

**The Sixth Session of the East Asia Winter Climate Outlook Forum (EASCOF-6)**

**Seasonal Climate Outlook for coming winter of  
2018/19 over Mongolia using dynamical model  
and statistical downscaling**

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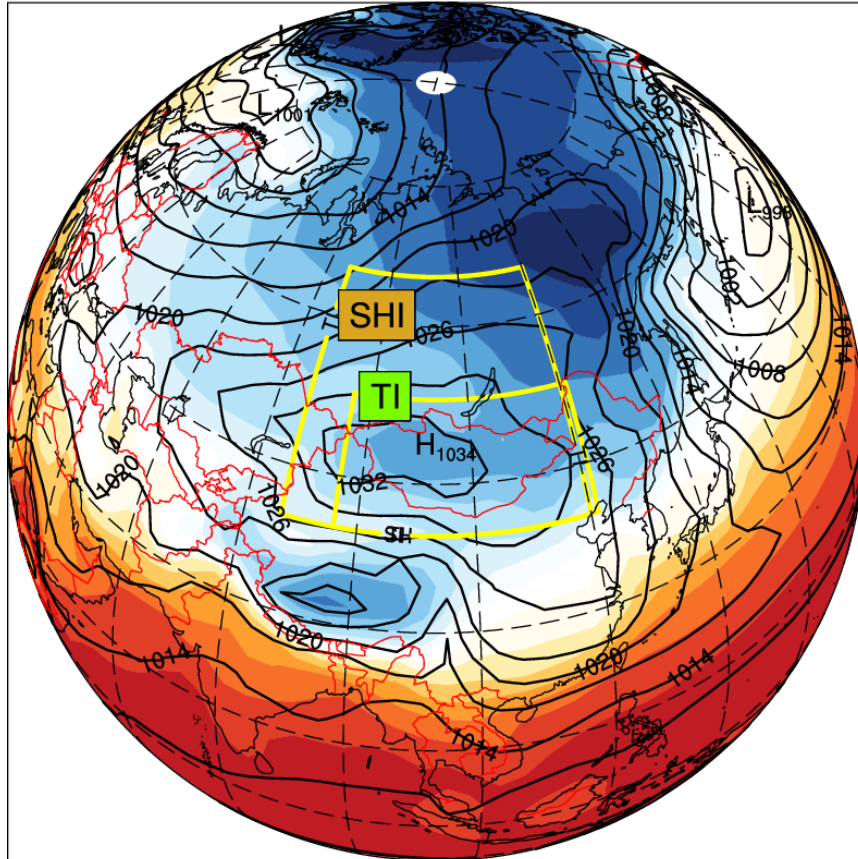
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# Background

## Large scale climate variables (LCV)

NCEP:

DJF



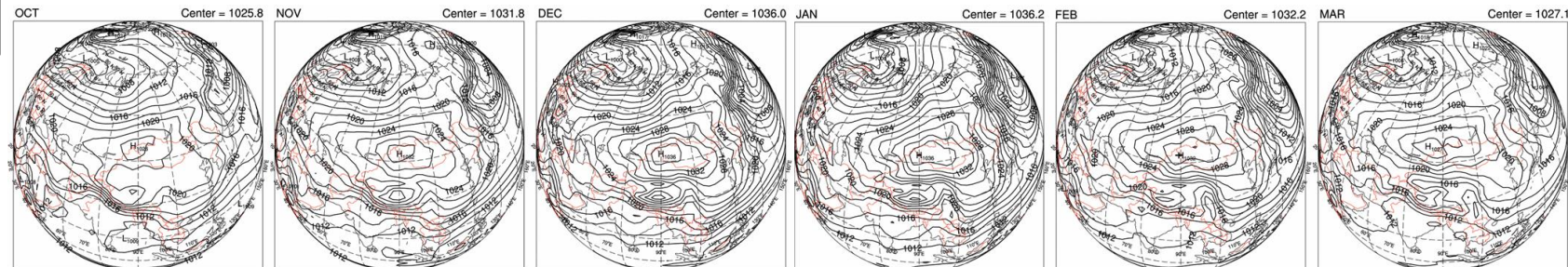
**Large scale temperature index (TI):**

TI is defined as area averaged (87-121E, 40-53N) monthly mean temperature at 2 meter from NCEP II.

