



Supplement of

Benchmarking convection-permitting climate simulations for hydrometeorological characterizations: a comparative study of WRF-SAAG and observation-based products in Chile

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This document presents supplementary results to the paper entitled “Benchmarking convection-permitting climate simulations for hydrometeorological characterizations: A comparative study of WRF-SAAG and observation-based products in Chile.” The figures included here provide additional details on the evaluation of precipitation and temperature products across continental Chile for the period April 2001–March 2018, using ground-based observations as the reference dataset.

- 5 Specifically, the supplementary material includes seasonal and annual assessments of model performance using modification of the Kling-Gupta efficiency (KGE; Gupta et al., 2009) proposed by Tang et al. (2021) (KGE_T) and its components: correlation (r), bias ratio (β_T), and variability ratio (α_T). Spatial distributions and macrozone-based summaries are presented for precipitation and temperature variables. Additionally, maps of mean bias are provided for daily precipitation as well as daily minimum and maximum temperatures.

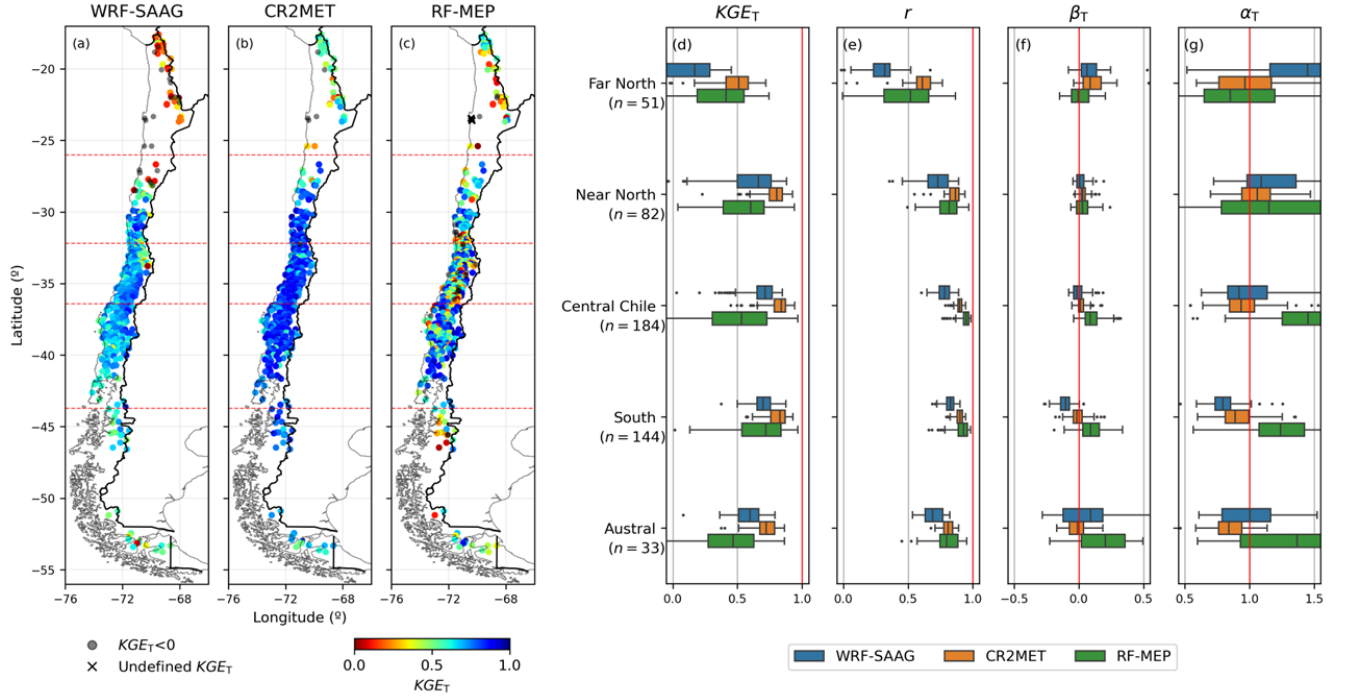


Figure S1. (a)–(c) Spatial distribution of Tang’s Kling-Gupta Efficiencies (KGE_T) for autumn (MAM) daily precipitation retrieved from WRF-SAAG, CR2MET, and RF-MEP (period April/2001–March/2018) across continental Chile, using ground-based observations as the reference. Red dashed lines indicate the limits of the macrozones analyzed. (d) to (g) boxplots with KGE_T , the Pearson correlation coefficients (r), bias term (β_T), and variability ratios of Tang’s Kling-Gupta Efficiency (α_T) obtained with the products examined for each macrozone, with the red line indicating the optimal value. Each boxplot comprises results for all the stations within a specific macrozone. The boxes correspond to the interquartile range (IQR, i.e., 25th and 75th percentiles); the vertical line in each box is the median, and the whiskers extend to the $\pm 1.5 \cdot IQR$ of the ensemble of stations.

