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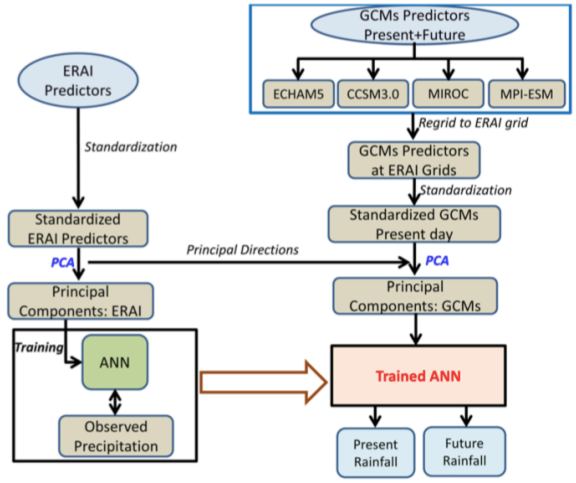
Statistical downscaling rainfall using artificial neural network: significantly wetter Bangkok?

曼谷

Methods:

本文基于ANN方法，针对曼谷降水进行降尺度。
时间：1980-2000(present), 2080-2100(future)
空间：Bangkok(the capital and commercial city of Thailand and is one of the highly developed cities in Southeast Asia and as well largely vulnerable to climate change. The study focuses on the future climate change over Bangkok area only during the rainy season.)
变量：Rainfall(mean sea level pressure, relative/specific humidity, zonal/meridional wind and temperature)



(only 10 variables: mslp, p__u, p8_u, p850, p__v, rhum, r500, shum, s500 and temp were selected as predictors for MPI-ESM model, which are also common in the ERAI predictor set.)

Results:

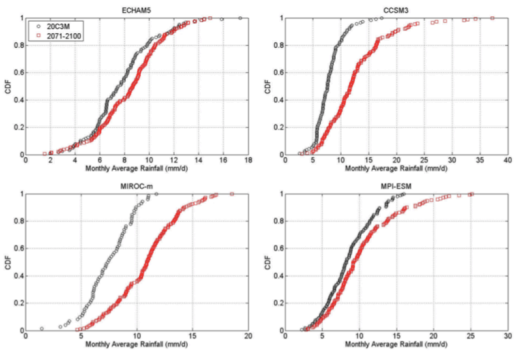
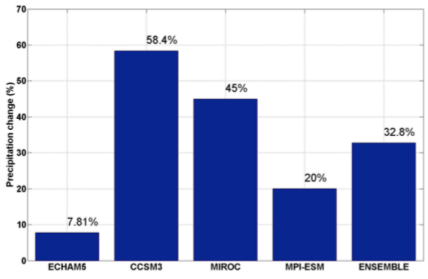


Fig. 6 CDF of downscaled present and projected southwest monsoon rainfall from four GCMs

The CDF graphs of GCM projections are distributed to the right of the present-day climate, indicating that there is an agreement with the increasing trend for all downscaled GCMs in future climate.
The increase is different for all GCMs during the wet season, from lowest of ECHAM5 A1B (7.8 %) to highest of CCSM3 A1B (58 %). The ensemble results between four GCMs is the average of the four, stands at 32.8 %, which is significant to show that Bangkok might experience wetter conditions during the rainy season in the future.

Fig. 8 Delta change (%) between projected southwest monsoon rainfall and present for different downscaled GCMs. The ensemble value is the average of four GCMs's delta change



Conclusions:

Results indicate that the overall trend for the future wet indices (SDII, Prcp, Ptot, R5d, P95p) are on the increase. These can have strong implications as the increasing extreme rainfall intensity over Bangkok during rainy season may induce large flooding and inundation for the area, which was already vulnerable to one such flooding in 2011.