**Siberian high индекс (SHI):**

SHI is defined as area averaged (80-120E, 40-65N) monthly mean SLP from NCEP II

**Data period: from 1981 to now**



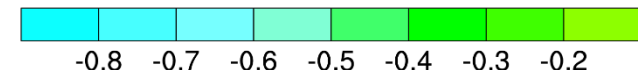
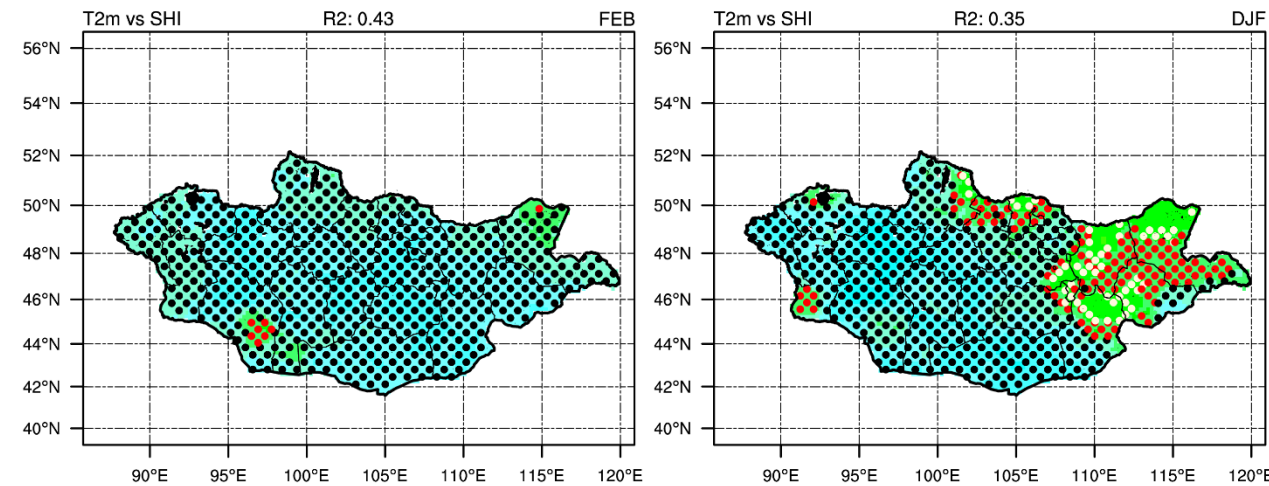
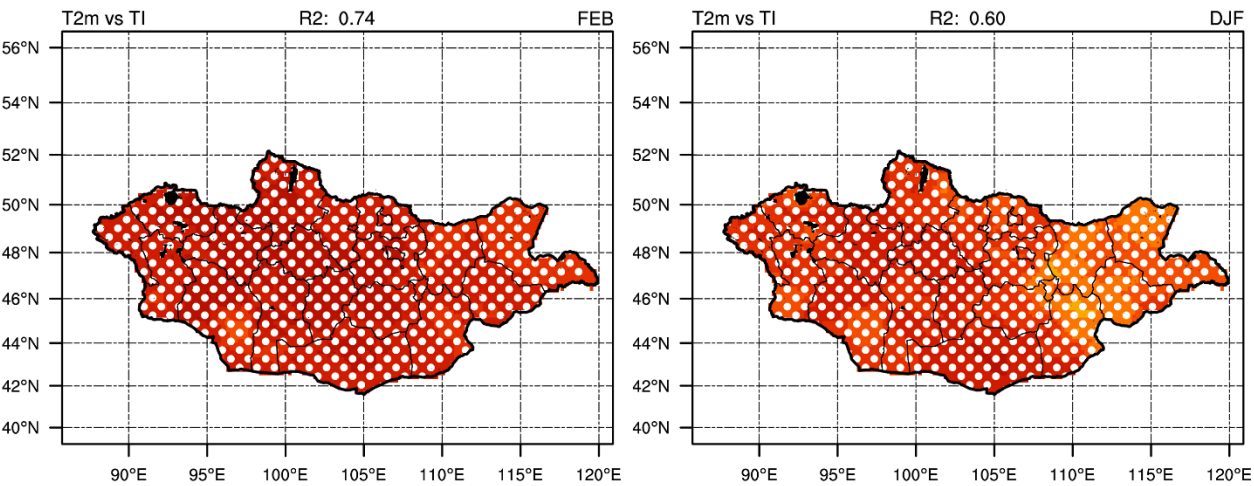
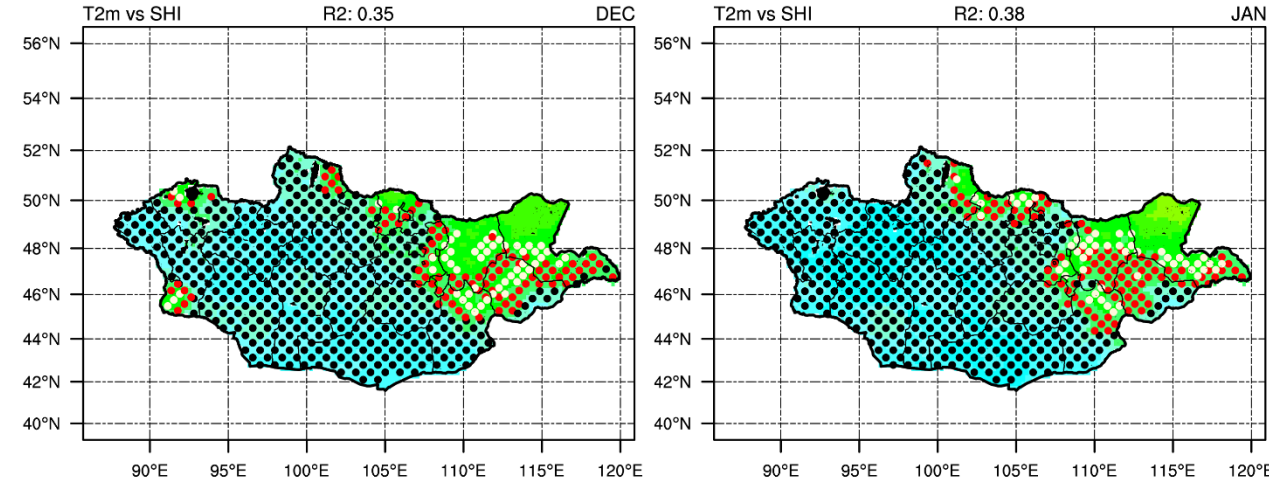
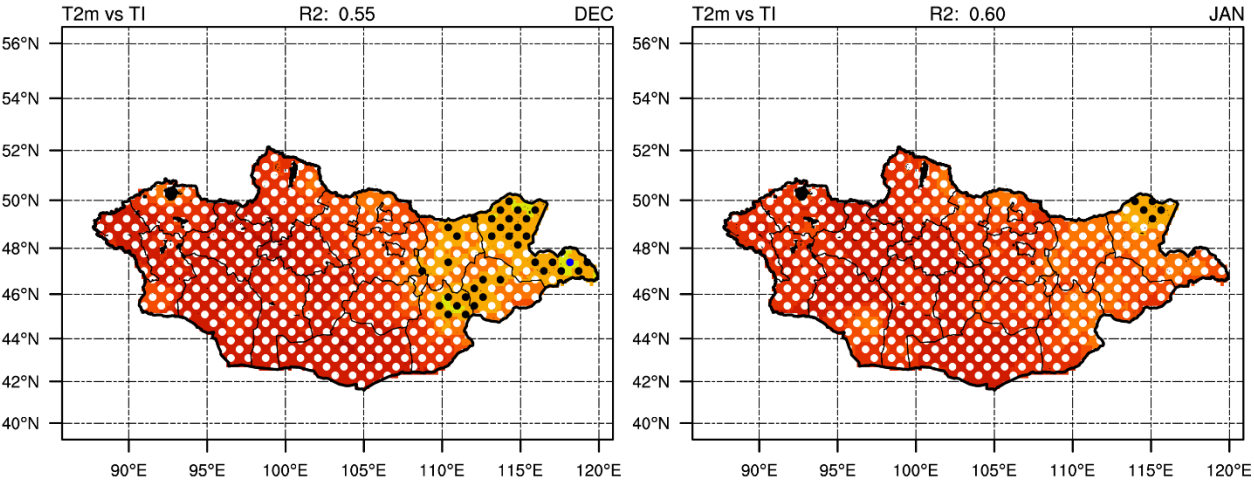
-30 -22 -14 -6 2 10 18 26

