

Evaluation of orographical precipitation over Central Asia and its super-ensemble and downscaling simulations to evaluate precipitation change under the warming environment

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Following JpGU 2019 presentation, here we apply the multimodel superensemble (MMSE) technique to monthly precipitation of Central Asia (CA, 50E-85E/35N-60N). We focus on our results in spring. As reference datasets, we used GPCC monthly precipitation as well as APHRODITE precipitation. First we apply MMSE to CMIP5 “historical” precipitation according to each monthly precipitation. We use data for 1980–1990 (11 years) and all registered 20 climate models from CMIP5 archive. We used 10 years data for “training” to decide weighting parameters according to APHRODITE, then we “simulate” the rest of 1 year with the parameters. Then we compared the “simulated” value with APHRODITE data of the year. We repeated this process for 11 times, so that every year’s data is forecasted by MMSE.

Comparison of each model precipitation pattern to observations, the correlation coefficients (CC) between MMSE results are higher than that of each models for all years. We also made SUP with top 6 models that show high CC between time series of CA mean precipitation and that of each model. Namely, we select the models that simulate interannual variation of total precipitation to the CA area, because it was reflected how each model simulate the dynamical structure by the observed force. In JpGU2019, we evaluate these CC over whole CA, however, now we focused on Tianshan/Pamir area (65-80E, 37-45N) to calculate horizontal pattern of monthly precipitation and temporal changes in areal mean precipitation.

Results show that highest correlation has been made by the airs with using APHRODITE for training than that of GPCC. However, the top 6 models for showing interannual variability showed minus correlation to the precipitation of validation years. Before applying the parameters to future forecasts, we need to evaluate the interannual variability of the precipitation change with a long-term dataset with APHRODITE type orographic precipitation.

Keywords: Precipitation, Central Asia, superensemble forecast