

Yatagai, A., M. Masuda, K. Tanaka, M. Hashimoto, and S. Yamaguchi, 2025: Evaluating winter precipitation in snowy Japanese mountains using gauge observations and model-based climatology. *J. Meteor. Soc. Japan*, **103**, <http://doi.org/10.2151/jmsj.2025-037>.

Plain Language Summary: Japan's mountain regions receive some of the heaviest snowfall in the world, but standard rain gauges underestimate snowfall, and few gauges exist in high mountain areas. To address these issues, we improved winter precipitation estimates by refining the long-term climatology using a high-resolution regional climate model (NHRCM), in addition to applying wind-effect correction (Fig.1a-b). We then tested the improved datasets with two independent methods: snow weight observations at mountain sites and water balance analysis in dam catchments (Fig.1c-e). Both evaluations showed that the model-based climatology had a stronger impact than wind correction, especially in high-elevation areas.

- On average, wind-effect correction and climatology refinement reduced the RMSE by 9.6% and 8.4%, respectively.
- Both validation methods showed that climatology refinement had a greater impact than wind correction, particularly in high-elevation regions (Fig.1e).
- The corrected gridded dataset developed in this study will be publicly available through the APHRODITE website (<http://aphrodite.st.hirosaki-u.ac.jp>).

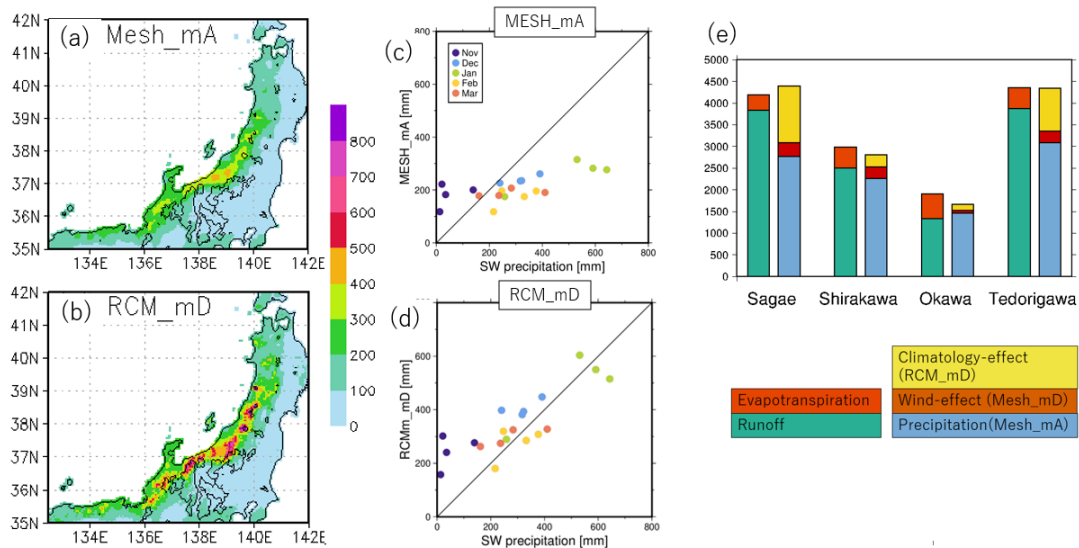


Figure 1. (a)-(b) Winter (DJF) precipitation (mm/3mo) distribution for the original dataset (Mesh_mA=APHRO_JP) and the corrected dataset (RCM_mD), showing improvement by applying wind correction and NHRCM climatology. (c)-(d) Monthly precipitation at the Myoko Sasagamine site, where the corrected dataset (RCM_mD) matches snow weight observations better than the original APHRO_JP. (e) Water balance comparison at four dam catchments, showing that the corrected dataset improves agreement with runoff plus evapotranspiration, and that climatology refinement had a stronger impact than wind correction, in high-elevation sites (Sagae and Tedorigawa).