



# COST-ES0601 WG 2-4 meeting, Palma de Mallorca, 26<sup>th</sup> Jan 2010

## Practical Recommendations

Ingeborg Auer

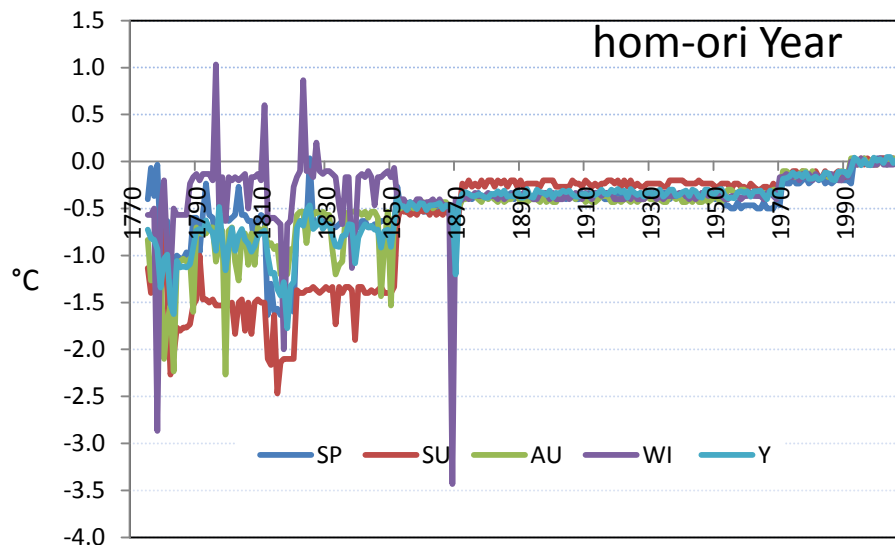
Zentralanstalt für Meteorologie und Geodynamik, Wien, Austria

Vienna 1775- 2009

235 years long

(nearly) complete on daily  
time scale

**However: homogeneity  
problems**



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# What to do- what has been recommended before?

Budapest, 1996 (selection)

- ✓ to use only homogeneity tested (homogenized) series for climate change studies
- ✓ archive (store) the original data (measured or observed)
- ✓ parallel measurements before introduction of new instrumentation
- ✓ Applied hom-methods are part of metadata
- ✓ use of relative methods, absolute ones only in exceptional cases
- ✓ need to develop further methods (multiple change point detection, trends)
- ✓ Methodologies for the constitution of reference series
- ✓ other elements than t or precip, derived elements – monthly
- ✓ use of metadata, metadata “rescue”-projects by NMSs
- ✓ WMO should provide assistance and support to homogenization issues
- ✓ need to catalog methods



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# what has been recommended before, cont?

Budapest, 1998

- ✓ homogenization is part of database building
- ✓ To make homogenized time series available
- ✓ up to now it is not possible to recommend a special method
- ✓ methods must satisfy climatological & mathematical presumptions

Budapest 2000, ????

Budapest, 2003

- ✓ user-friendly versions of appropriate software
- ✓ methods for dailies to be developed



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# what has been recommended before?

2005: A new instrumental precipitation dataset in the greater alpine region for the period 1800-2002, IJC, 25/2 139-166: Auer I, ..... **Mestre O, Szentimrey T,**

- the choice of any one specific homogeneity test is of minor importance (HOCLIS consisted of CRADDOCK test, the MASH test and the SNHT)
- 1. Ignore any previous homogeneity work undertaken for any of the series (i.e. start from the beginning, assuming all series contain potential breaks).

