Global Warming and Monthly Water Balance Change in Korea
- *Interim findings* -

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Research Objective

The goal is to :

1. Identify the characteristics of large spatial scaled input climate data for regional impact study by each GCM,

2. Identify the characteristics of potential runoff change will be affected by climate variables to get the useful information for direction of model development

Global Climate Model

Table 1. Tested GCM result from IPCC and NIES

| No.	Scenario	GCM	Acronym	Nation	A-res.	Time-period	
1	SRESA1	CSIROMk2	CSIRO	Australia	3.2*5.6	1990-2100	M
2	SRESA1	CCSR/NIES2	CCSR/NIES	Japan	5.6*5.6	1890-2100	M
3	SRESA2	HadCM3	UKMO	UK	2.5*3.75	1950-2099	M
4	SRESA2	CSIROMk2	CSIRO	Australia	3.2*5.6	1990-2100	M
5	SRESA2	CGCM2	CCCma	Canada	3.8*3.8	1900-2100	M
6	SRESA2	CCSR/NIES2	CCSR/NIES	Japan	5.6*5.6	1890-2100	M
7	SRESB1	CSIROMk2	CSIRO	Australia	3.2*5.6	1990-2100	M
8	SRESB1	CCSR/NIES2	CCSR/NIES	Japan	5.6*5.6	1890-2100	M
9	SRESB2	HadCM3	UKMO	UK	2.5*3.75	1950-2099	M
10	SRESB2	CSIROMk2	CSIRO	Australia	3.2*5.6	1990-2100	M
11	SRESB2	CGCM2	CCCma	Canada	3.8*3.8	1900-2100	M
12	SRESB2	CCSR/NIES2	CCSR/NIES	Japan	5.6*5.6	1890-2100	M
13	SRESA2	NIESRAMS	NIESRAMS	Japan	60km	2041-2050	M/D

Climate model validation
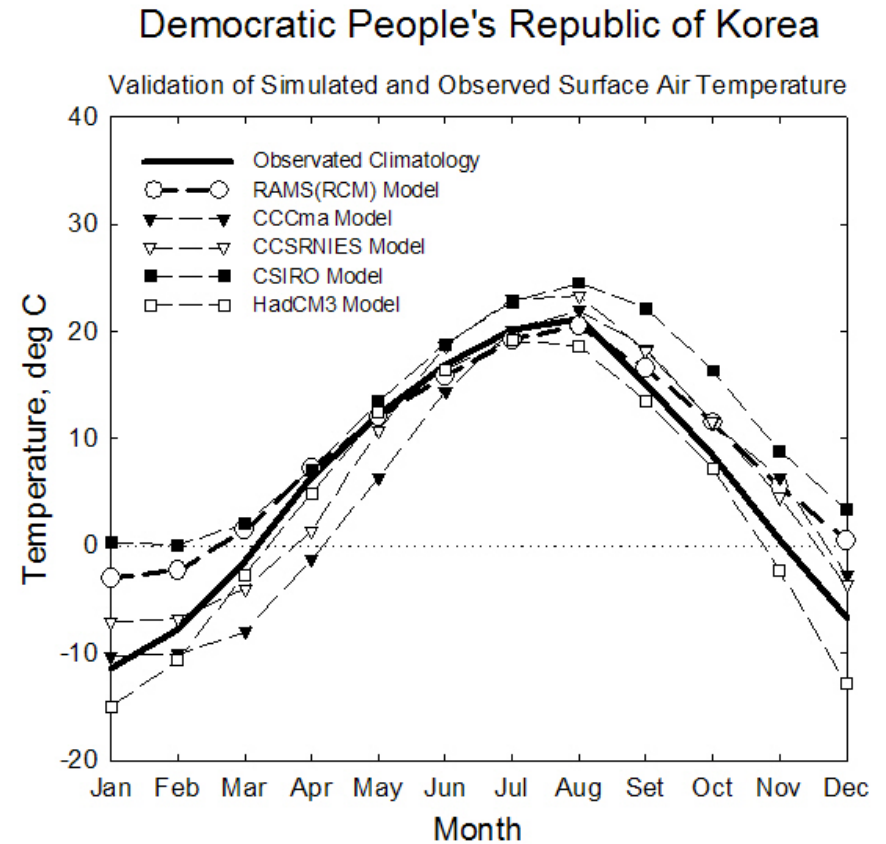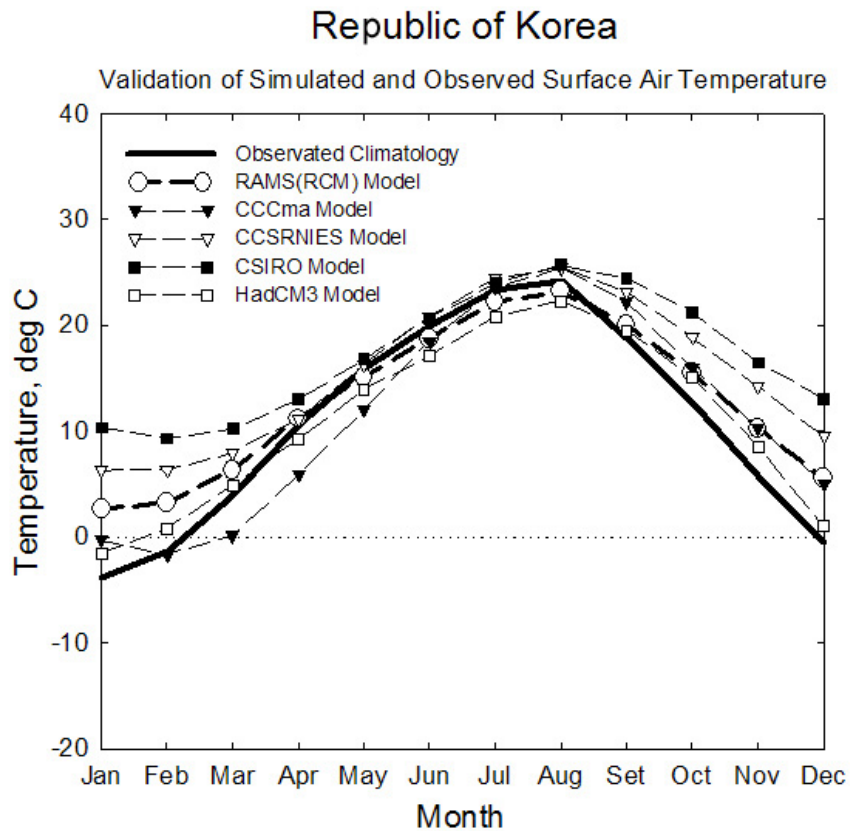
* Temperature data are regionally interpolated to 5km with DEM

