

Downscaling the Regional Climate of Iran and its challenges

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- ✓ **Motivations**
- ✓ **CORDEX-SAS vs. CORDEX-MENA**
- ✓ **Driving Models**
- ✓ **Comparing BATS and CLM**
- ✓ **Future Works!**

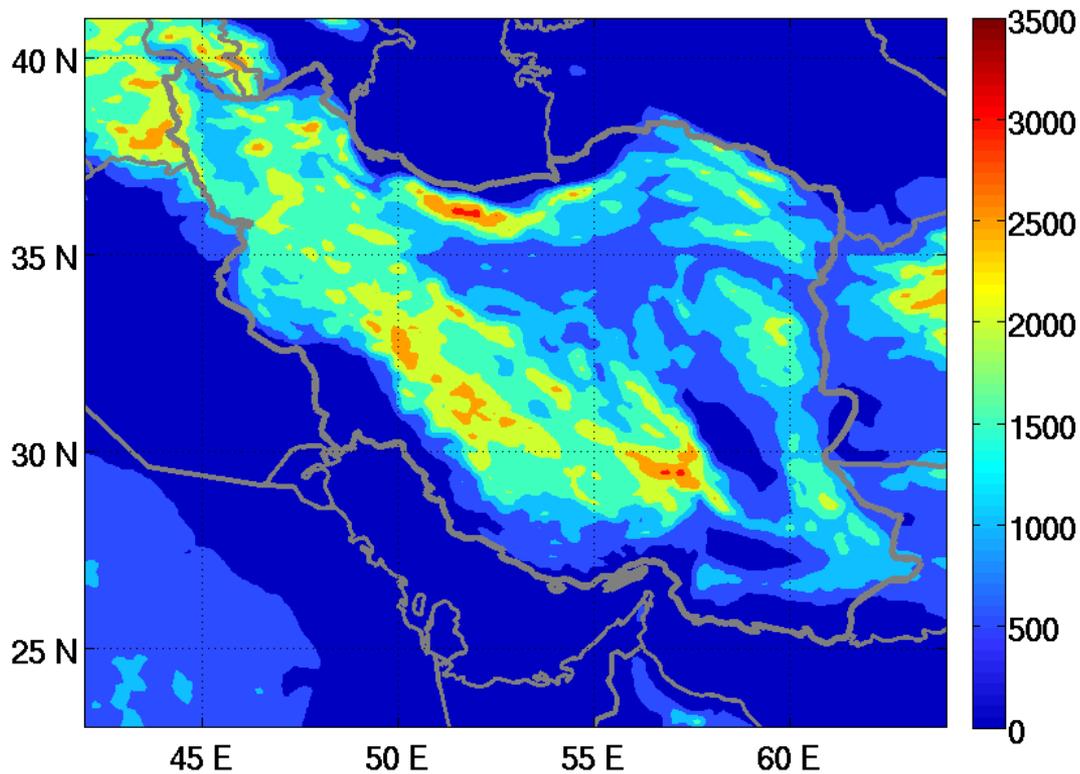
Drought & Water Resources Management



Air Pollution & Dost Events

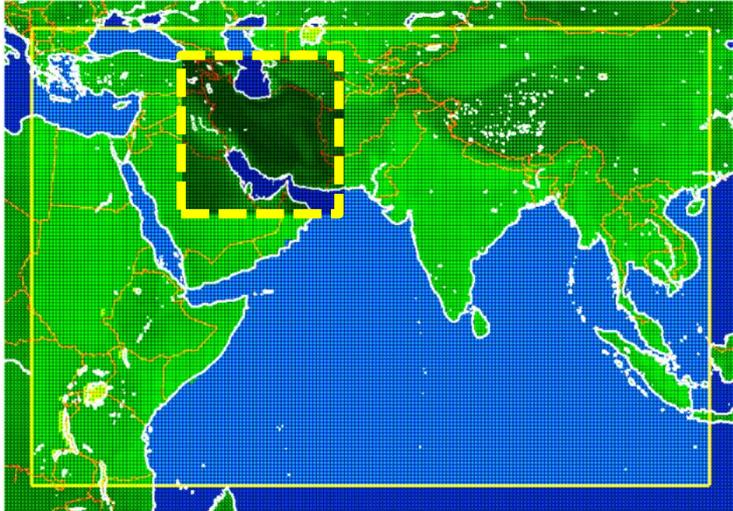


Topography (m)

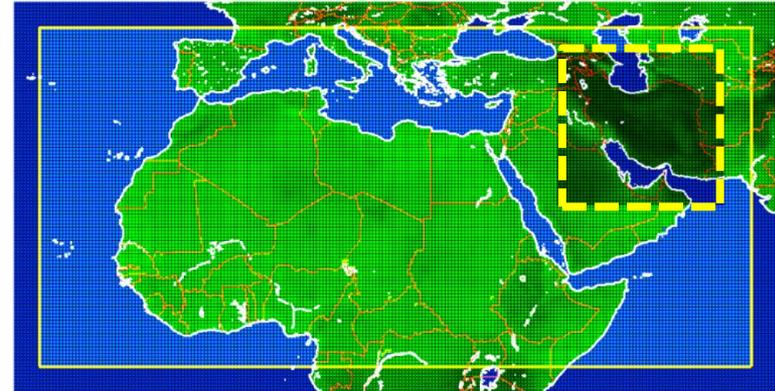


Iran is located in three CORDEX domains: South Asia (SAS), Middle-East and North Africa (MENA), and Central Asia (CAS). In this study, data of those parts of SAS and MENA domains, that Iran located in, have been compared. longitude and latitude are between 22N to 42N and 42E to 64E.

