The paper presents a comprehensive comparison and evaluation of existing and downscaled precipitation products for the Peruvian Andes. The discussion section is particularly well written and effectively synthesizes the findings. However, the primary novelty of this manuscript lies in generating a regional dataset (downscaling precipitation specifically for the Peruvian Andes) rather than proposing a novel methodological framework. I urge the editor to consider whether this level of regional application aligns with the journal's specific criteria for novelty and scope.

Furthermore, significant methodological clarifications are required regarding the mathematical formulation of the GWR model, baseline dataset selection, and threshold coherency before the manuscript can be considered scientifically sound, which are described below.

Major Methodological Concerns

1. Justification of the Parent Product for Downscaling

The evaluation demonstrates that Rain4PE generally performs better overall, and PISCO performs better during extreme rainfall events than GPM-IMERGF. Given that downscaling primarily enhances spatial resolution (yielding finer spatial patterns) but inherently inherits the accuracy and biases of the parent product, the authors must justify why GPM-IMERGF was selected as the basis for downscaling over the superior-performing Rain4PE or PISCO datasets.

2. Ambiguity in Scale Selection for Downscaling (Line 172) The manuscript states that the best-fit exponential regression occurred at the 0.75-degree resolution. If I understood properly, the operational downscaling methodology appears to use only the 0.1-degree resolution. The authors need to clarify the purpose of identifying the best fit if it does not serve as the statistical foundation for subsequent spatial upscaling.

3. Mathematical Notation in GWR (Equation 7).

Equation 7 differs from the standard Geographically Weighted Regression (GWR) formulation by imposing a non-linear interaction through the multiplication of two coefficients: one for optimization (δ), and one for regression (φ). If both parameters are intended to be calculated simultaneously, the system becomes mathematically unidentifiable via standard Weighted Ordinary Least Squares, requiring the authors to either write the assumption or explain how these coefficients were calculated. Also, what does $this$ (δ) signify in this case?

Furthermore, to ensure methodological transparency and reproducibility, the authors must expand the methodology section to explicitly state the specific spatial kernel function used (e.g., a fixed Gaussian or adaptive Bi-square kernel) and detail the statistical optimization routine used to determine the bandwidth (e.g., cross-validation scoring or the Akaike Information Criterion).

4. Incoherent Precipitation Thresholds

If I understood correctly, there is a contradiction in the classification of rainfall events across the methodology. In Section 3 (Line 236), the authors establish a firm threshold of 2.5 mm/day to filter out satellite noise, defining any value below this threshold as "no rain. However, in Table 3, the ETCCDI indices for Consecutive Dry Days (CDD) and Consecutive Wet Days (CWD) are calculated using a threshold of 1mm/day. So, any day with less than 2.5 mm from

GPM-IMERGf and the subsequent downscaled products will be classified as no rain, hence affecting CCD and CWD. This lack of coherence invalidates direct comparisons between the general and extreme forecasting indices. The authors must standardize this threshold across the entire study or provide a robust meteorological justification for shifting the definition of a "dry day" mid-analysis.

Specific Line Comments

- **Line 81:** The argument that Machine Learning (ML) is limited because it "works only for the calibration period" is fundamentally incorrect and should be revised. Just like other models, ML modeling pipelines inherently account for this by using strict training, validation, and test holdout sets to ensure out-of-sample generalization. A stronger, scientifically valid argument against ML in this context would focus on its highly parameterized, non-linear nature, compared to the linear nature of equations used in this paper.
- **Line 86:** The phrase "performance is adequate at low spatial resolutions" is vague. The authors should define what quantitative metrics or thresholds constitute "adequate" in this climatological context.
- **Lines 195–197:** The manuscript states that precipitation uncertainty is particularly acute in the Andes due to sparse station networks and subsequently claims to "address this gap." This is misleading. While the authors produce a high-resolution interpolated map, the fundamental epistemic uncertainty arising from a lack of ground-truth validation data remains unresolved. The phrasing should be tempered to reflect that the paper provides a higher-resolution estimate rather than a solution to the underlying data scarcity.

Suggestions for Figures and Visualizations

- **Figure 3:** The image quality is insufficient. The dotted (median) and dashed (quartile) lines inside the violins are nearly impossible to read, making it difficult to verify the authors' claims in the text visually.
- **Figure 4** effectively presents the conclusions the author intends, so I suggest keeping it before Figure 3.
- **Figures 5 & 7:** It is exceedingly difficult to judge the spatial differences between GPM-IMERGF, GPM-EXP, and GPM-GWR simply by looking at absolute value maps side-by-side. The authors may consider replacing or supplementing these with **Difference Maps** (e.g., mapping) to highlight where spatial deviations occur explicitly.
- **Figures 8 & 12:** Connecting discrete data points with a continuous line implies a sequential relationship between those points that may not exist. A scatter plot or grouped bar chart would be a more statistically honest representation of this data, in my view.
- **Figure:** The presentation of this continuous graph is unclear. Please explicitly define in the methodology or caption how the elevation binning was performed to generate these lines.

Thank you!

Cheers,

Prajwal