Figure 1. The area averaged monthly mean observed and simulated temperature
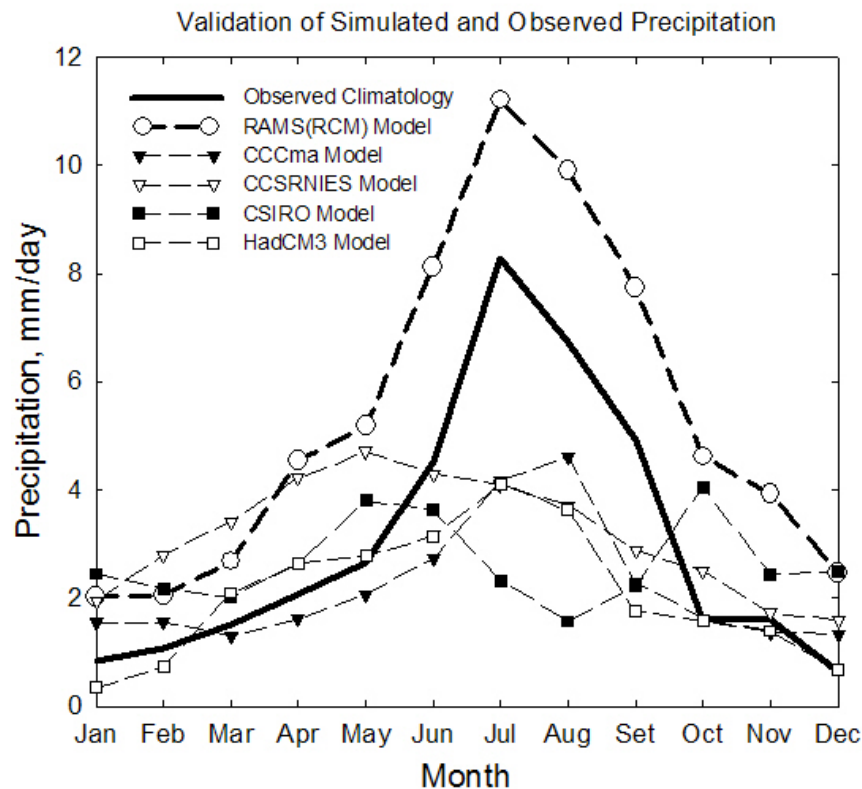
Climate model validation