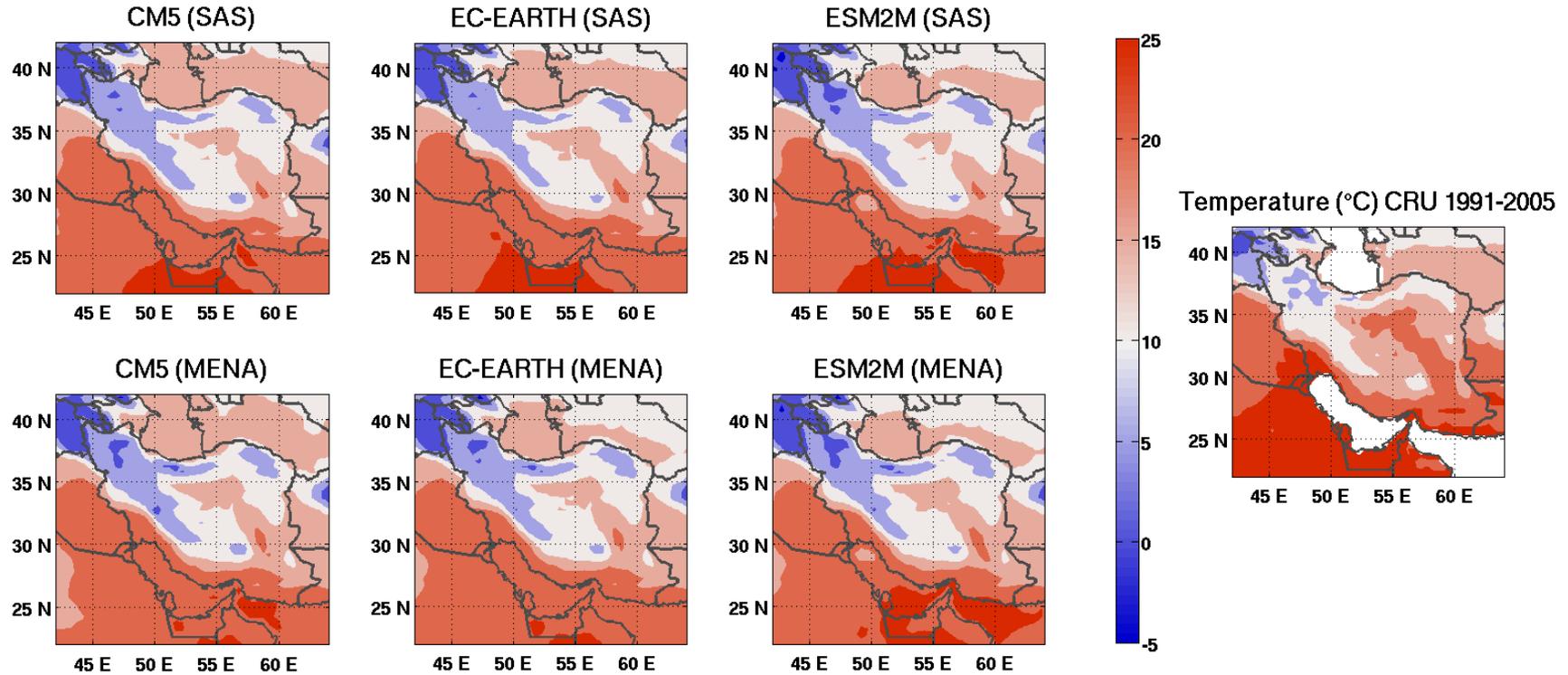
(SAS)



(MENA)

