



HOMPRA Europe

HOMogenized Precipitation Analysis of European in-situ data

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Meaning of homogenous/ inhomogenous









Overview

Meaning of homogenous/ inhomogenous

- → Causes of inhomogenous time series
- ➔ Impact on climate analyses
- Data base
- Homogenization
 - → Overview
 - ➔ Homogenization course
- HOMPRA







Table: Effect of modifications on different climate variables (Beaulieu, 2009)

Type of change	T _{mean}	T _{min,max}	Prectot	Pres	Hum	n ^v dir	Vforce	
Instrumentation Instrument height Exposition Observation time Calculation method Relocation Environment Observer	- + + + + + + + + + +	+ + ++ - - ++++ + -	+ + ++++ - - ++++ + -	- +++ - - - - -	++ + + + + + -	- + ++ - - ++ + -	++ ++ ++ + + +++ + +	
- no major p + some inhor ++ important +++ very impor	no major problems some inhomogeneities important breaks very important breaks		Average temperature Minimum temperature Maximum temperature Precipitation			Pres P Hum H ^V dir ^V ^V force V	Air pressure Humidity Wind direction Wind force	







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The wind-induced error, which can be on average **2%-10% for rain** and **10%-50% for snow**, is the most important of systematic error. (Sevruk, 1985)



Figure: Computed trajectories of water drops (Nešpor and Sevruk, 1999)





Objective of monthly homogenization: trend correction









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Data base









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Homogenization course









Homogenization course: Detection



Investigation of difference series

Log-likelihood

→Best break-point position for each number of breaks

Penalty term

→Number of breaks







Homogenization course: Correction



1)Binary coding of the series

2)Multiple linear regression over homogeneous segments

3)Regressioncoefficients indicate break amplitude

x Standarized monthly series

Detected breaks







Homogenization course: Correction



- 1)Binary coding of the series
- 2)Multiple linear regression over homogeneous segments
- 3)Regressioncoefficients indicate break amplitude

Monthly regression parameter

 Segment regression parameter







3.) Verification

Especially important due to automatization not all series can be controlled manually

Usually testing on independent data

Artificial data

- Sensitivity study
 - \rightarrow Variation of reference series
- Suspicious series are controlled manually







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Deutscher Wetterdienst

Wetter und Klima aus einer Hand















Braemar

Braemar - May

Summary and next steps

- \rightarrow Development of automatic algorithm
 - \rightarrow Allows for homogenization of large data sets
- \rightarrow Homogenization of European GPCC data set

Summary and next steps

- \rightarrow Development of automatic algorithm
 - \rightarrow Allows for homogenization of large data sets
- \rightarrow Homogenization of European GPCC data set

- Checking of suspicious series
- \rightarrow Comparison with other homogenized data sets

DWD

Thank you for your attention!

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