ROK
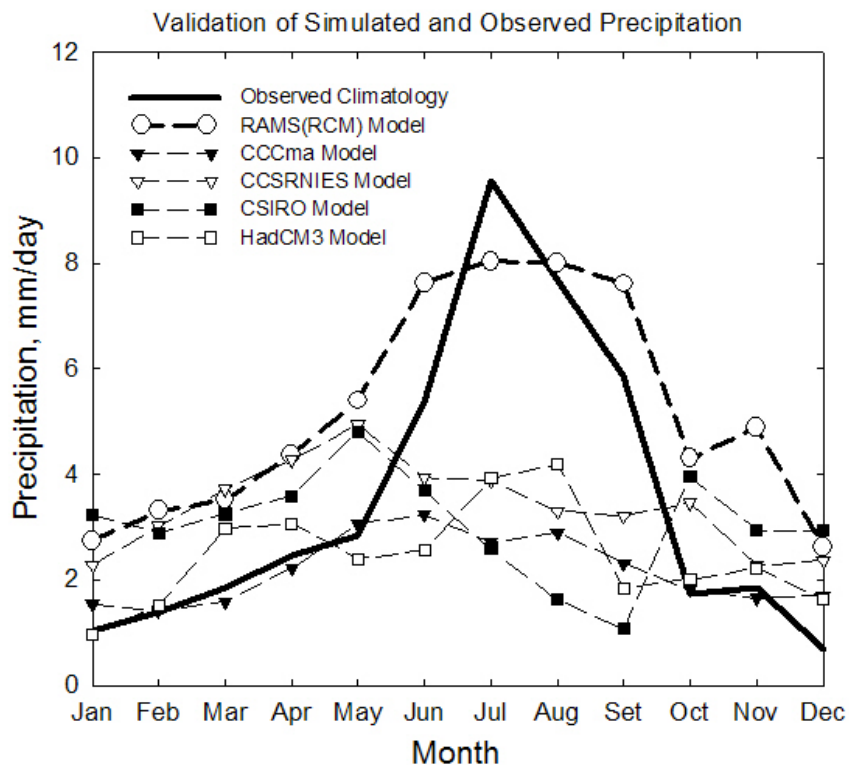
DPRK

Figure 2. The area averaged monthly mean observed and simulated precipitation
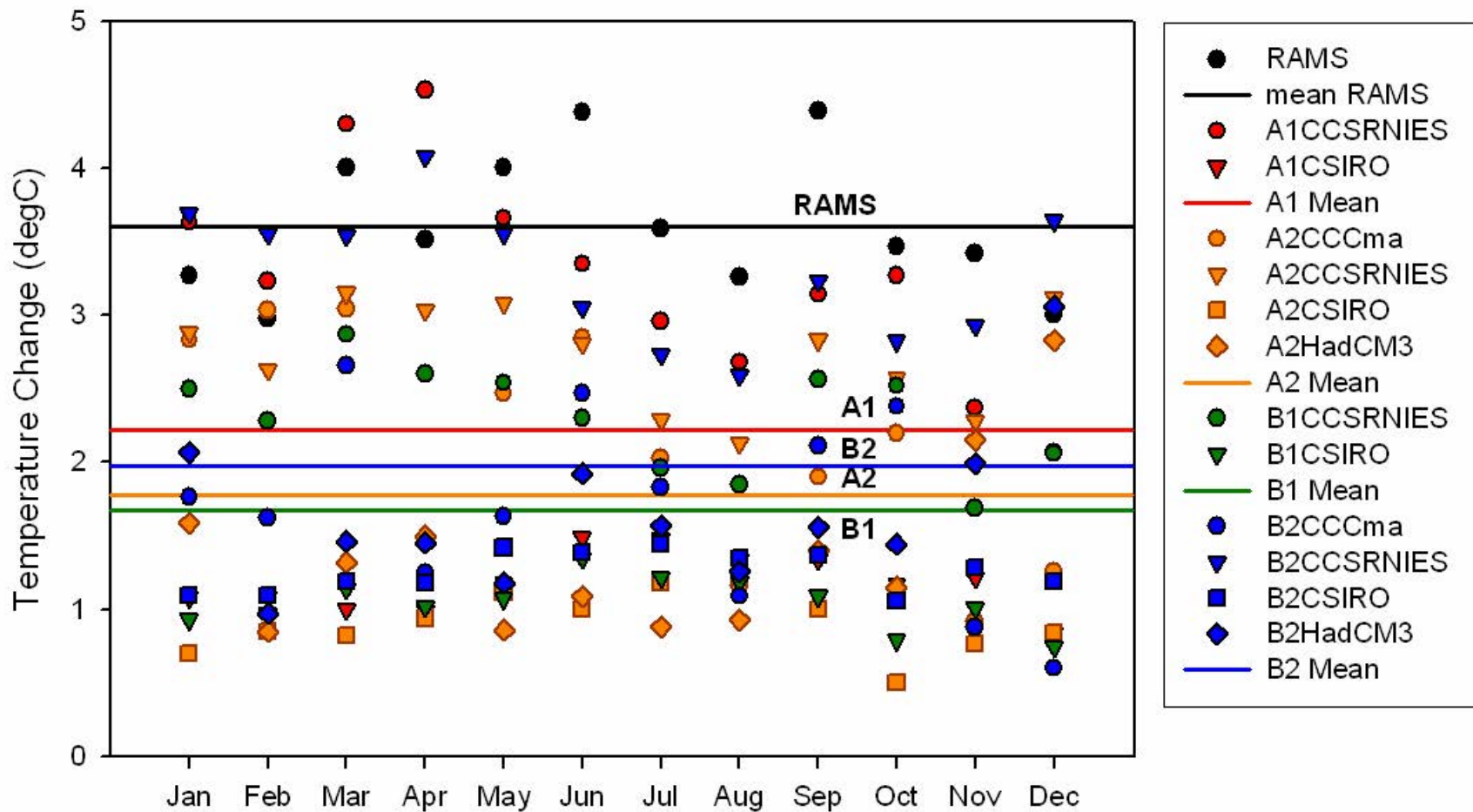
Future climate change