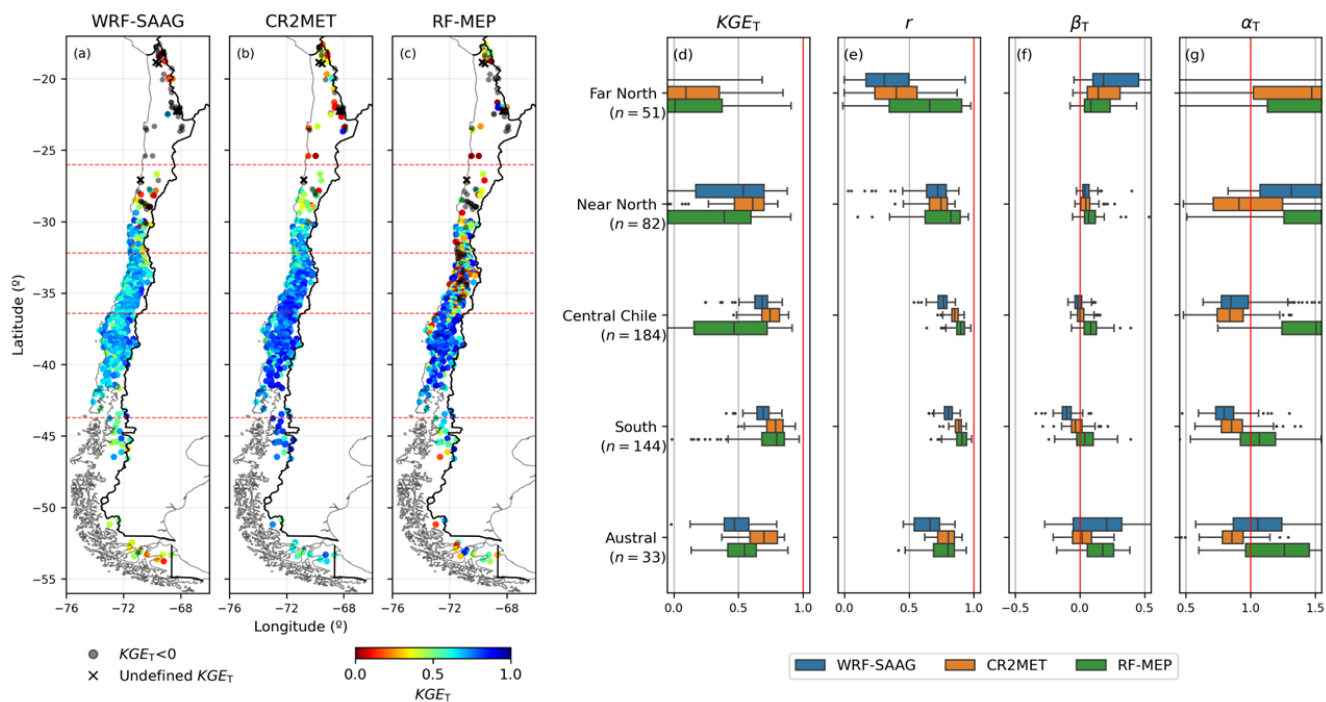


Figure S2. Same as in Figure S1, but for spring (SON) daily precipitation.

