

# **LS4P regional climate model intercomparison over the Tibetan Plateau**

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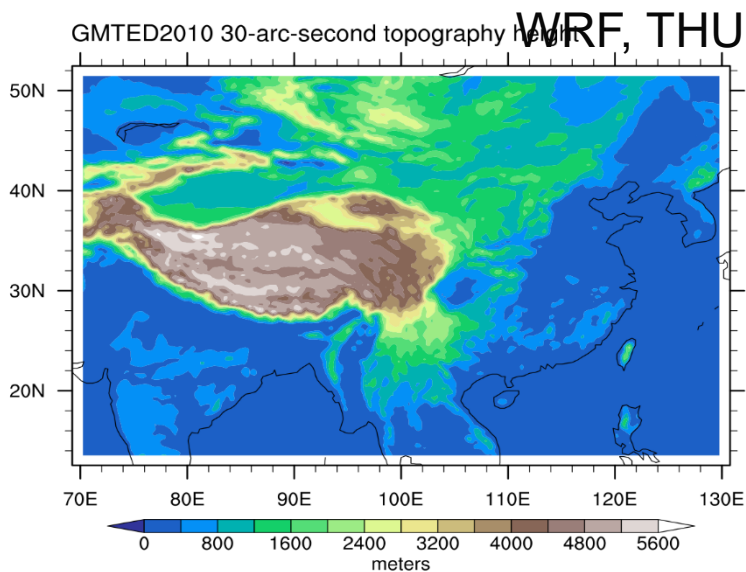
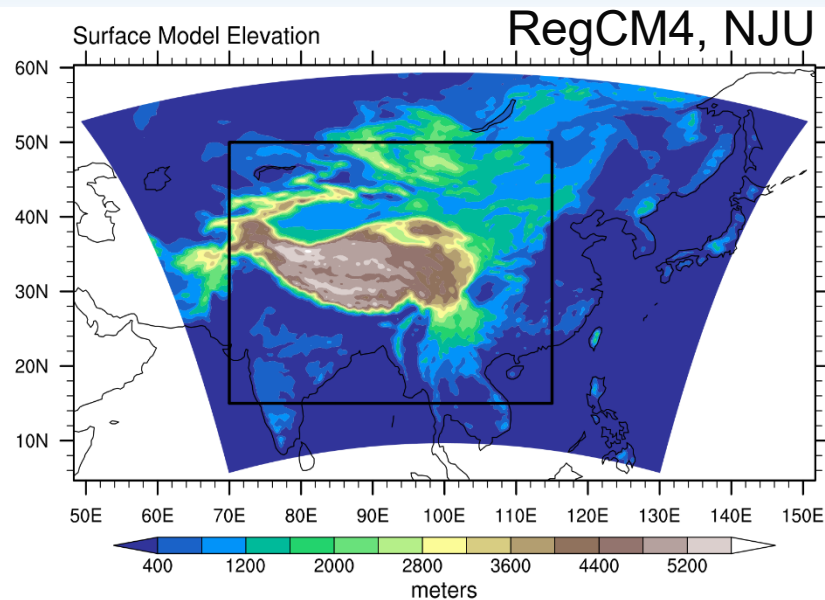
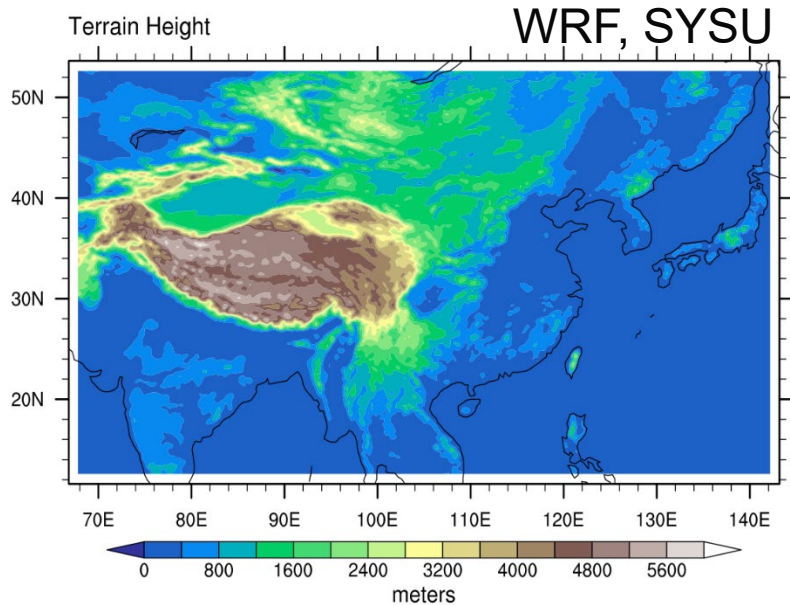
And  
LS4P RCM Team