Figure 3. The future(2041-2050) change of area-averaged temperature in South Korea
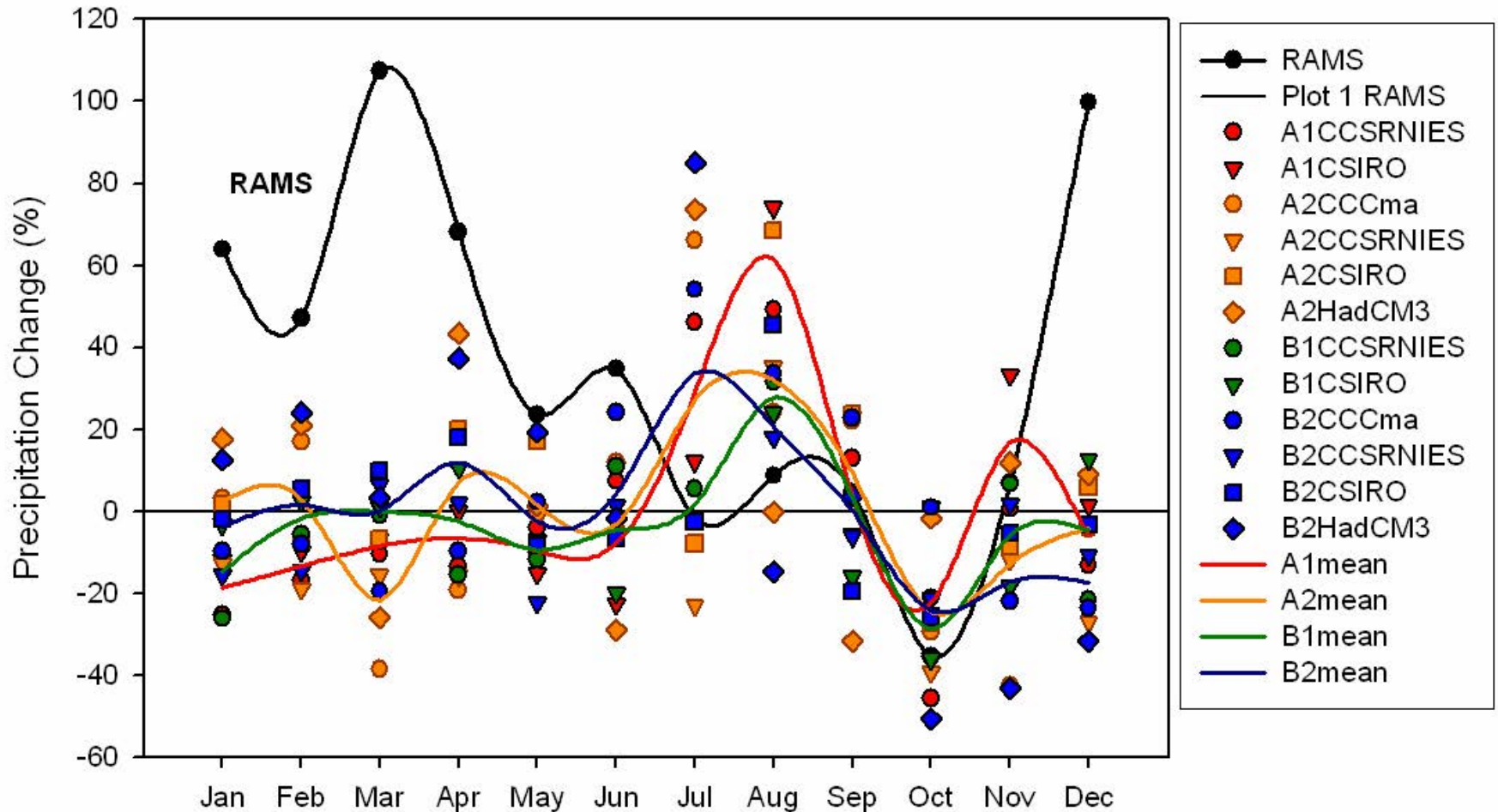
Future climate change