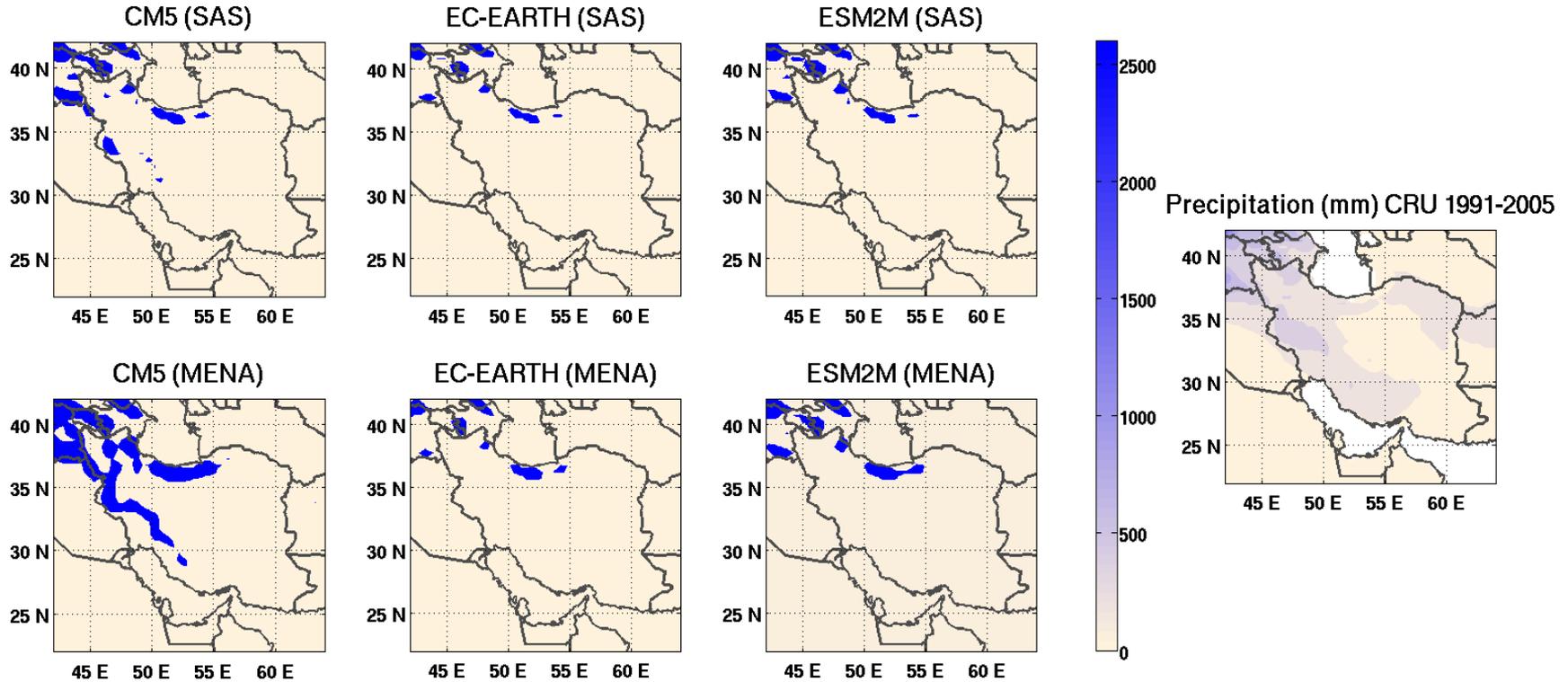


CORDEX-SAS vs. CORDEX-MENA: Temperature

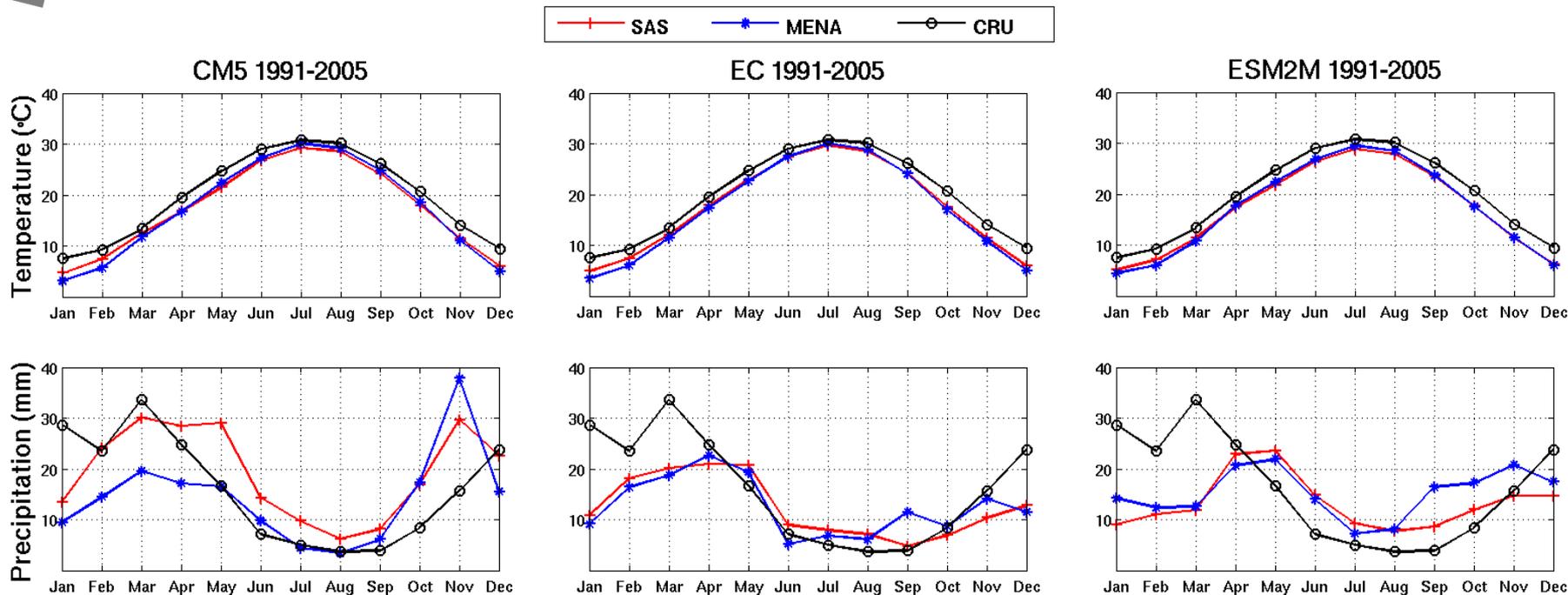


Annual average temperature of three driving models for SAS and MENA domains, and CRU over the period 1991-2005.

CORDEX-SAS vs. CORDEX-MENA: Precipitation



Annual average precipitation of three driving models for SAS and MENA domains, and CRU over the period 1991-2005.

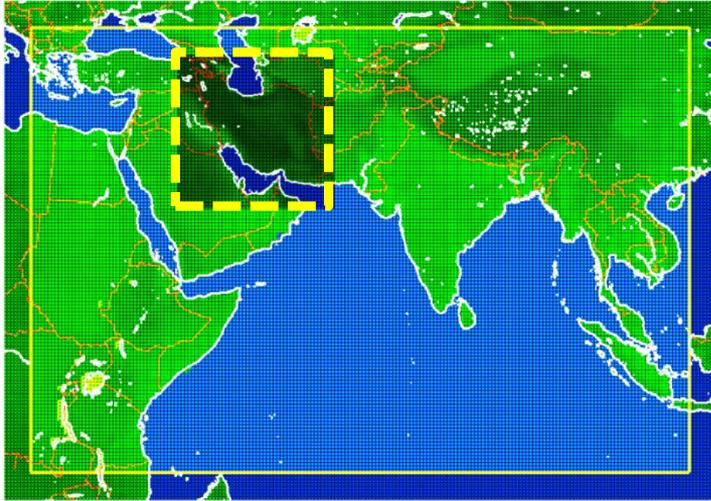


Monthly variations of temperature and precipitation for SAS and MENA domains and CRU over the period 1991-2005, for three driving models .

CORDEX-SAS vs. CORDEX-MENA

	CRU	MENA ESM2M	SAS ESM2M	MENA EC-EARTH	SAS EC-EARTH	MENA CM5	SAS CM5
Temperature (°C)	19.55	17.06	17.03	17.01	17.45	17.11	17.25
Precipitation (mm)	16.23	15.24	13.34	12.48	12.45	14.28	19.37