# Background

## Relationship between LCV's and local temperature in winter

TI

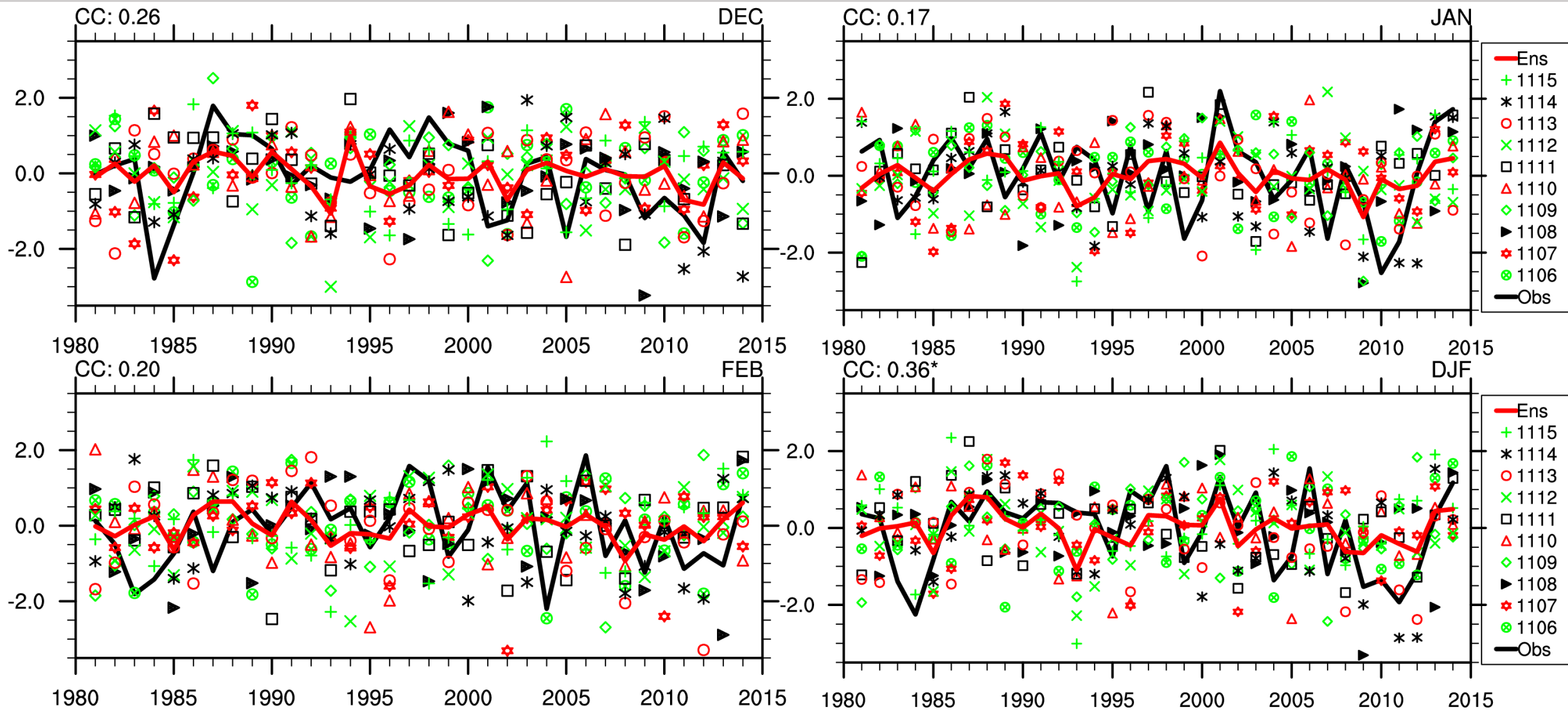
SHI





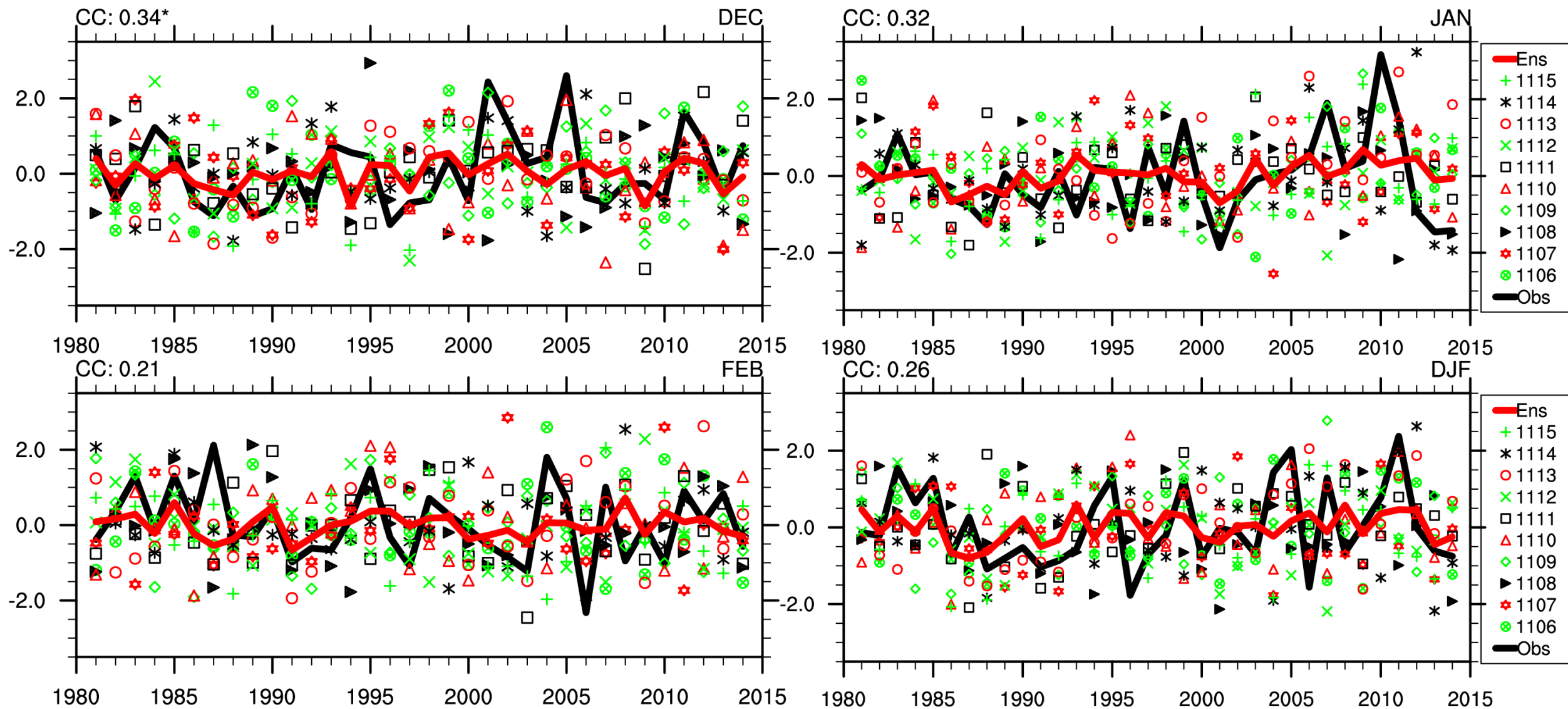
# Hindcast experiment of a CGCM

## Time series of observed and predicted TI



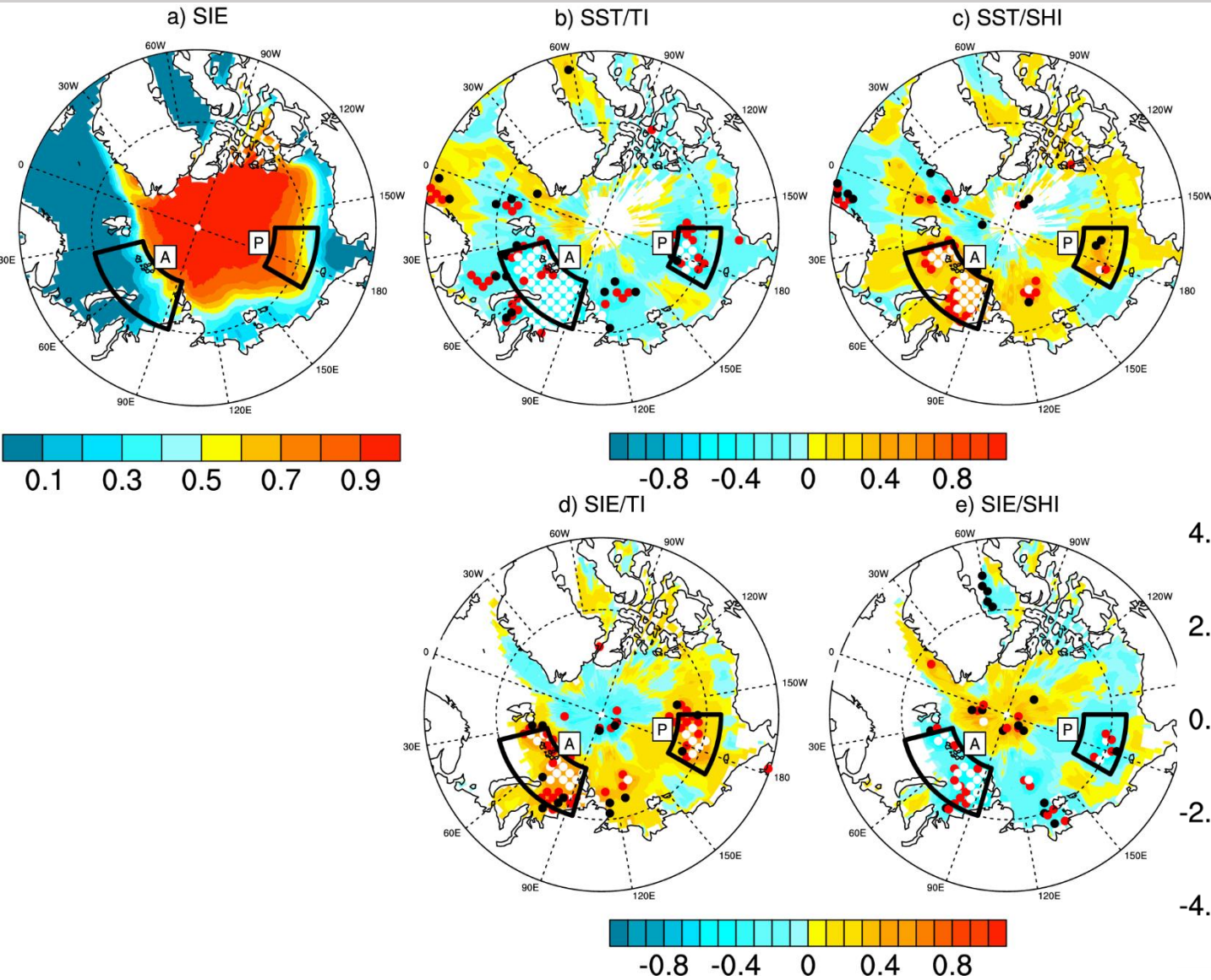