Figure 4. The future(2041-2050) change of area-averaged precipitation in South Korea

Soil Water Balance Model

- Grid-based simple soil water balance modeling

- Yearlly mean runoff change with monthly time step

- Soil water balance model for large basin (AIM, 1997)

$$RO = SM + Pr + Rs - PET - FC$$

where, RO(runoff), Pr(rainfall), Rs(snowmelt),

PET(potential evapotranspiration) and FC(Field Capacity)
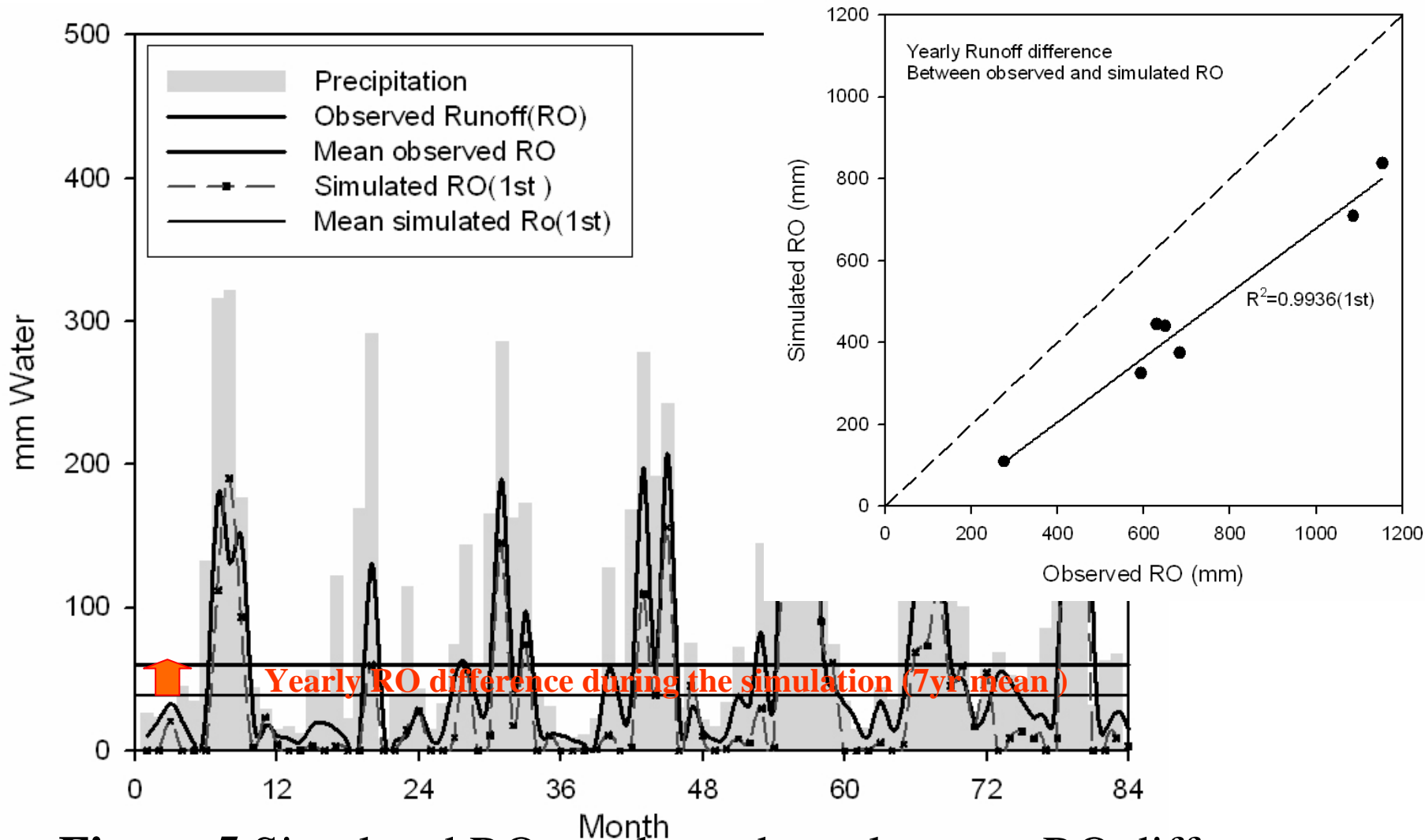
in the cell