Contributions: Shiori Sugimoto, Kun Yang, Xinzhong Liang, Zhenming Ji, Jeongwon Kim, Jinkyu Hong, Yongkang Xue, Tomonori Sato, Hiroshi Takahashi, Shuyu Wang, Guiling Wang, Sin chan Chou, Weidong Guo, Miao Yu

To assess the ability of RCMs to simulate the regional climate from later spring to summer over the TP with several LS4P regional models

Observation: **CN05.1** for precipitation and surface air temperature at 0.25x0.25 resolution, which is based on the interpolation from more than 2000 station observations in China.

# LS4P RCM Domains



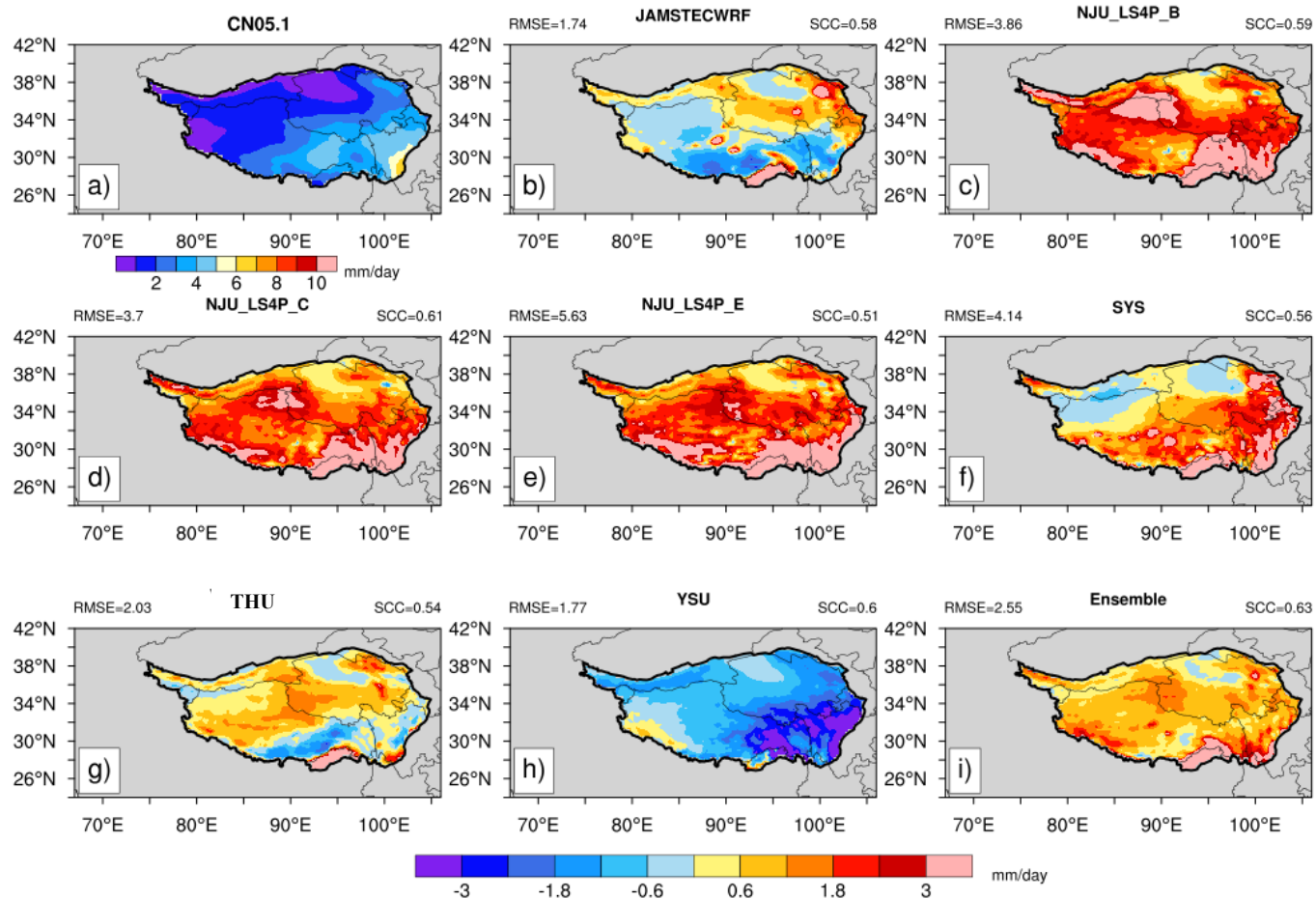
# RCMs and Configuration

RCM	Participants	Land	Cumulus	PBL	Micro	Rad	Forcing
