

WMO Consultation on climate data homogenization

Use case from: *Regional Climate Center for the Southern South American Region (RCC-SSA)*

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Date: 17/10/2025

Homogenization: data processes, products and services

Data processes

Variables

- ✓ Tmin, Tmax, Tmean and SWS.
- ✓ Daily series undergo QA/QC, but breakpoint detection/adjustment is done on monthly aggregates

Data

- ✓ Station observations
- ✓ Station metadata
- ✓ ERA5 reanalysis (Hersbach et al., 2020) for SWS

No developments in products and services yet.

Methods & tools

- ✓ *Climatol* v4.1.0 R package (Guijarro, 2024)
- ✓ Detection and adjustment of breakpoints using neighboring series
- ✓ Parameter choices guided by published “Operational homogenization of daily climate series in Spain: experiences with different variables” (Lorenzo et al, 2024)

People involved

- ✓ 4 staff from the Climatology Department of the National Meteorological Service of Argentina

Homogenization: projects, needs and issues

Projects

- ✓ ENANDES+ Project
- ✓ Spatio-temporal variability analysis of SWS in Argentina from homogenized observations

Needs

- ✓ More observations
- ✓ More metadata
- ✓ More people involved in this process, specially from all the countries of the domain of CRC-SAS

Issues

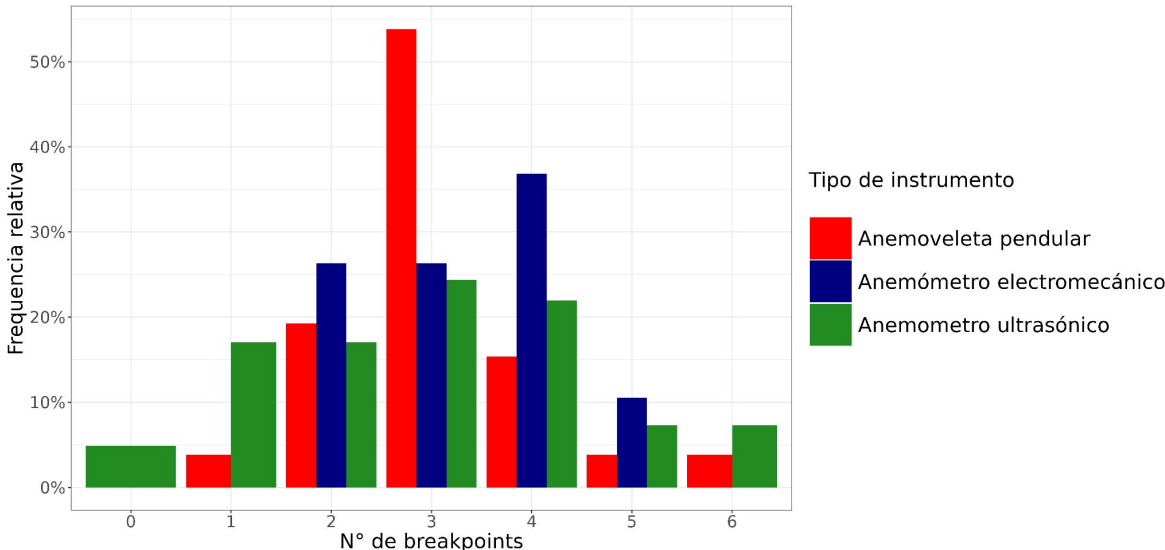
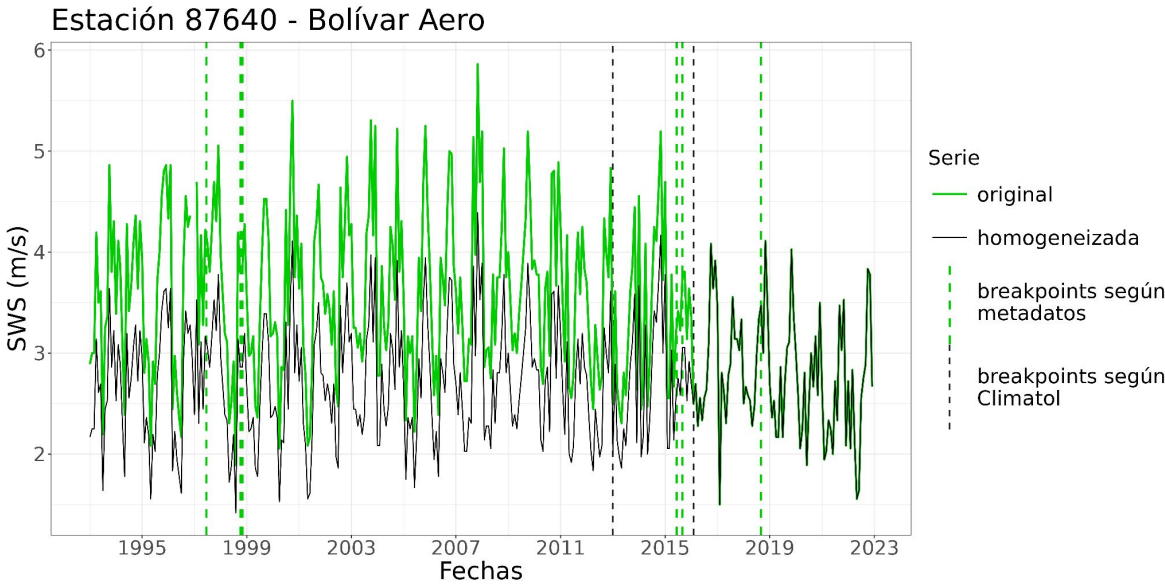
- ✓ Series derived from 3 or 4 hourly observation times
- ✓ Changes in instrumentation not always documented
- ✓ Instrumentation issues that are difficult to resolve
- ✓ Problems with observers
- ✓ Not all the people use R