# Hindcast experiment of a CGCM

## Time series of observed and predicted SHI



# Arctic Impact

## Relationship between ASO SST/SIE and DJF TI/SHI

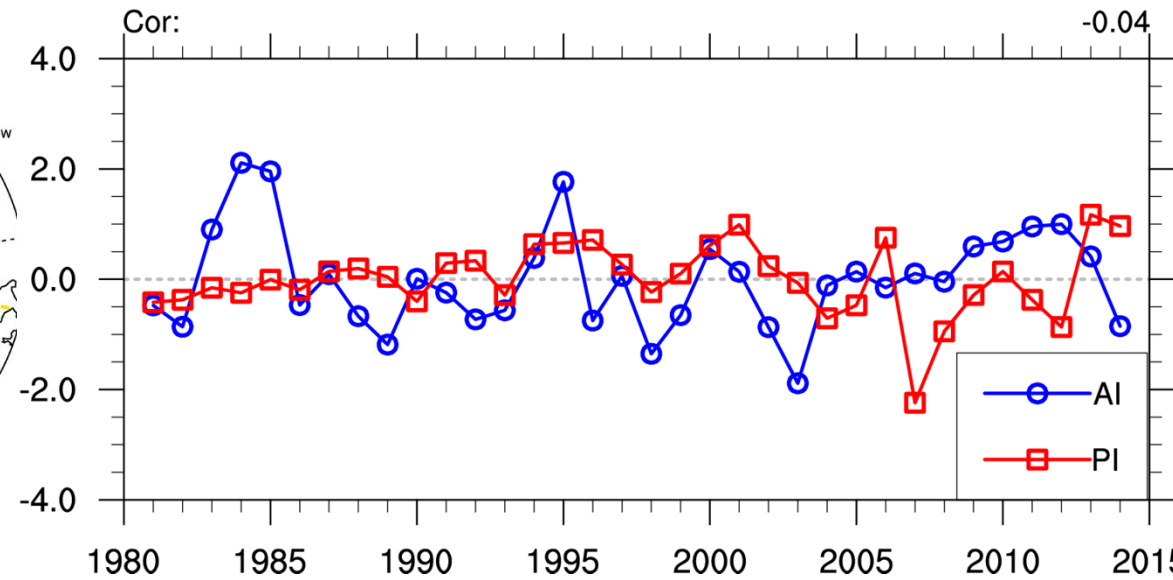


### A index (AI):

AI is defined as area averaged (34-94E, 75-82N) ASO SST from Research Data Archive at NCAR.