Soil Water Balance Model

Figure 5 Simulated RO results and yearly mean RO differnces in Daechung basin with no FC calibration
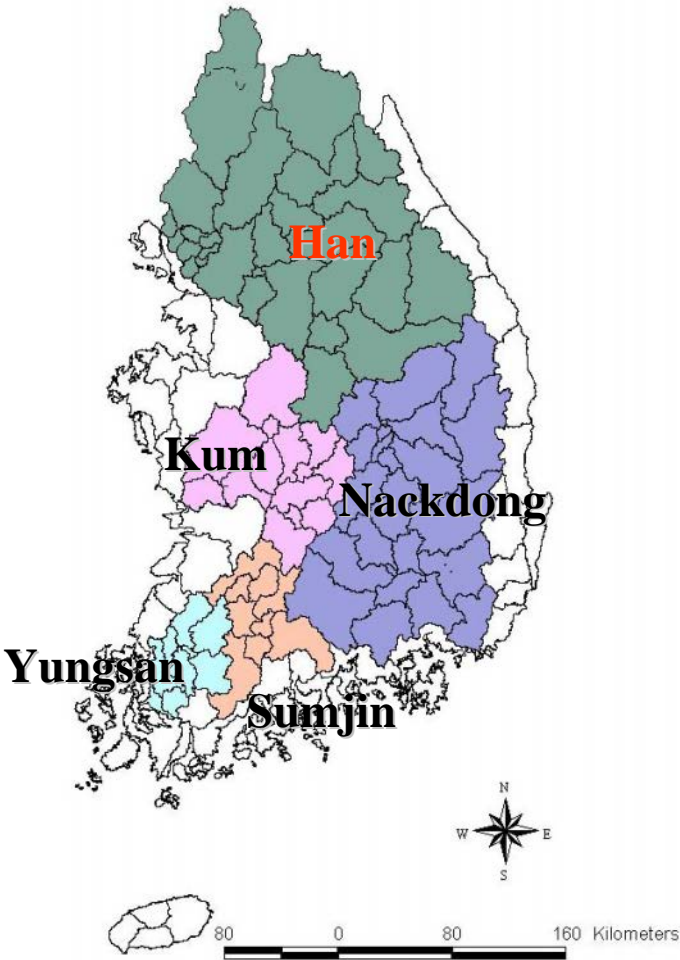
Major Basin Information

Table 2. Major Basin Information of Korea

No.	Basin	Area(km^2)	PPT(mm)	RO(mm)	RO ratio
1	Han	26,018	1,301	723	55.8%
2	Nackdong	23,728	1,186	580	48.9%
3	Kum	9,810	1,272	676	53.1%
4	Sumjin	4,897	1,412	801	56.8%
5	Yungsan	3,429	1,318	800	60.7%

* 30yr('69-'98) mean data from water vision 2020
* RO is calculated by Tank model
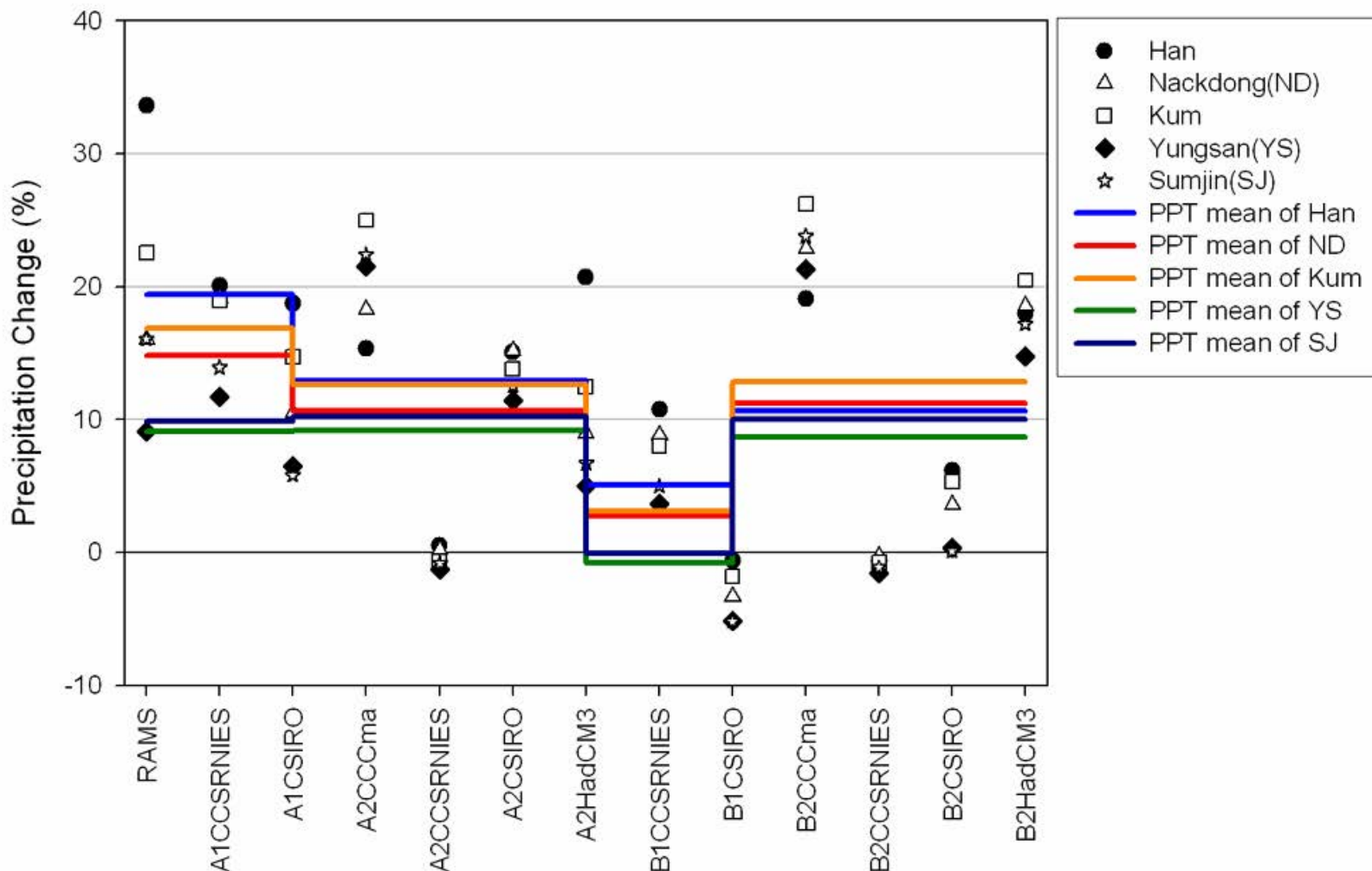
PPT change for the major basins