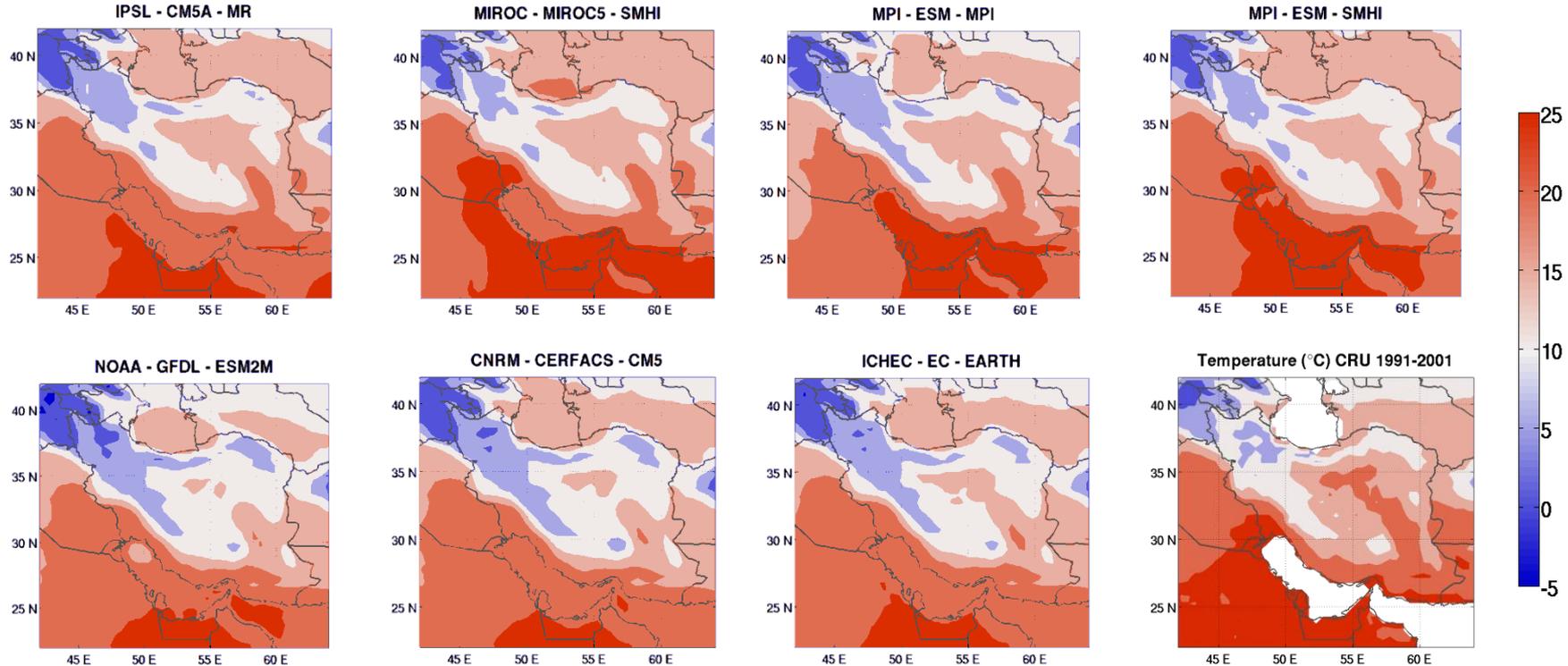
Monthly variations of temperature and precipitation for SAS and MENA domains and CRU over the period 1991-2005, for three driving models and over considered region.



longitude between 22N to 42N

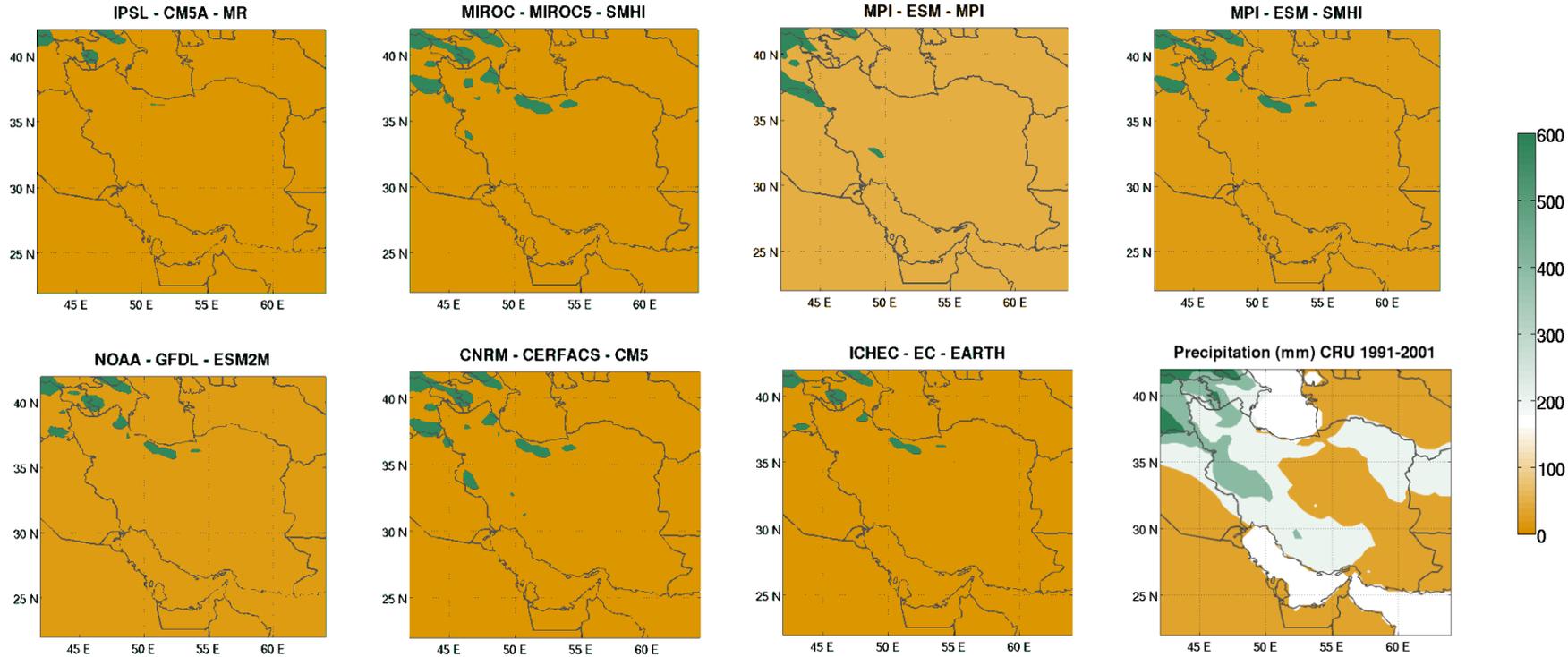
&

latitude between 42E to 64E.



