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Downscaling the IPCC AR4 Climate Projections over East Asia with APHRODITE

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Extensive climate simulations by various modeling groups for the IPCC AR4 made probabilistic, multi-model projections and impact assessments practical. But one problem with the IPCC AR4 model data archive is that the spatial scale of climate model output is typically too coarse for regional and local studies on climate impact and adaptation. Furthermore, regionally, large model biases do exist. Very high resolution version of climate models run under the time-slices experiment design or fine-scaled regional climate models forced by global model result from lateral boundaries are used to explore the problem. Although it generally matched better with station rainfall data or high-resolution gridded observational analysis, the cost of such high resolution model runs are too expensive to be affordable to create multi-models and multiple-member ensembles that better sample the uncertainty in future projections.

Recently high temporal and spatial resolution ground station analysis and satellite estimates are available for climate study. The length of data record are starting to provide enough statistical sampling. Using the APHRODITE precipitation product, we apply statistical downscaling methodology with this observational constrain and transfer the relatively low resolution global model result to very high resolution of multi-model future climate projections over East Asia with different emission scenarios. The result should be welcomed by the community working on the impact and adaptation study that need more local climate projection. The uncertainty of downscaling method can be estimate through monte-carlo simulation.

Keywords: Statistical Downscaling, Precipitation, Climate Change