<b>WRF4.2.1</b>	SYSU	NOAH	Grell-Freitas	BouLac	Morrison	RRTM	MERRA2
<b>WRF</b>	JAMSTEC	NOAH	Grell 3D	MYNN2.5	Thompson	Dudhia RRTM	ERA-Interim
<b>WRF</b>	YSU	NOAH	Kain-Fritsch	YSU	WSM6	RRTMG	ERA-Interim
<b>WRF</b>	THU	NOAH	Grell 3D	MYJ	New Thompson	Dudhia RRTM	ERA-Interim
<b>RegCM4_B</b>	NJU	<b>BATS,</b>	<b>Tiedtke</b>	<b>Holtslag</b>	<b>SUBEX</b>	<b>RRTM</b>	<b>ERA-Interim</b>
<b>RegCM4_C</b>		<b>CLM4.5</b>	<b>Tiedtke</b>	<b>Holtslag</b>	<b>SUBEX</b>	<b>RRTM</b>	
<b>RegCM4_E</b>		<b>CLM4.5</b>	<b>Emanuel</b>	<b>Holtslag</b>	<b>SUBEX</b>	<b>RRTM</b>	

**Simulation period : From April 1 to Sep 1., 1991-2015,**  
**total 25years**

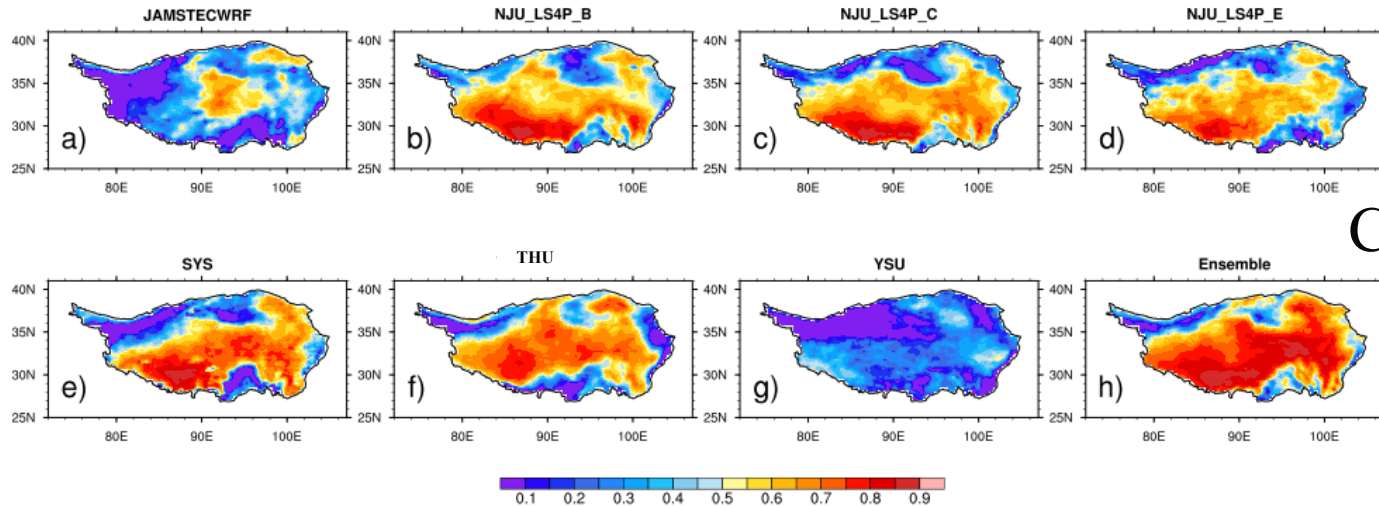
(JAMESTEC from May 1 to Sep 1)