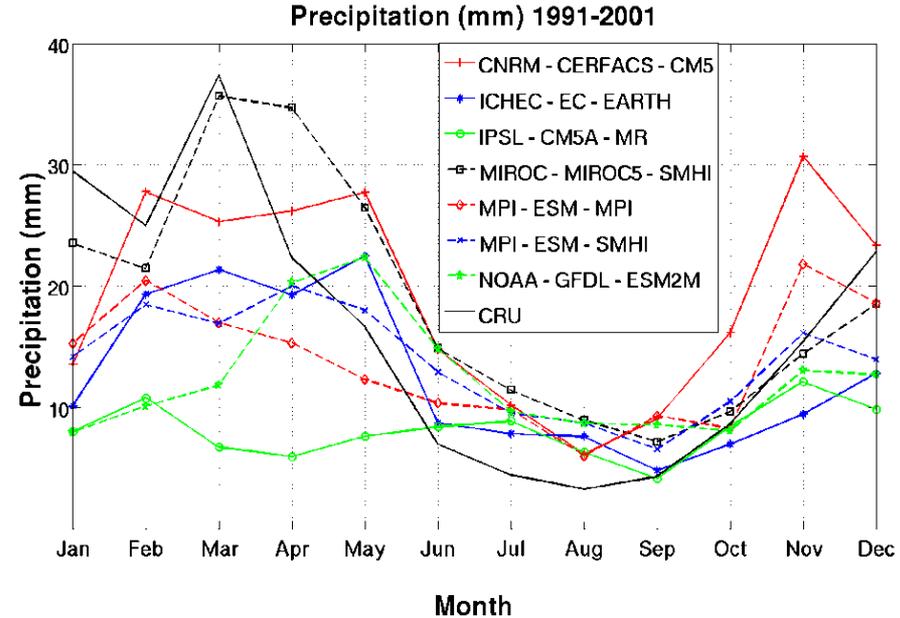
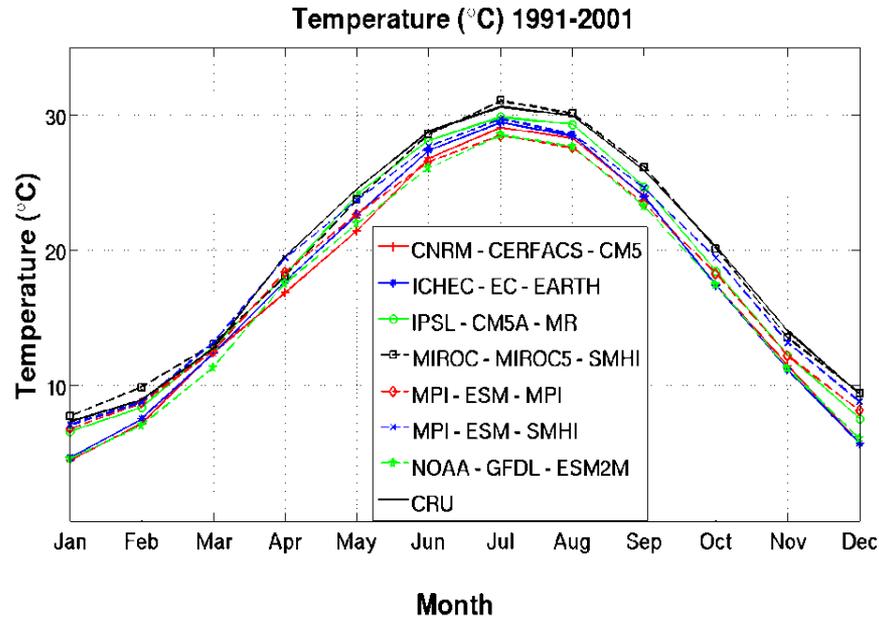
Annual average temperature of seven driving models for SAS domain, and CRU over the period 1991-2000.

Comparing Driving Models for CORDEX-SAS: Precipitation



Annual average precipitation of seven driving models for SAS domain, and CRU over the period 1991-2000.

Comparing Driving Models for CORDEX-SAS



Monthly variations of temperature and precipitation for SAS domain and CRU over the period 1991-2000, for seven driving models .

	Temperature (°C)	Precipitation (mm)
CRU	19.3194	16.4020
CNRM-CERFACE-CMP	17.0865	19.2501
ICHEC-EC-EARTH	17.3611	12.5819
IPSL-CM5A-MR	18.3546	8.1230
MIROC-MIROC5-SMH	19.2837	18.9101
MPI-ESM-MPI	17.8178	13.7229
MPI-ESM-SMHI	18.6709	13.8378
NOAA-GFDL-ESM2M	16.8907	12.3598

Monthly variations of temperature and precipitation for SAS domain and CRU over the period 1991-2005, for seven driving models and over considered region.



Comparing BATS and CLM

Model Domain: 22-42 N, 42-64 E

Resolution: 30Km

Analysis Period: 1990 – 2010

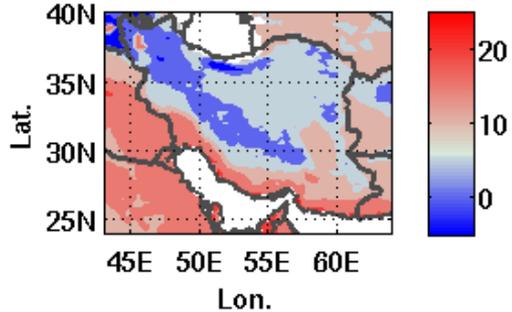
Driving Model: NNRP1

SST: NOAA

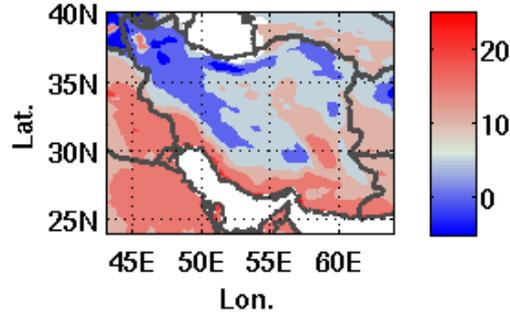
Convection Scheme: Emanuel

Comparing BATS and CLM: Temperature

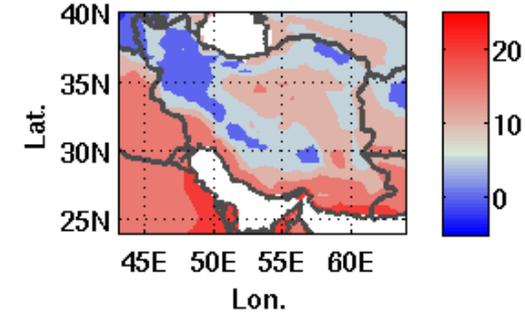
RegCM BATS Min-Temperature (°C) 1991-1995