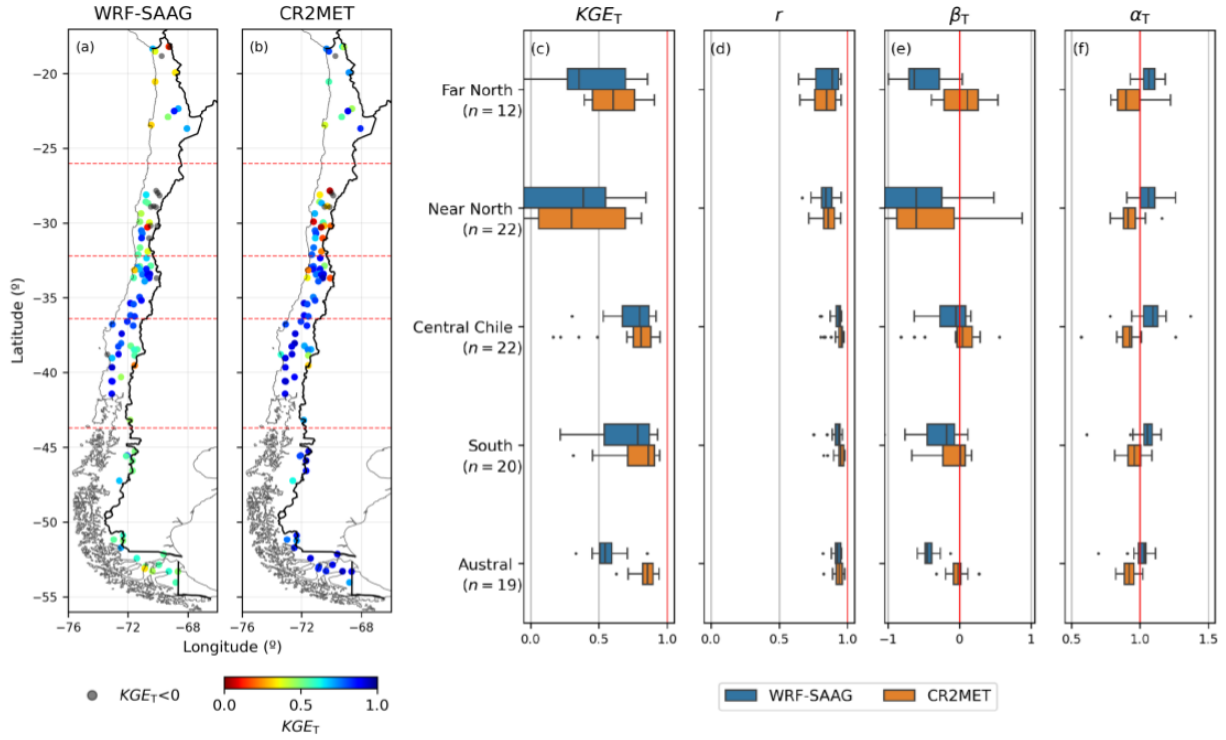


Figure S3. Spatial distribution of Tang's Kling-Gupta Efficiencies (KGE_T) for daily maximum temperature retrieved from (a) WRF-SAAG and (b) CR2MET (period April/2001–March/2018) across continental Chile, using ground-based observations as the reference. Red dashed lines indicate the limits of the macrozones analyzed. (c) to (f) boxplots with KGE_T , the Pearson correlation coefficients (r), bias term (β_T), and variability ratios (α_T) obtained with the products examined for each macrozone, with the red line indicating the optimal value. Each boxplot comprises results for all the stations within a specific macrozone. The boxes correspond to the interquartile range (IQR , i.e., 25th and 75th percentiles); the vertical line in each box is the median, and the whiskers extend to the $\pm 1.5 \cdot IQR$ of the ensemble of stations.