# MJJA Precipitation distribution from CN05.1 and simulated biases: 1991-2015 May-June-July-August

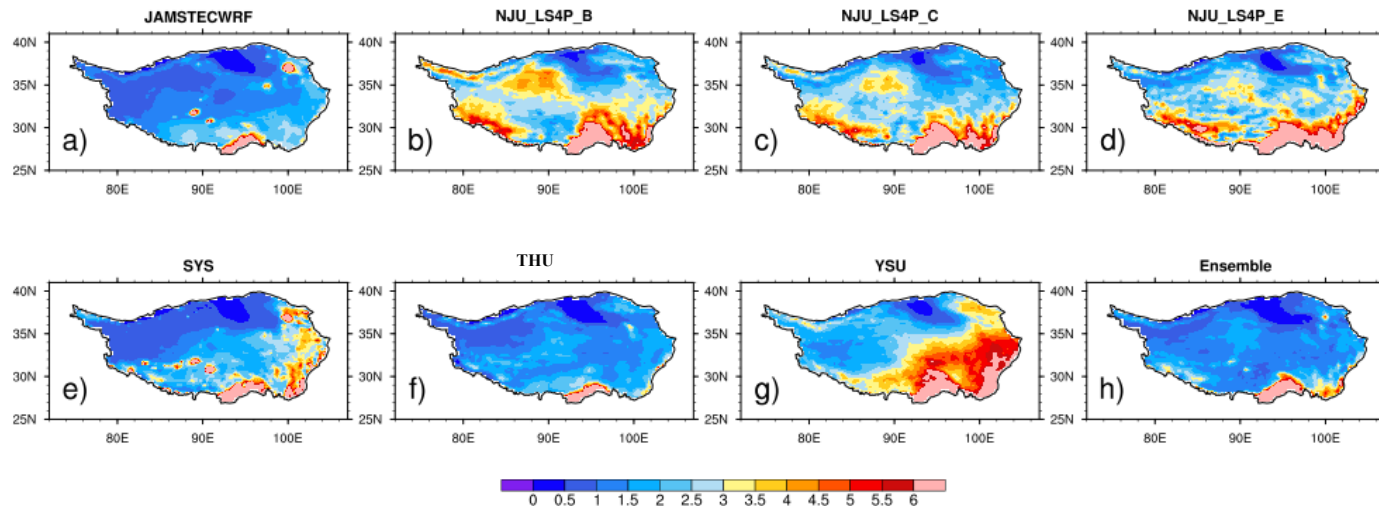


- Differences clearly exist in MJJA precipitation simulation over the TP.
- Compared to WRF, RegCM4 tends to produce more precipitation with larger RMSE.