### P index (PI):

PI is defined as area averaged (170E-160W, 73-79N) ASO SIE from Research Data Archive at NCAR.





# Artic Impact

MLR model based on AI and PI for TI and SHI

|           | $TI_{MLR}$     |    |             |      |                      |
|-----------|----------------|----|-------------|------|----------------------|
| Model     | Sum of squares | df | Mean square | $F$  | Sig.                 |
| Regrssion | 23.6           | 2  | 11.8        | 30.6 | $4.5 \times 10^{-8}$ |
| Residual  | 11.9           | 31 | 0.38        |      |                      |
| Total     | 35.5           | 33 | 1.1         |      |                      |
| $R^2$     | 0.66           |    |             |      |                      |

|           | $SHI_{MLR}$    |    |             |       |                      |
|-----------|----------------|----|-------------|-------|----------------------|
| Model     | Sum of squares | df | Mean square | $F$   | Sig.                 |
| Regrssion | 15.8           | 2  | 7.90        | 12.43 | $1.1 \times 10^{-4}$ |
| Residual  | 19.8           | 31 | 0.64        |       |                      |
| Total     | 35.7           | 33 | 1.1         |       |                      |
| $R^2$     | 0.44           |    |             |       |                      |

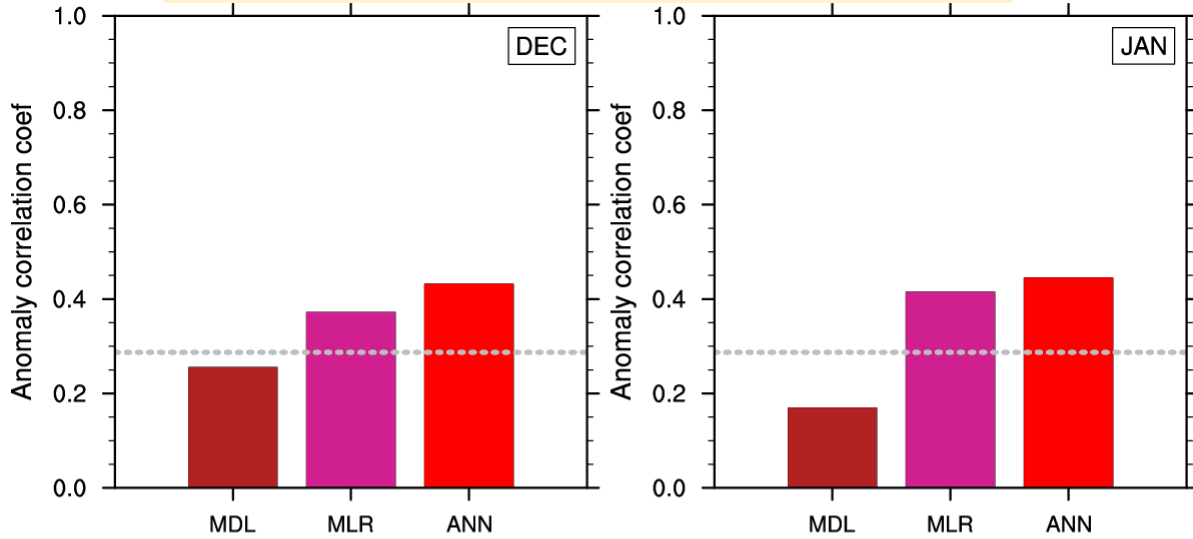




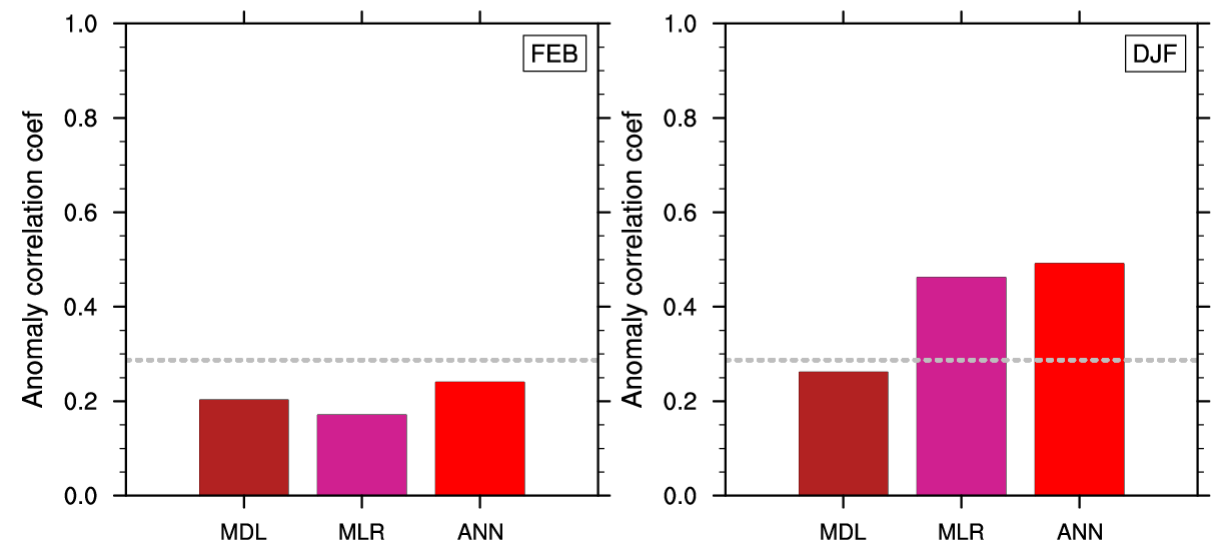
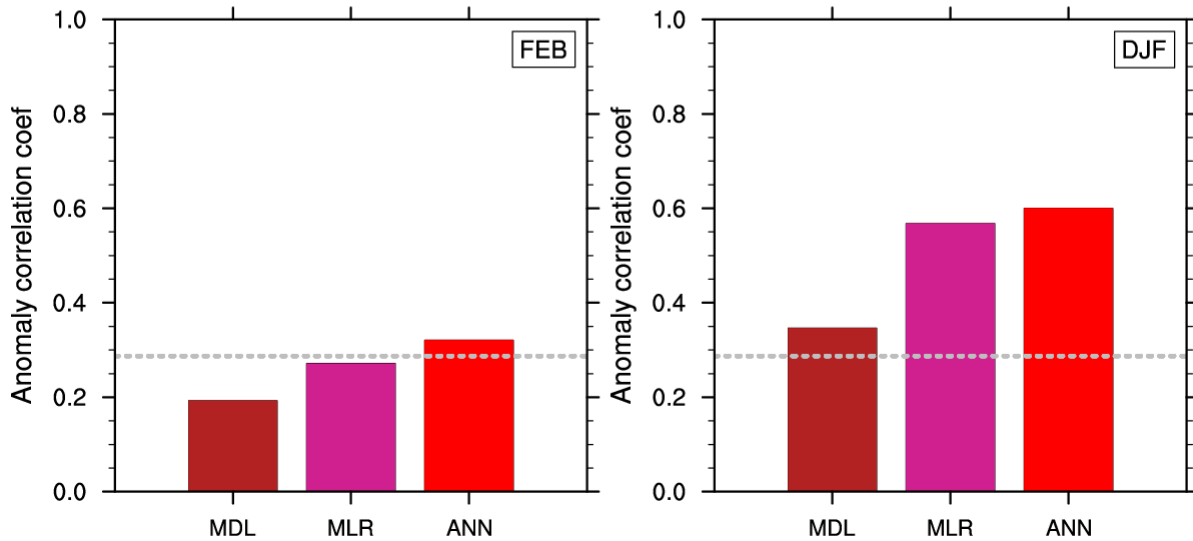
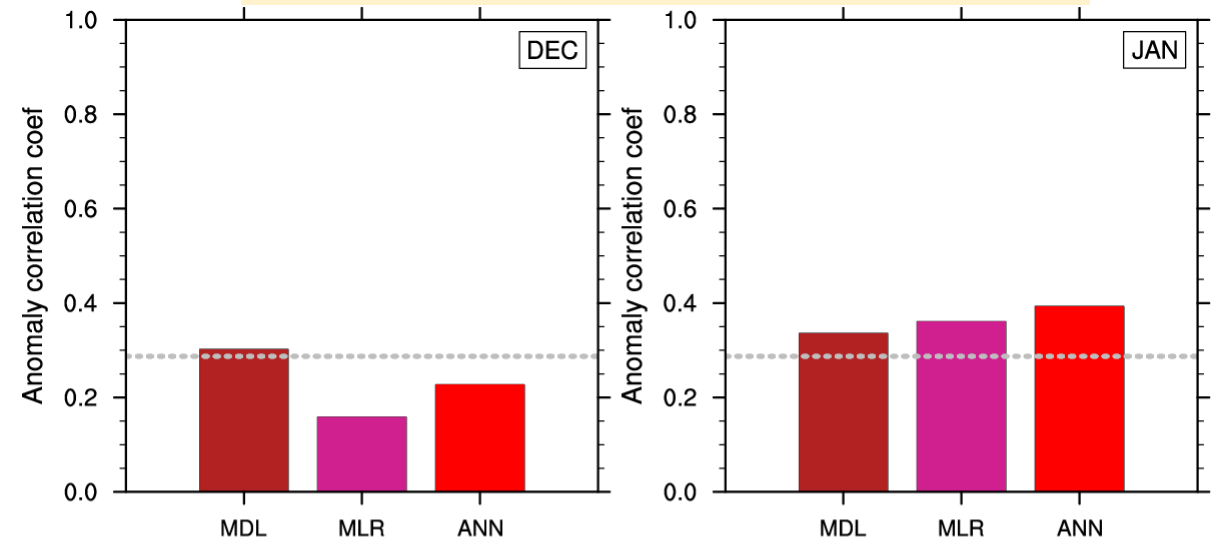
# Verification of prediction system