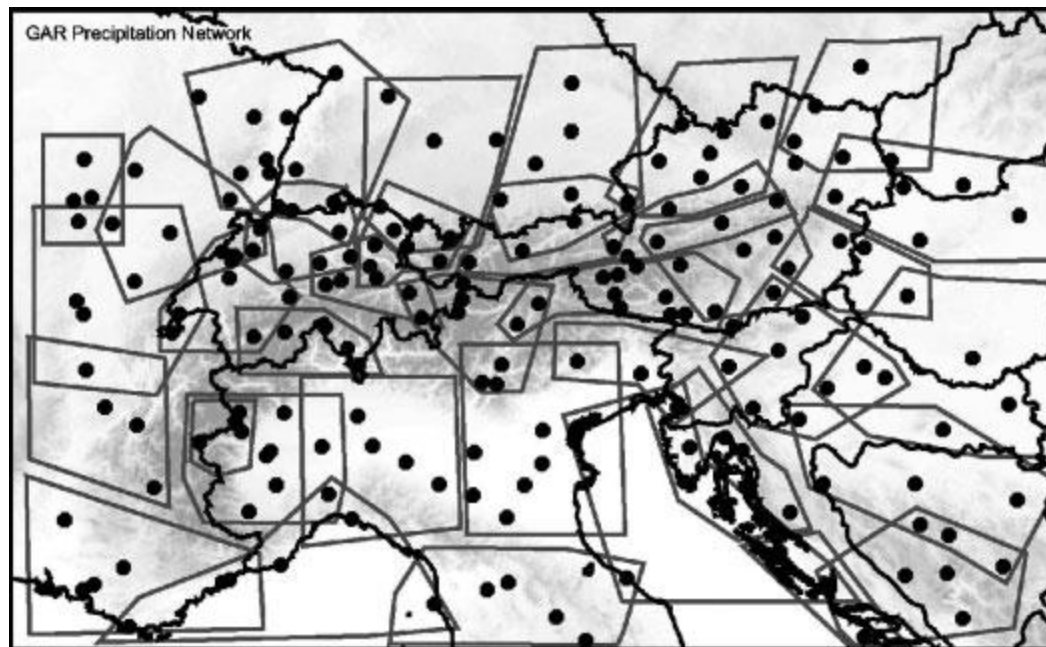


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# what has been recommended before?

2. Test in small, well-correlated subregions (a maximum of 10 series tested against each other results in a  $10 \times 10$  decision matrix, which enables most breaks detected to be assigned to a most likely candidate series).



The precipitation network in the GAR (dots) with the subregions for regionally independent homogeneity testing and adjustment



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# what has been recommended before?

3. Choose the most appropriate reference series with a non-affected subinterval for the adjustment of each break detected (i.e. different reference series can be used for each break detected in a candidate series).

(4. Avoid erratic monthly precipitation adjustments by smoothing the annual course of adjustment factors.)

5. Detect outliers and 'overshooting adjustments' using spatial comparisons (by mapping precipitation values both in absolute and relative units) for each month of the study period.

6. Attempt to determine support for homogeneity adjustments when few metadata are available (i.e. contact data providers for more information in difficult cases).

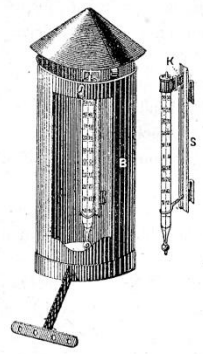
7. Give preference to good metadata rather than mathematical methods in all cases, especially where adjustment factors can be calculated directly from sufficiently long series of parallel measurements