Homogenization: some results

SWS

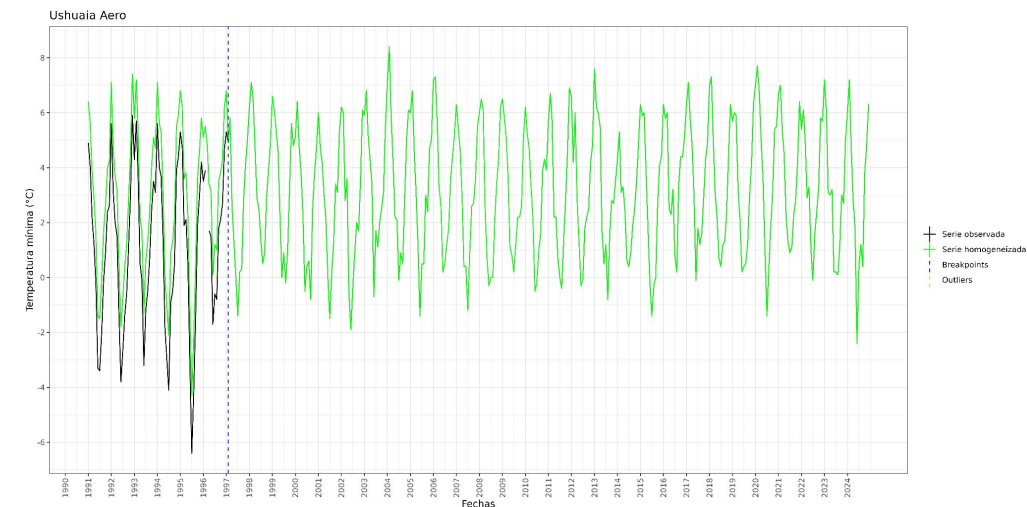
Tabla 2.4. Cantidad de estaciones analizadas y de breakpoints encontrados en las series mensuales de la SWS derivadas de 3, 4 y 24 observaciones horarias. Se consideraron tres periodos: 1961-2022, 1993-2022 y 2013-2022.