Figure 6. Annual precipitation change by GCM data
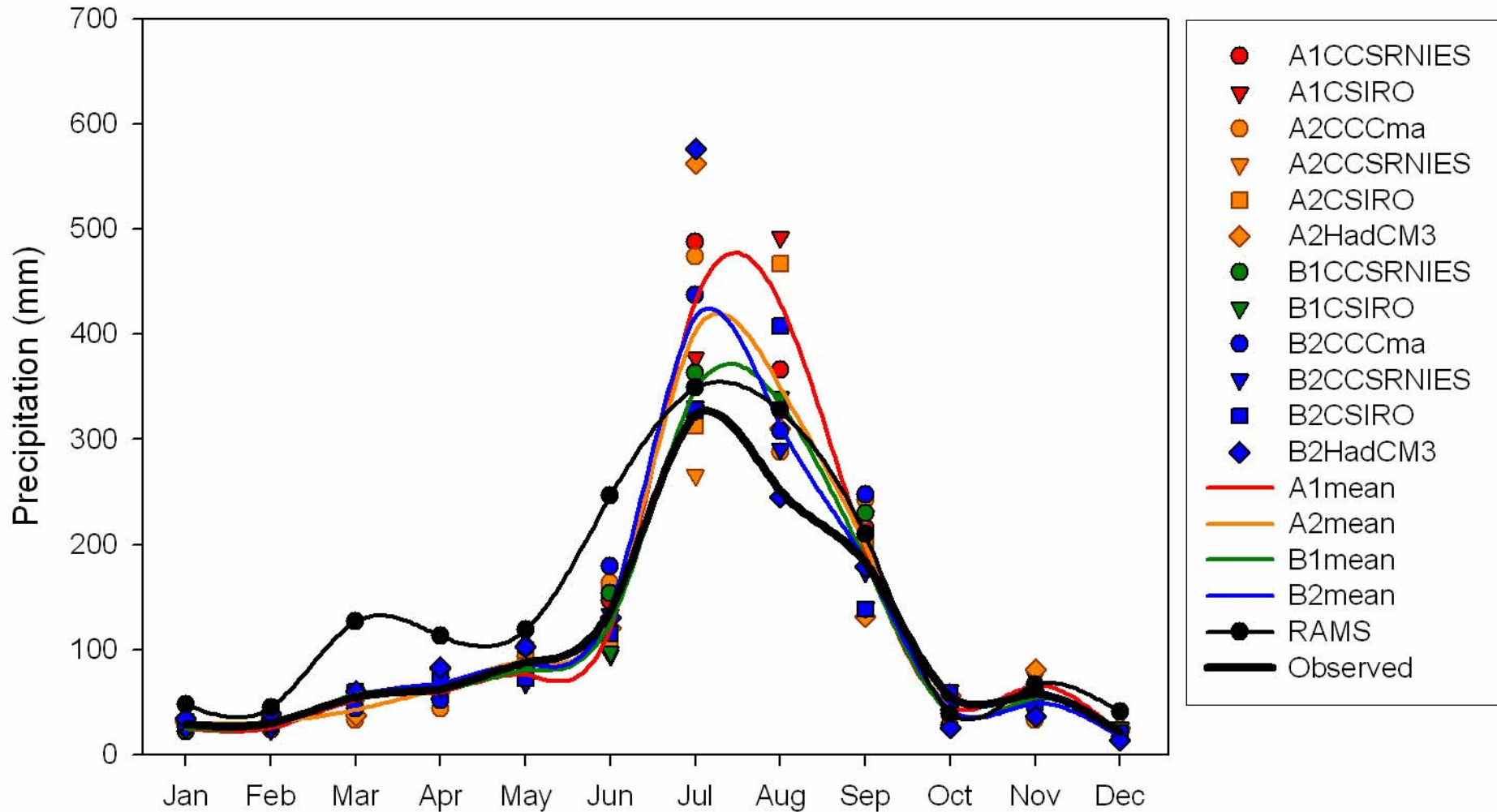(10yr mean, 2041-2050)