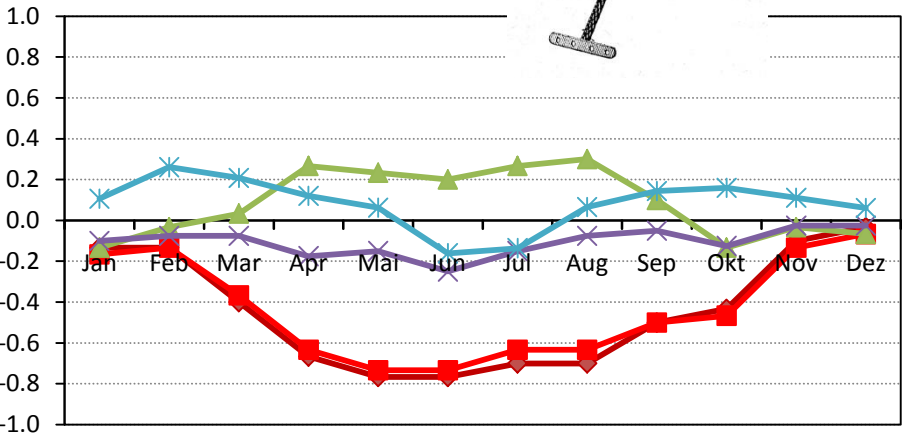
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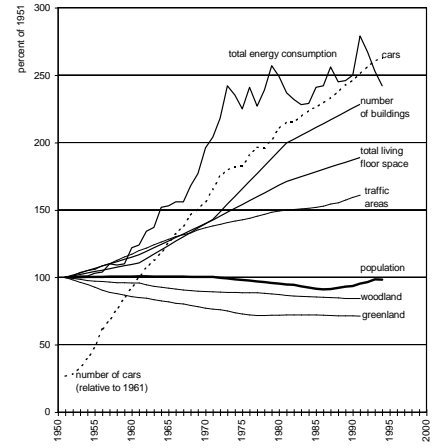
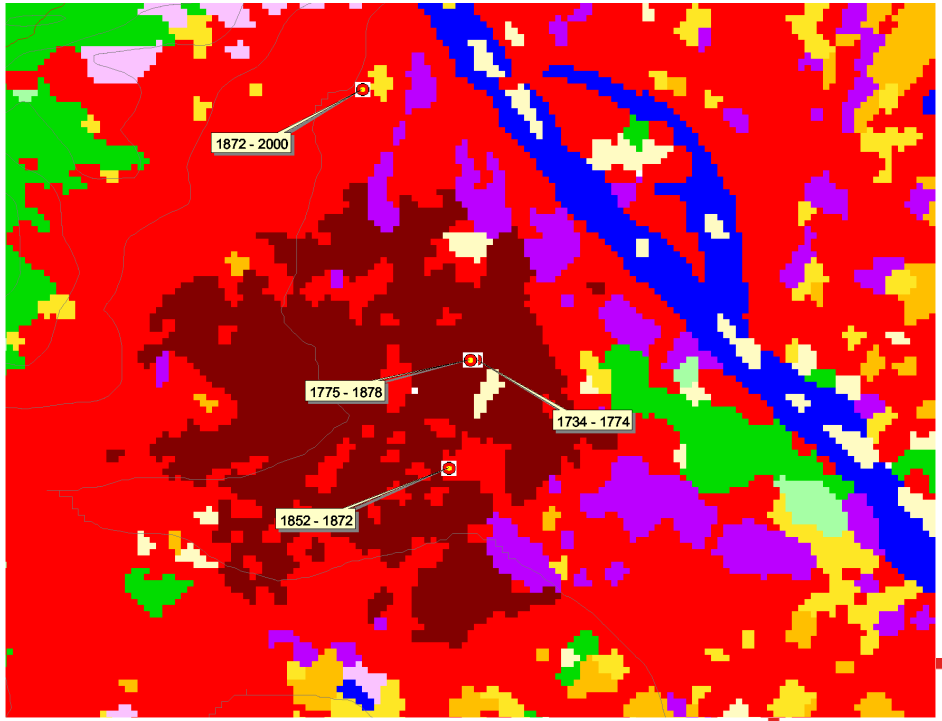
today?



Search intensively for metadata and use them when homogenizing



- ◆ 8,15, 22
- 8, 14, 22
- ▲ 6, 14, 22
- ✕ KÄMTZ
- ✱ (7+19+MAX+MIN)/4



etc.

# Resulting Practical Recommendations

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## General recommendations

- Search intensively for metadata and use them when homogenizing
- Archive (store) the original data
- Document your homogenization (metadata)



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# Resulting Practical Recommendations

## COST HOME specific recommendations

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1. Apply the procedures recommended by COST –HOME ES0601 and make use of the software provided by COST ES0601
2. start always with quality controlled data
3. assume each series may contain multiple breaks,
4. Test together well-correlated series in climatologically coherent regions,
5. Include metadata knowledge to precise your breakpoints and/or to justify your decisions
6. If adjustment factors can be calculated directly from sufficiently long series of parallel measurements use them
7. Check your results with respect to outliers that might have been produced by homogenization
8. Consider the uncertainty of your adjustments
9. For climatological analyses consider that you are working with homogenized data
10. Training you shall follow



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