

## Reproducibility and Regional Characteristics in Altitudinal Dependency of Snow Depth using Regional climate model

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The reproducibility of the snow cover in the mountain areas depends on the horizontal resolution of a climate model. A high-resolution experiment can simulate detailed snow cover distributions and their characteristics (Leung and Qian 2003), i.e., the relation between the amount of snow cover and the altitude of the terrain. Then, we discussed the factors of reproducibility of snow cover distributions and the regionality of altitudinal dependency using a regional climate model with 1.5km horizontal resolution.

We used the Advanced Research Weather Research and Forecasting (WRF) modeling system Version 3.4. The initial and lateral boundary conditions are interpolated from the ERA-interim data set. We used the Noah-LSM including a one-layer snow model as a land surface model and the WSM6 including the cloud micro physics scheme with 6 class (mixing ratio of water vapor, cloud water, cloud ice, snow, rain, and graupel). We turn off the cumulus parameterization.

Snow depth tended to be underestimated by the model. The spatial distributions of snow are, however, consistent with the observations having sufficient reproducibility to the characteristics of regionality. The altitudinal dependencies with linear and nonlinear relationships are found in the windward side and the leeward side of the coastal mountainous area, respectively. This is because many snow clouds are blocked by the coastal mountain about 1,000m. The phenomena cause the difference of precipitation between windward and leeward areas. The sensitivity experiment without coastal mountain shows the nonlinear altitudinal dependency makes similar the linear dependency. As the results, a one of the major factor of regional difference in the altitudinal dependency is geometry of terrain.

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