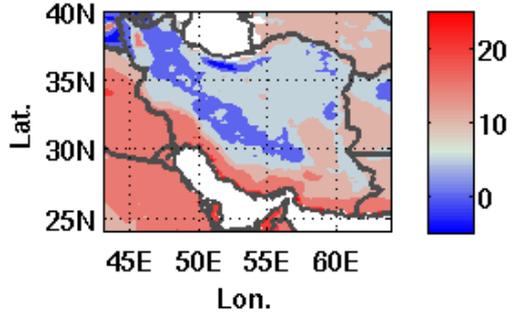
RegCM CLM Min-Temperature (°C) 1991-1995



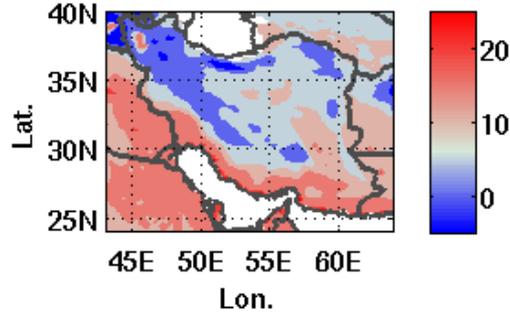
CRU Min-Temperature (°C) 1991-1995



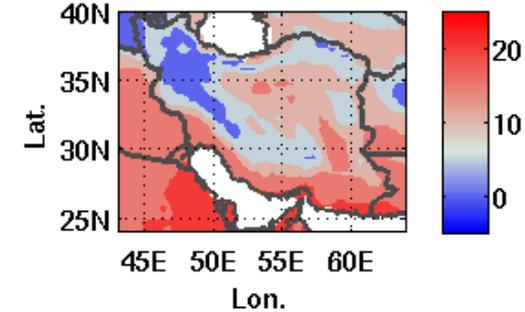
RegCM BATS Min-Temperature (°C) 2006-2010



RegCM CLM Min-Temperature (°C) 2006-2010



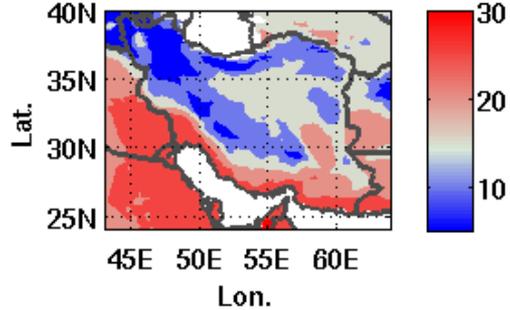
CRU Min-Temperature (°C) 2006-2010



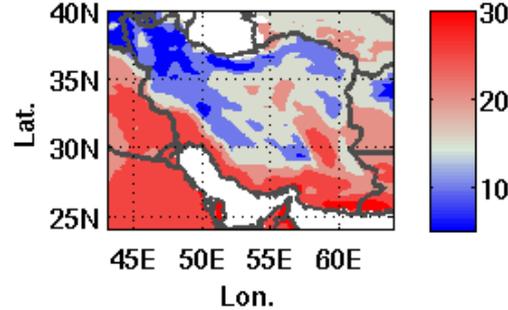
Annual mean value of Min Temperature for BATS and CLM, and CRU over the period 1991-2010.

