



## **Reconstructing Temperature Climatology in The Netherlands using observations and Principle Component Analysis**

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### **Abstract**

High-resolution, regularly-gridded temperature maps are frequently used in various scientific fields. Within the Netherlands the spatial density of the automatic weather stations (AWS) is insufficient for this purpose. This study establishes a daily temperature reconstruction for the period 1990-2017 by combining information from the 34 AWS and the numerical weather prediction model HARMONIE. In order to explain spatial variations and reduce the size and noise of the HARMONIE data set, a Principle Component Analysis (PCA) was performed. The first four Principle Components (PCs) explain approximately 92% of the variance. A daily temperature reconstruction was made using a kriging and machine-learning approach. Models using information from AWS and PCs show a significant decrease in R2 and RMSE compared to an AWS only approach. Conclusively, cities, elevated and coastal areas can be distinguished from the temperature grid.

Temperature, Observations, PCA, Climatology, Spatial Prediction