

Community Comment on Rosales et al. (2026)

The water balance quagmire: a zoom out to close in on climate forcing biases

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Two diagnostic checks are needed before attributing the extracted low-frequency field to forcing bias: independence of the elevation diagnostic; invariance to spatially structured temporal support.

1. Elevation enters both extraction and diagnosis

- Section 2.5: the TPS is three-dimensional; horizontal coordinates and elevation are inputs to the interpolation.
- Sections 2.6 and 3.3 / Fig. 6: the relation between $\Delta\text{IWB}^{\text{MS}}$ and elevation is then used to assess H-0 and to delimit the λTPS interval.
- Therefore, the elevation relation is not fully external to the extraction procedure. This does not imply that a positive elevation slope is imposed by construction.
- Report the coordinate system and the actual fields: Tps scaling options. In fields v17.3, Tps() defaults to scale.type = "range"; each predictor dimension is mapped to [0,1] unless overridden.

Requested ablation

- Repeat the TPS with horizontal coordinates only; same gauges; same λTPS grid.
- Recompute the Fig. 6 slopes, R^2 , regional means, and the λTPS interval selected from those diagnostics.
- Report the 2D-versus-3D change. Persistence under the 2D fit would show that the elevation structure is present without supplying elevation to the interpolator; attenuation would quantify dependence on the 3D interpolation geometry.
- Fig. 7 provides a separate lowland test using solid-precipitation fraction. It does not resolve the independence issue specific to Fig. 6.

2. Heterogeneous temporal support can alias into the low-frequency spatial field

- Data availability states that the supplement lists the years used to compute water-balance closure. The supplied table contains 3,614 gauges and valid-year indicators from 1985 to 2020, with heterogeneous temporal coverage.
- Section 4.3.3 already identifies non-stationarity, averaging-period sensitivity, and possible consequences for the unnesting procedure.
- Gauge providers and countries are spatially grouped. Window length and window timing can therefore also be spatially grouped.
- H-0 assigns low-frequency spatial structure preferentially to forcing bias. A period-dependent anomaly with spatially grouped observation windows can project into the same low-frequency component.
- Appendix D rescales nested catchments through the Turc-Mezentsev model. This treats the nested-pair problem but does not establish invariance of the final mesoscale field to temporal support.

Requested sensitivity test

- Map, for retained gauges, number of valid years plus temporal centroid or start/end years.
- Test their association with ΔIWB and $\Delta\text{IWB}^{\text{MS}}$.

- Repeat the mesoscale analysis on a shared multi-decadal window, or on a matched-window subset. The supplied table contains 2,133 gauges with complete 1990–2015 coverage; use this or another interval only if spatial coverage remains adequate.
- Compare the principal Fig. 3 spatial structures and Fig. 6 diagnostics against the main analysis.
- No artefact is asserted here. The requested test is intended to exclude spatio-temporal aliasing.

3. Marginal consistency points

Harmonize the sample counts and time bounds. The abstract gives 3,641 catchments; the ENTWASH text/supplement gives 3,614; the final mesoscale selection gives 3,567. The abstract gives 1984–2024; Appendix D defines validity over 1984–2025; Eq. D4 describes a 1985–2024 reference period; the following text defines QIM_ref over 1984–2025; the supplement provides only valid_1985 to valid_2020. Data availability also calls the supplement the final station/year list; specify which processing stage it represents. Appendix D states $V_j = 1$ for a valid year and $V_j = 0$ otherwise; the second value should presumably be 0. Supplement readme: “AUSRIA” should be “AUSTRIA”.

Software note: fields 17.3 manual, Tps(), CRAN, 2026-05-05: default scale.type = "range". <https://cran.r-project.org/web/packages/fields/fields.pdf>