PARALLEL SESSION B : FRONTIER DOWNSCALING TOOL
B3: A FOCUS ON ESD SPECIFIC OPPORTUNITIES

On the bias correction for regression-based ESD result for multi agro-meteorological elements over Japan and their comparing with RCMs results

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Current estimates and future projections of surface agro-meteorological elements by using empirical statistical downscaling (ESD) are essential to apply climate impact and adaptation analyses together with regional climate models (RCMs) output. Recently, the CORDEX-ESD activities has proposed an experiment protocol to estimate the inherent uncertainty of the ESD. In this study, a multivariate multiple linear regression (MMLR) -based ESD method that comprehensively analyzed for seven surface predictands (daily averaged, maximum and minimum temperatures, precipitation, solar radiation, relative humidity and wind speed) is applied over Japan by using atmospheric circulation factors derived by JRA-25 reanalysis dataset as predictors,. Then the result compared and validated with the RCMs' output drive by the same boundary conditions as the ESD. The experiment basically operated in accordance with the CORDEX-ESD protocol to set various calibration and validation periods.

Generally, ESD results were still provided estimated bias, so the initial value of the ESD was adjusted to have the same variance as observed climate (scaling method) on the elements except the precipitation. The scaling method is, however, insufficient for precipitation. As the example for applying to Argentina, common research field for the ESD protocol, weak rainfall tended to drizzle in the linear regression-based ESD, which is associated with significant overestimation of rainfall, especially in the dry season. Here, an alternative bias correction technique, adjusting the number of the rainy days, was developed. The reproducibility for daily precipitation was improved with each season over Argentina, so the same procedure is also applied to Japan, characterized by much more warm and wet climate. As the result, the ESD with new bias correction method obtained the good estimation with observed climate relative to the RCMs result, even on the daily time-scale over Japan.