Comparing BATS and CLM: Temperature

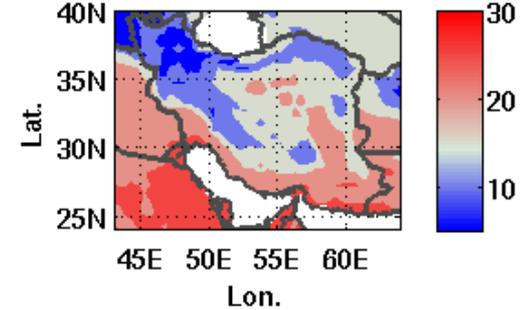
RegCM BATS Temperature (°C) 1991-1995



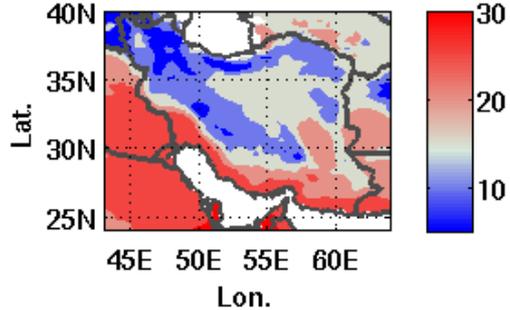
RegCM CLM Temperature (°C) 1991-1995



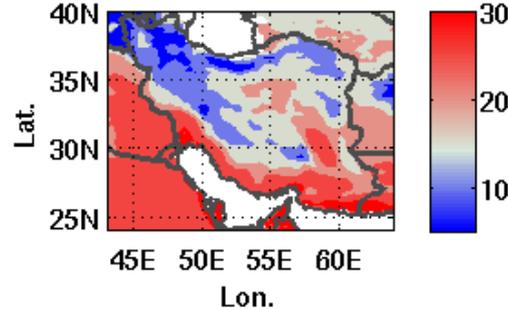
CRU Temperature (°C) 1991-1995



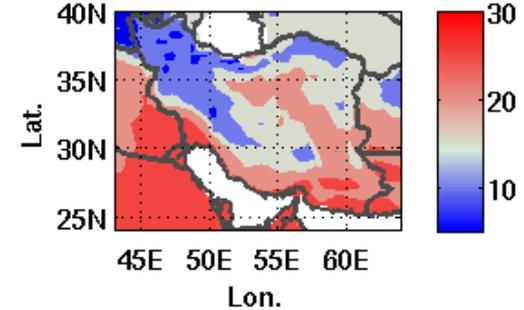
RegCM BATS Temperature (°C) 2006-2010



RegCM CLM Temperature (°C) 2006-2010



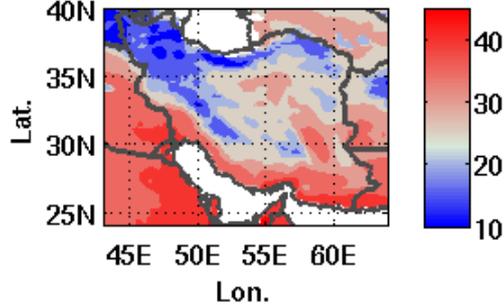
CRU Temperature (°C) 2006-2010



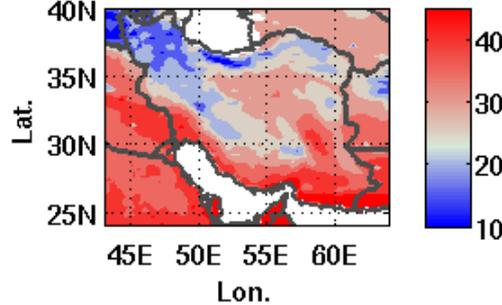
Annual mean value of Mean Temperature for BATS and CLM, and CRU over the period 1991-2010.

Comparing BATS and CLM: Temperature

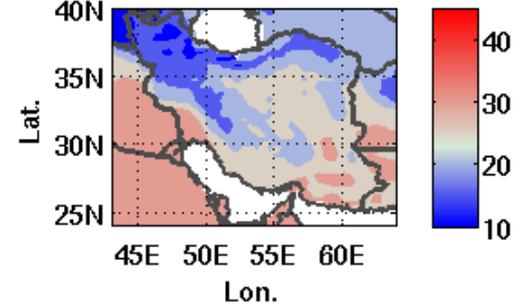
RegCM BATS Max-Temperature (°C) 1991-1995



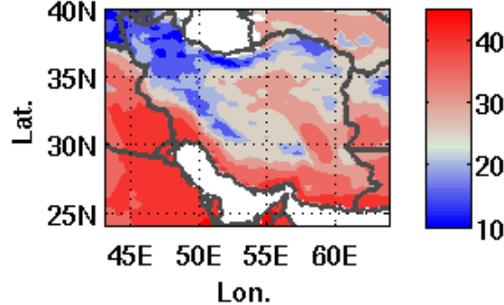
RegCM CLM Max-Temperature (°C) 1991-1995



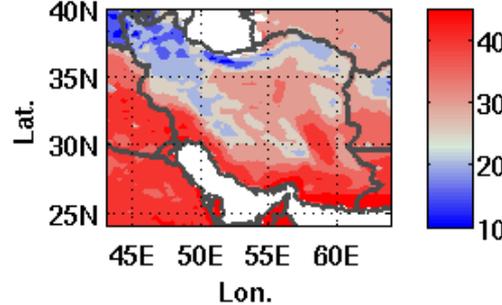
CRU Max-Temperature (°C) 1991-1995



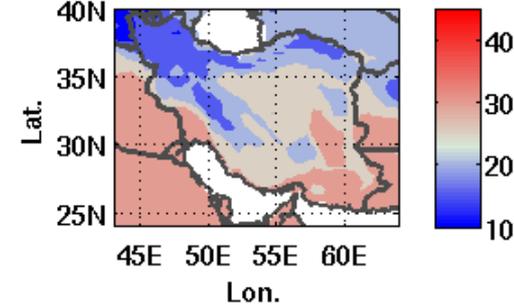
RegCM BATS Max-Temperature (°C) 2006-2010



RegCM CLM Max-Temperature (°C) 2006-2010

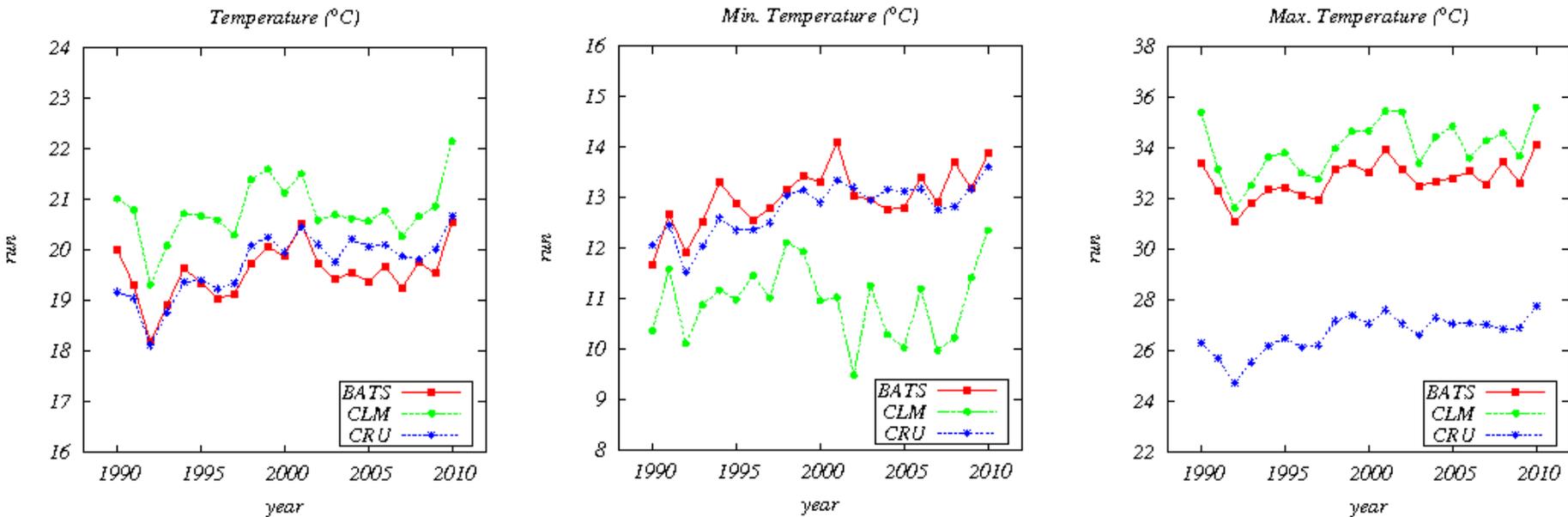


CRU Max-Temperature (°C) 2006-2010



Annual mean value of Max Temperature for BATS and CLM, and CRU over the period 1991-2010.