Correlation coefficients of observed and predicted indices with MDL, MRL and ANN

TI

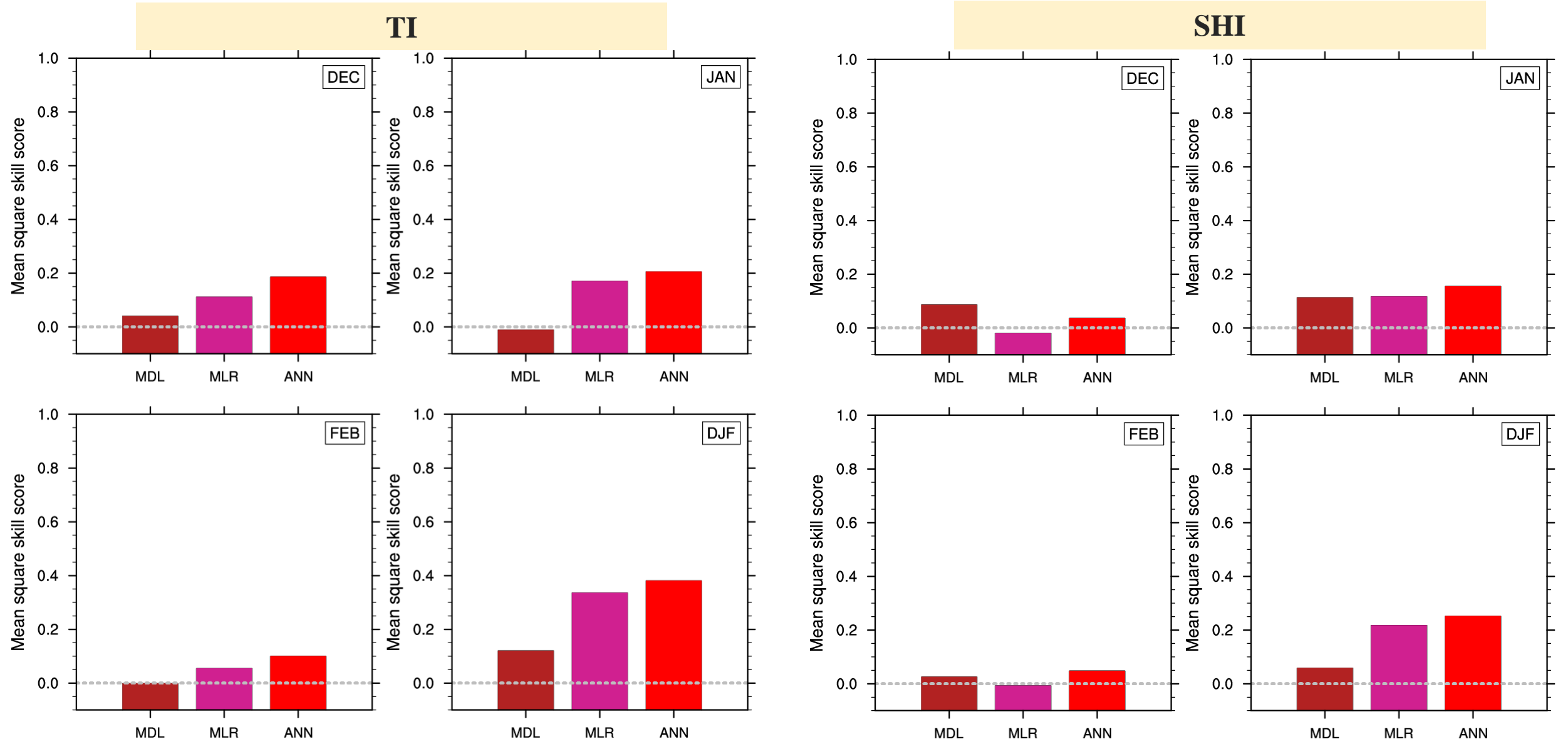


SHI



# Verification of prediction system

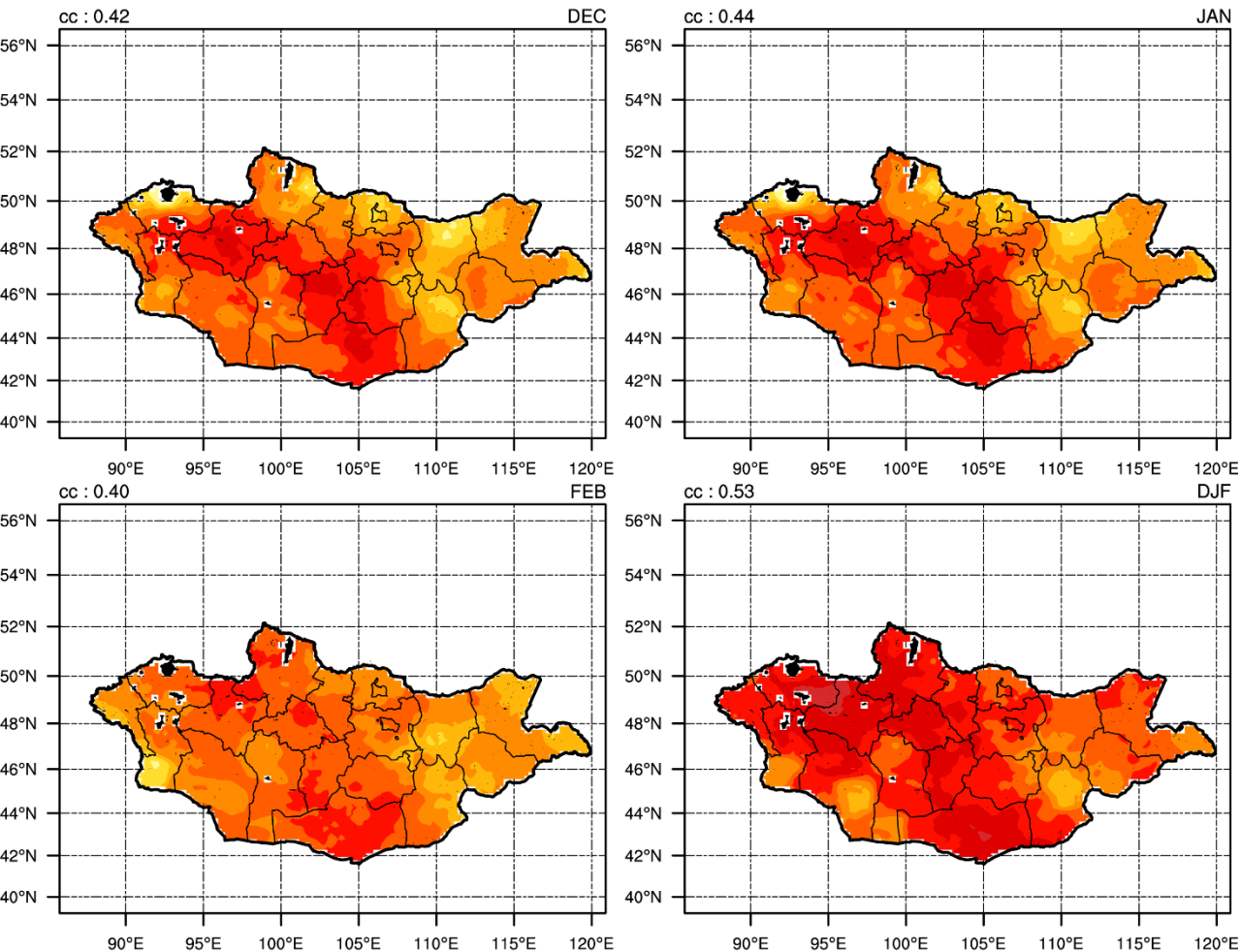
Mean square skill score of observed and predicted indices with MDL, MRL and ANN