# Inter-annual variation of MJJA precipitation



Correlation



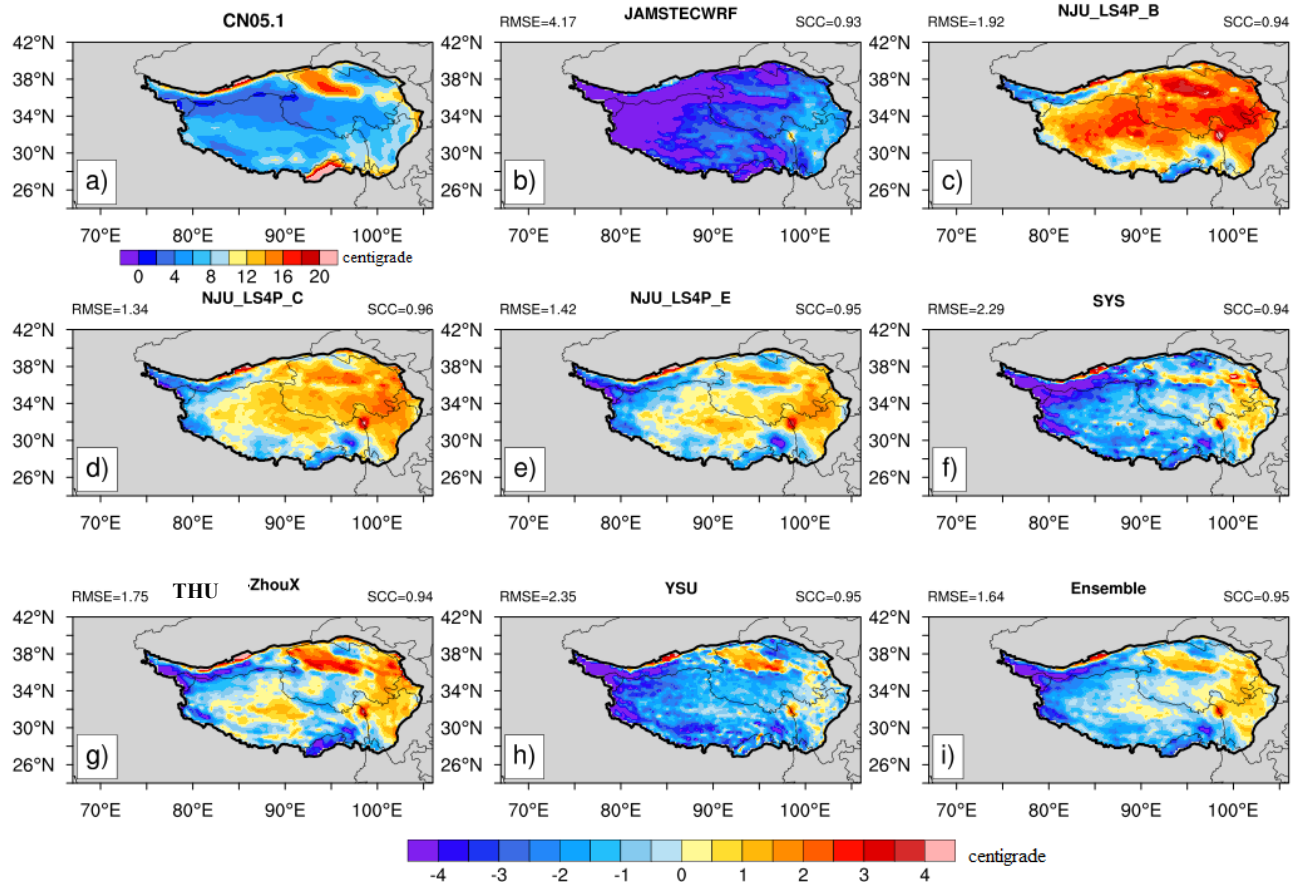
RMSE

- RegCM4 can simulate the inter-annual variation of MJJA Precipitation, but has relative larger RMSE.



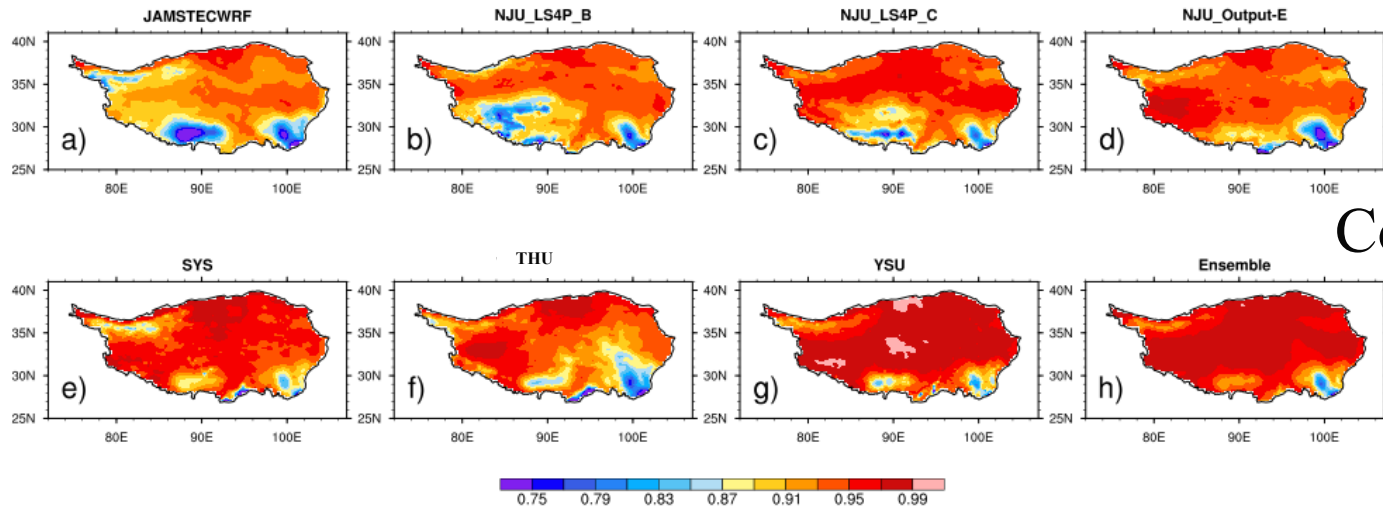
# T2m from CN05.1 and simulated biases: 1991-2015