Seasonal PPT change

Figure 7. The future mean monthly precipitation of the Han river basin (10yr mean, 2041-2050)
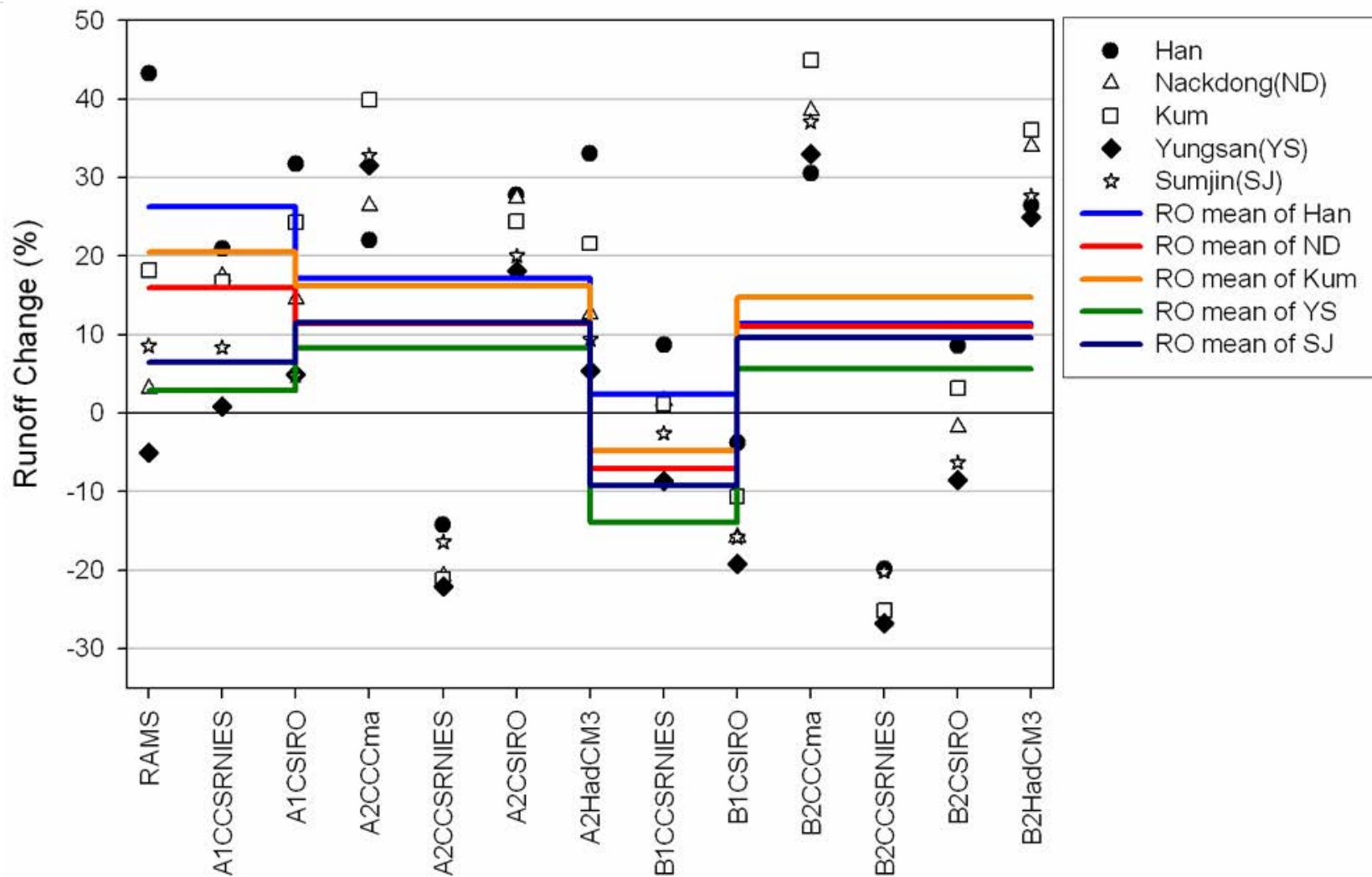
RO change for the major basins

Figure 8. Simulated average annual runoff change by GCM
(10yr mean, 2041-2050)

Thank You!