

Manuscript Title: Benchmarking convection-permitting climate simulations for hydrological applications: A comparative study of WRF-SAAG and observation-based products

General Comments

This study presents a comprehensive evaluation of the high-resolution, long-term WRF-SAAG climate simulation (2000-2021) against station observations and two gridded meteorological products (CR2MET and RF-MEP) over Chile. The subsequent use of WRF-SAAG outputs to drive a hydrological model (TUW) successfully demonstrates the dataset's utility for hydrological applications. The paper highlights the good performance of WRF-SAAG in capturing precipitation and temperature, particularly in complex mountainous terrain where observational records are sparse. This is a valuable contribution to the regional climate modeling and hydrology communities.

The manuscript is well-structured and the analysis is thorough. However, I have several suggestions for improvement that I believe will enhance the clarity, presentation, and overall impact of the paper. My main suggestions focus on making the writing more concise, improving the presentation of results and data, and expanding the discussion to better guide potential users of these datasets.

Specific Comments

Abstract

- The abstract, and the paper in general, could be more concise. Please review for opportunities to shorten sentences and state the main findings more directly.
- The sentence on L9-21 is very long and difficult to parse. Please break this down into two or more sentences for clarity.
- In that same sentence, it is unclear which "precipitation products" are being referred to. Please be specific.

Introduction

- **L62:** The sentence beginning "As a result, high-resolution atmospheric models..." feels out of place. The preceding text introduces various observational and reanalysis datasets, but there has been no proper introduction to the concept of using high-resolution models as a data source. I suggest moving this sentence to a more logical position, perhaps after L91, where the rationale for using such models is better established.
- **L75:** The text discusses a "high disagreement among CR2MET, RF-MEP, and ERA5," but the RF-MEP dataset has not been properly introduced at this point. Please ensure all datasets are introduced before they are compared or discussed.

- **L105:** This paragraph should more clearly and explicitly state the aims of the study. Currently, it seems the primary goal is to assess WRF-SAAG, but much of the paper also focuses on the inter-comparison of the three gridded products. Clarifying the primary and secondary objectives here would help frame the paper for the reader.

2. Study Domain

- **Figure 1b-c:** The colormap used for temperature could be improved. The minimum temperature values around 10°C are close to white, making them difficult to distinguish. Please consider using a different colormap that provides better contrast across the full range of values.

3. Hydrometeorological Datasets

- This section introduces four different datasets. To improve clarity and provide an easy reference, I strongly recommend summarizing their key attributes (e.g., spatial resolution, temporal coverage, variables, post-processing methods) in a table.

5. Results

- **Figure 2a:** The y-axis scale (currently showing 0.0-1.0) makes the results difficult to read, as all the data points are clustered at the very top of the plots. Please adjust the y-axis scale to a more appropriate range (e.g., 0.5-1.0) to better visualize the differences.
- **Figure 3:** The caption appears to be missing the "WRF-SAAG" label.
- **Evaluation of Gridded Products:** Since CR2MET and RF-MEP both incorporate ground station data using different statistical methods (regression vs. random forest), a brief discussion on the potential sources of uncertainty and discrepancies between these two products would be valuable. Is the disagreement due to the selection of different stations, or the uncertainties inherent in the respective post-processing procedures?
- **Beyond Abstract Metrics:** Figures 2 and 3 provide a good statistical summary, but the information is quite abstract. To give readers a more intuitive understanding of model performance, please supplement the KGE and contingency table metrics with an evaluation of the raw precipitation and temperature fields. For example, providing maps or summary statistics of the seasonal or annual mean biases (e.g., wet/dry bias, warm/cold bias) would be extremely helpful.

Discussion

- **L452:** This paragraph provides a good summary of limitations and future work. To increase the impact of the paper, please also provide some specific insights and examples of how the WRF-SAAG and the two observational datasets could be used in practical application studies (e.g., water resource management, agricultural planning, climate change impact assessments). This would provide valuable guidance to other researchers and stakeholders in the region.