Series derivadas de	Período		
	1961-2022	1993-2022	2013-2022
3 observaciones horarias	- 368 breakpoints - 51 estaciones	- 263 breakpoints - 86 estaciones	- 79 breakpoints - 105 estaciones
4 observaciones horarias	- 84 breakpoints - 13 estaciones	- 129 breakpoints - 45 estaciones	- 41 breakpoints - 60 estaciones
24 observaciones horarias	- 0 estaciones	- 34 breakpoints - 12 estaciones	- 33 breakpoints - 50 estaciones



Homogenization: some results

Tmin



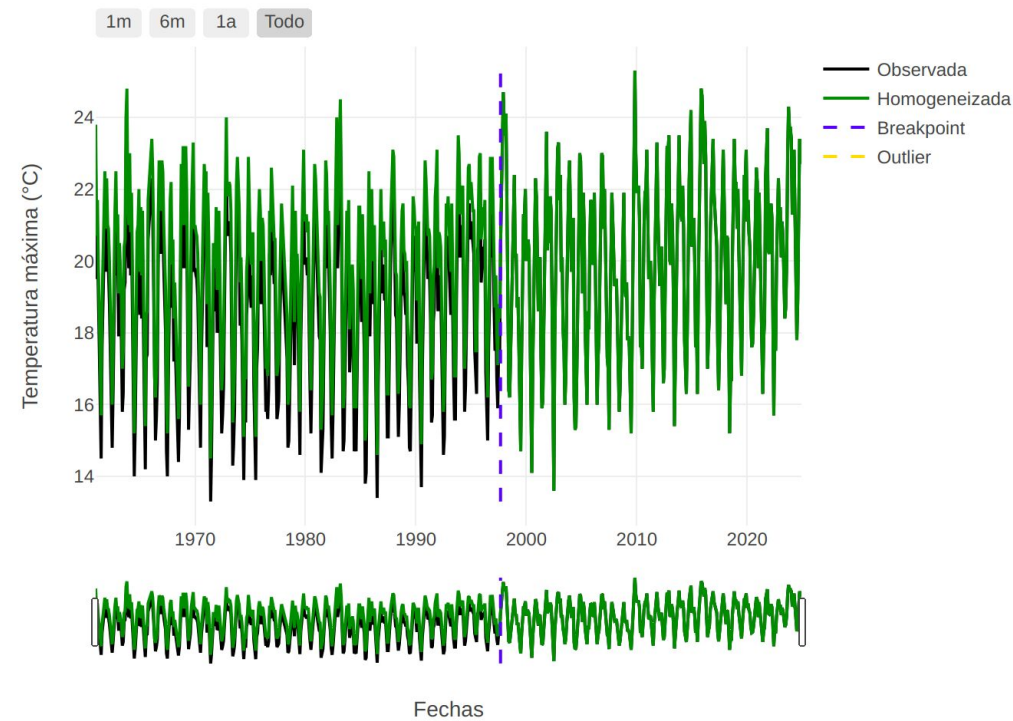
Tmax

Homogeneización temperatura

2025-08-26

Temperatura máxima:

Estación La Quiaca Obs.



References

- ✓ Guijarro, J. A. (2024). climatol: Climate Tools (Series Homogenization and Derived Products). R package version 4.1.0, <https://CRAN.R-project.org/package=climatol>.
- ✓ Hersbach, H., Bell, B., Berrisford, P., Hirahara, S., Horányi, A., Muñoz-Sabater, J., ... & Thépaut, J. N. (2020). The ERA5 global reanalysis. Quarterly journal of the royal meteorological society, 146(730), 1999-2049.
- ✓ Lorenzo, B., Guijarro, J. A., Chazarra, A., Rodríguez-Ballesteros, C., Moreno, J. V., Romero-Fresneda, R., ... & Morata, A. (2024). Operational homogenization of daily climate series in Spain: experiences with different variables. Idöjárás, 128(2).

Thank you

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