## May-June-July-August

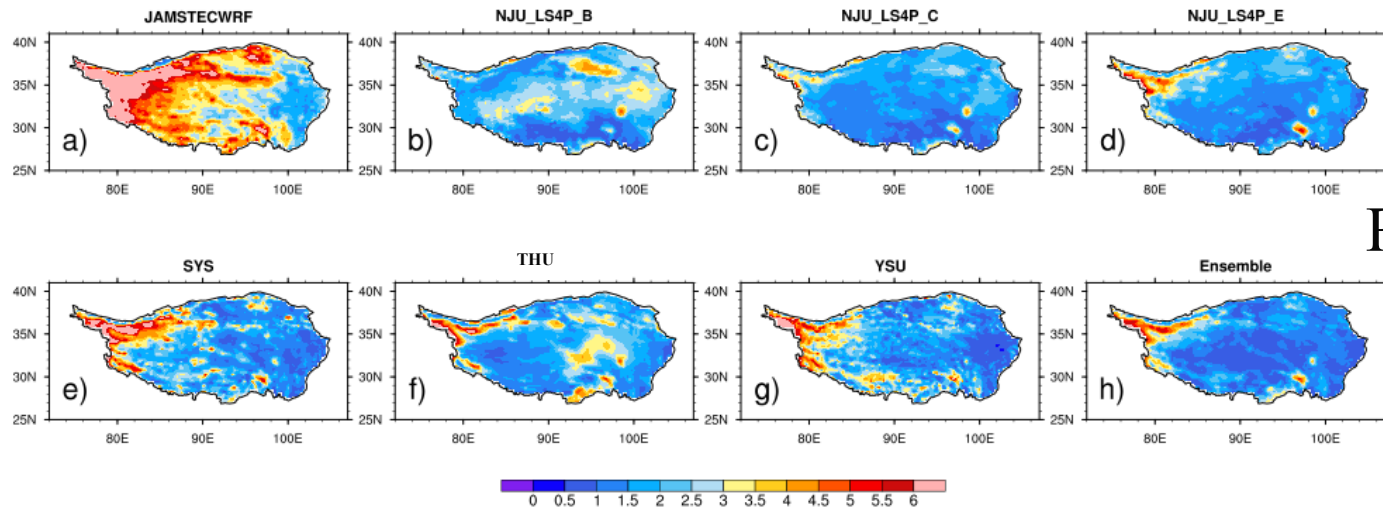


- All RCMs can well produce the distribution of T2m with high correlation, but large RMSEs exist especially in WRF simulations.
- RegCM4 tends to simulate warm biases, while WRF has cold biases.

# Inter-annual variation of MJJA T2m



Correlation



RMSE

- Correlations in YSU are higher than other models.
- The RMSEs in RegCM4 are smaller than that in WRF over the northwest TP.



# Conclusions

- RCMs can generally reproduce the spatial patterns of mean precipitation from May to August over the TP. Most RCMs tend to overestimate precipitation especially in JJA , while dry biases exist in JAMSTEC and YSU WRF experiments.
- Compared with WRF, RegCM4 simulates more precipitation over the Tibetan Plateau. Warmer biases can be found in RegCM4 experiments than that in WRF simulations over the TP.
- Multi-RCM ensemble mean can improve the simulation of precipitation and temperature, especially for the inter-annual variation.
- Differences of moisture and surface net radiation clearly exist in RCM simulations.

**Thank you !**