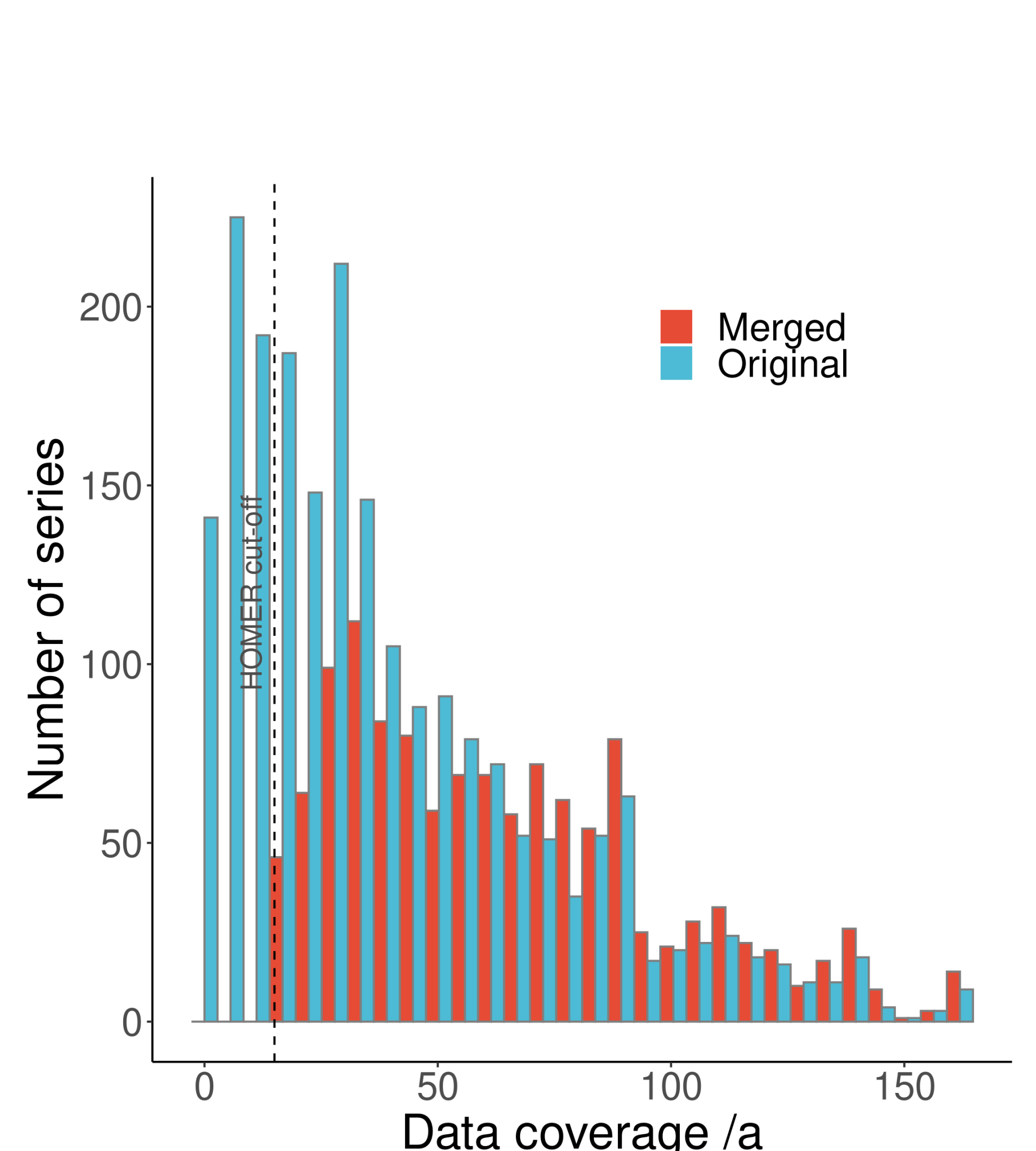
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**Figure 3:** Histogram of the data coverage in the time series.