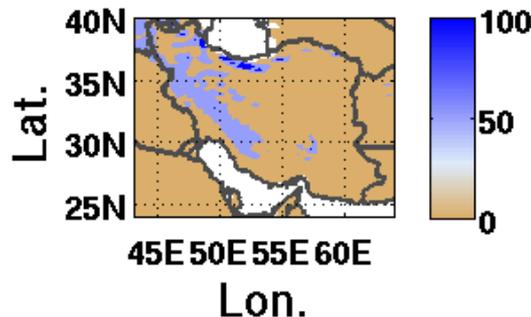
Comparing BATS and CLM: Temperature



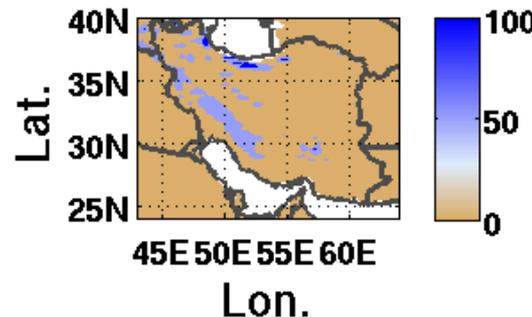
Annual mean value of Temperature for BATS and CLM, and CRU over the period 1991-2010.

Comparing BATS and CLM: Precipitation

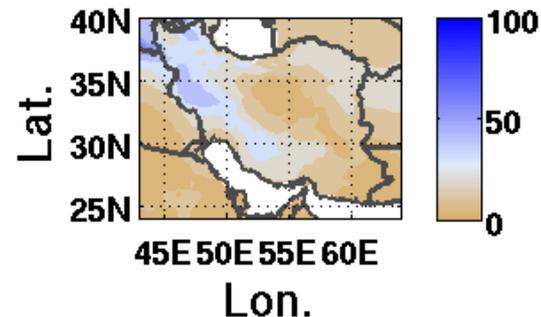
RegCM BATS Precipitation (mm) 1991-1995



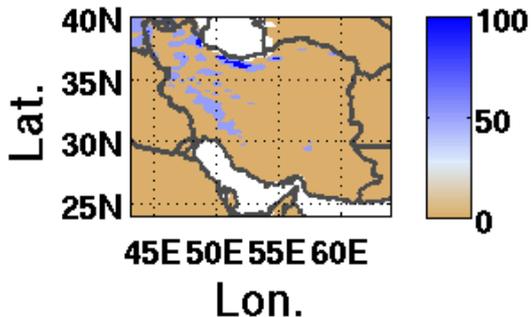
RegCM CLM Precipitation (mm) 1991-1995



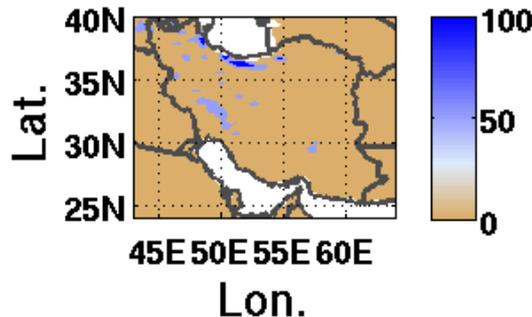
CRU Precipitation (mm) 1991-1995



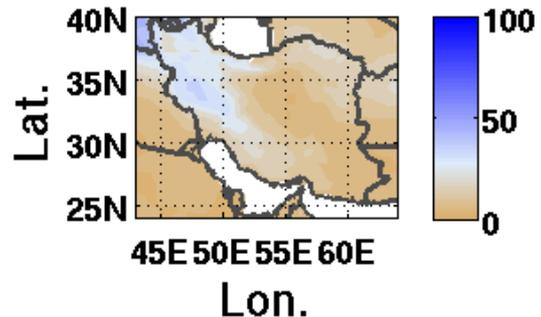
RegCM BATS Precipitation (mm) 2006-2010



RegCM CLM Precipitation (mm) 2006-2010

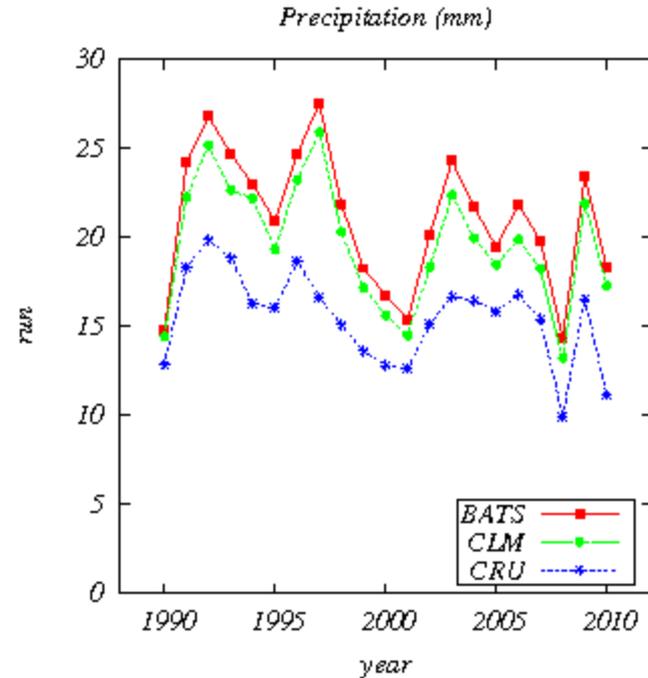


CRU Precipitation (mm) 2006-2010



Annual mean value of Precipitation for BATS and CLM, and CRU over the period 1991-2010.

Comparing BATS and CLM: Precipitation



Annual mean value of Precipitation for BATS and CLM, and CRU over the period 1991-2010.



Conclusion

We investigated two CORDEX domains which include Iran and considering temperature and precipitation, found that simulations over CORDEX-SAS has the best agreement with observational data.

Then we assessed different deriving models to find which one shows more fidelity in downscaling the regional climate of Iran.

Comparing BATS and CLM, it seems that BATS for average, minimum, and maximum temperatures leads to better results. Although difference between CLM and BATS is very small, CLM adjusts precipitation better than BATS.

Thanks for your attention

IASBS (2013)

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