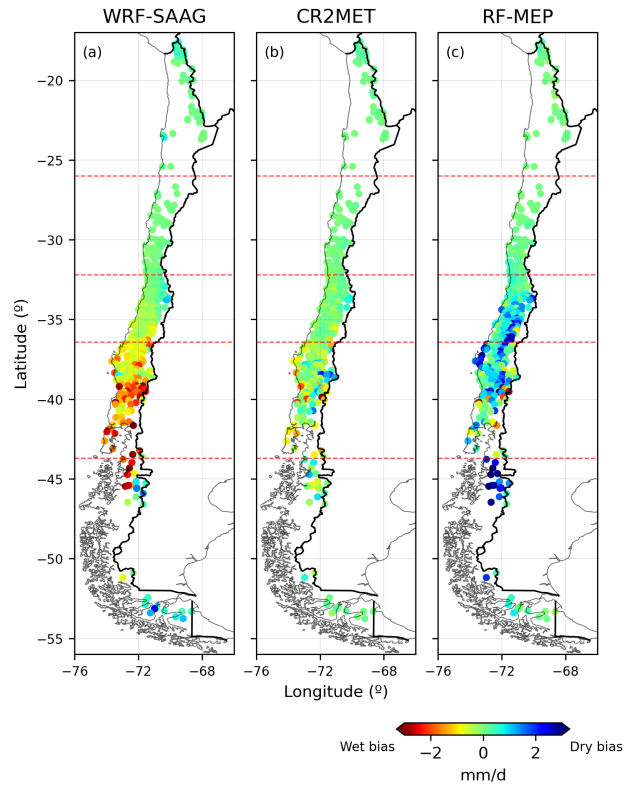


Figure S4. Spatial distribution of precipitation bias (mean difference between simulated and observed daily precipitation) from WRF-SAAG, CR2MET, and RF-MEP (April/2001–March/2018) across continental Chile, using ground-based observations as the reference. Red dashed lines indicate the boundaries of the analyzed macrozones.

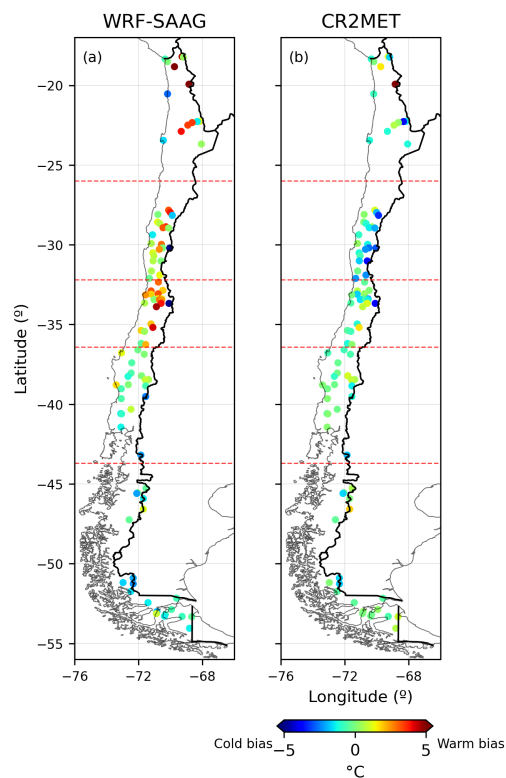


Figure S5. Spatial distribution of T_{min} bias (mean difference between simulated and observed daily minimum temperature) from WRF-SAAG and CR2MET (April/2001–March/2018) across continental Chile, using ground-based observations as the reference. Red dashed lines indicate the boundaries of the analyzed macrozones.

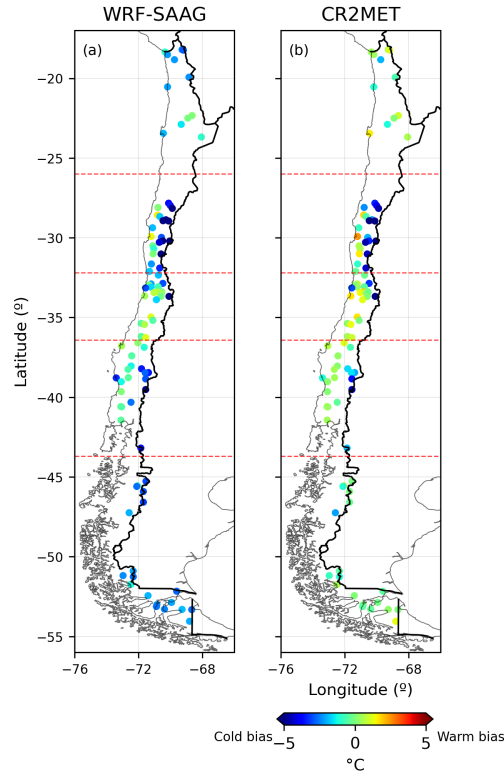


Figure S6. Spatial distribution of T_{max} bias (mean difference between simulated and observed daily maximum temperature) from WRF-SAAG and CR2MET (April/2001–March/2018) across continental Chile, using ground-based observations as the reference. Red dashed lines indicate the boundaries of the analyzed macrozones.

10 References

- Gupta, H. V., Kling, H., Yilmaz, K. K., and Martinez, G. F.: Decomposition of the mean squared error and NSE performance criteria: Implications for improving hydrological modelling, *Journal of hydrology*, 377, 80–91, 2009.
- Tang, G., Clark, M. P., and Papalexiou, S. M.: SC-Earth: A station-based serially complete Earth dataset from 1950 to 2019, *Journal of Climate*, 34, 6493–6511, 2021.