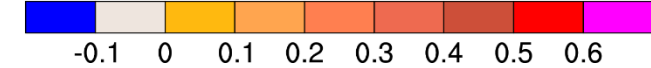
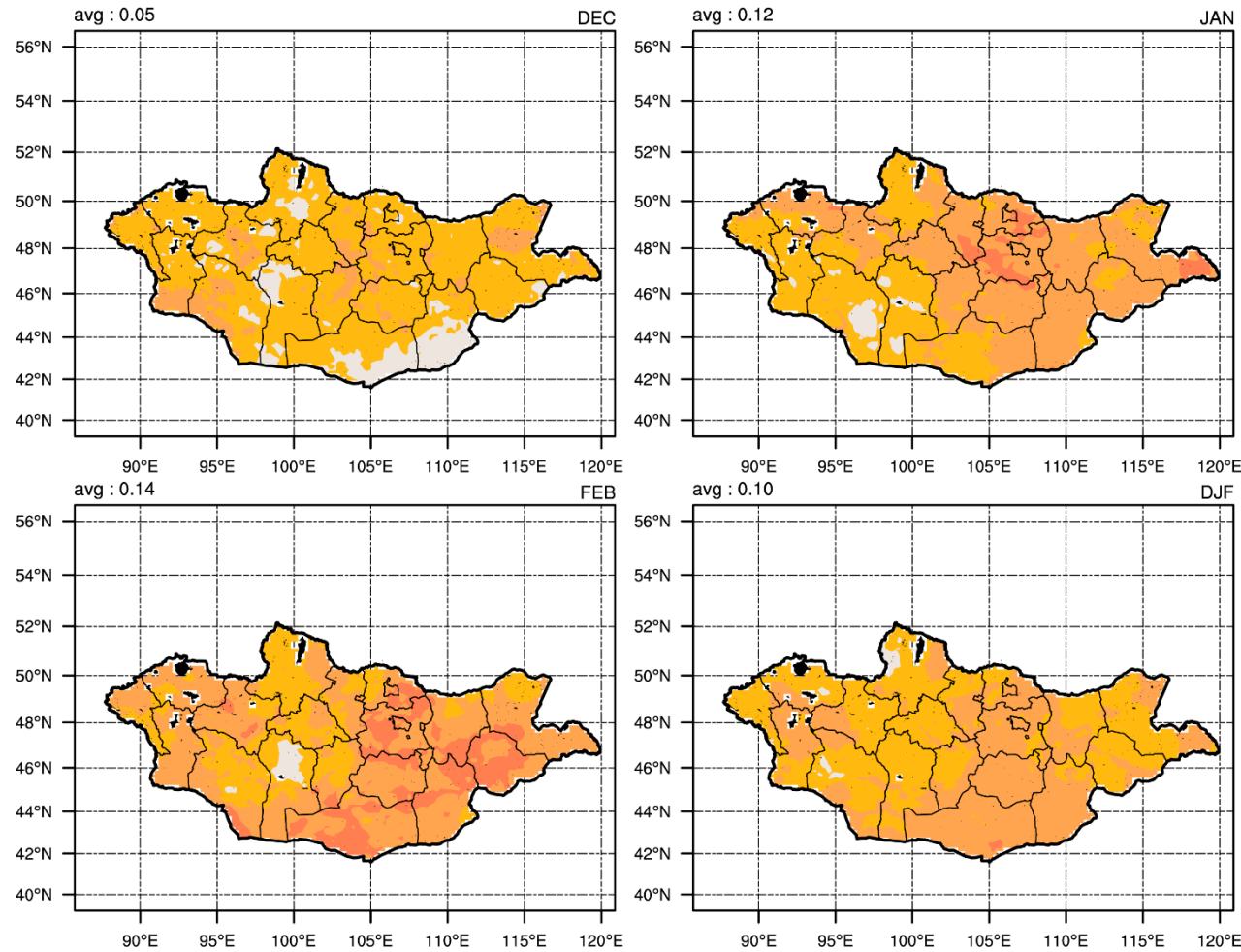
# Verification of prediction system

## Verification of T2m in deterministic and probabilistic prediction

### Correlation coefficients



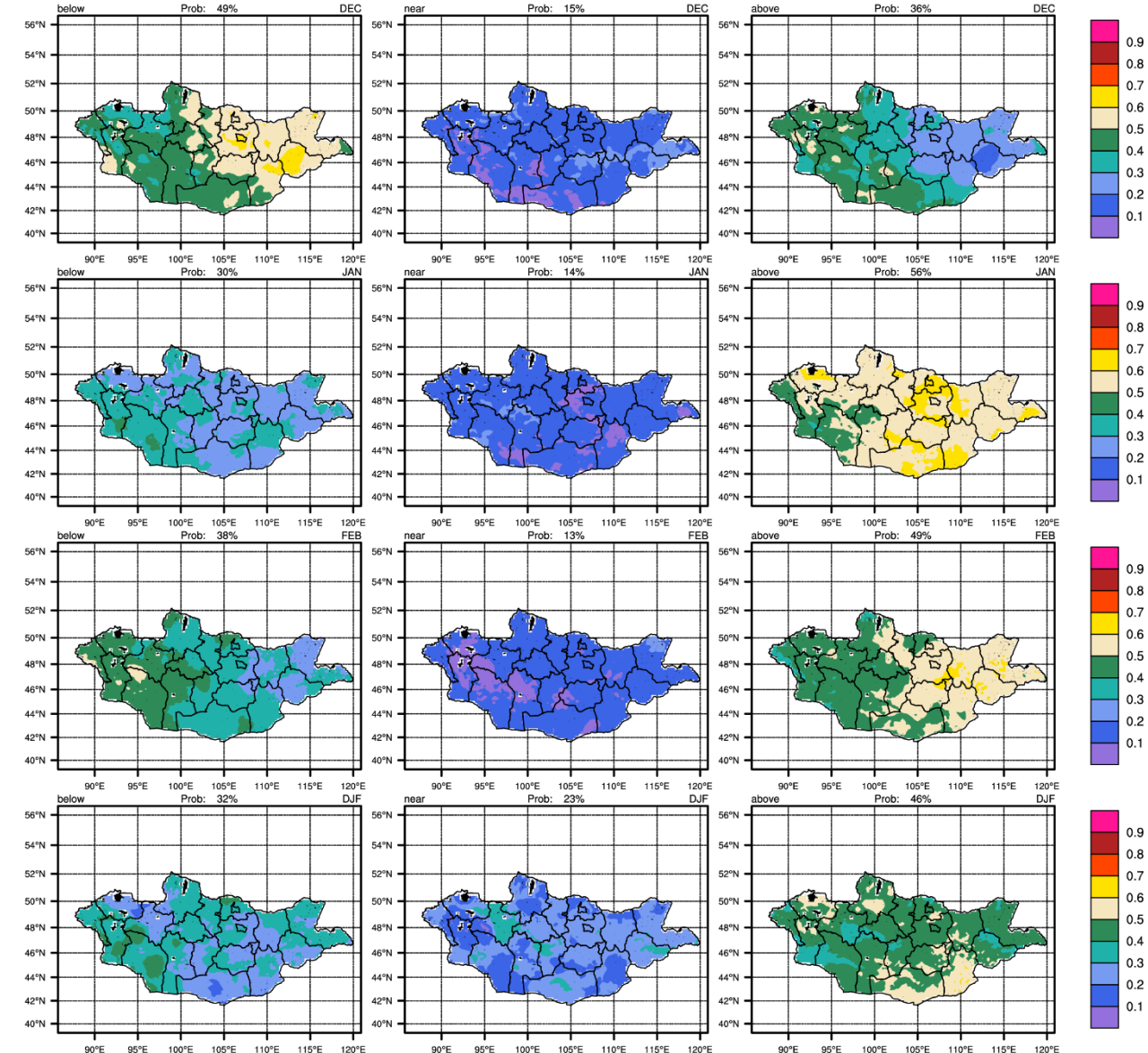
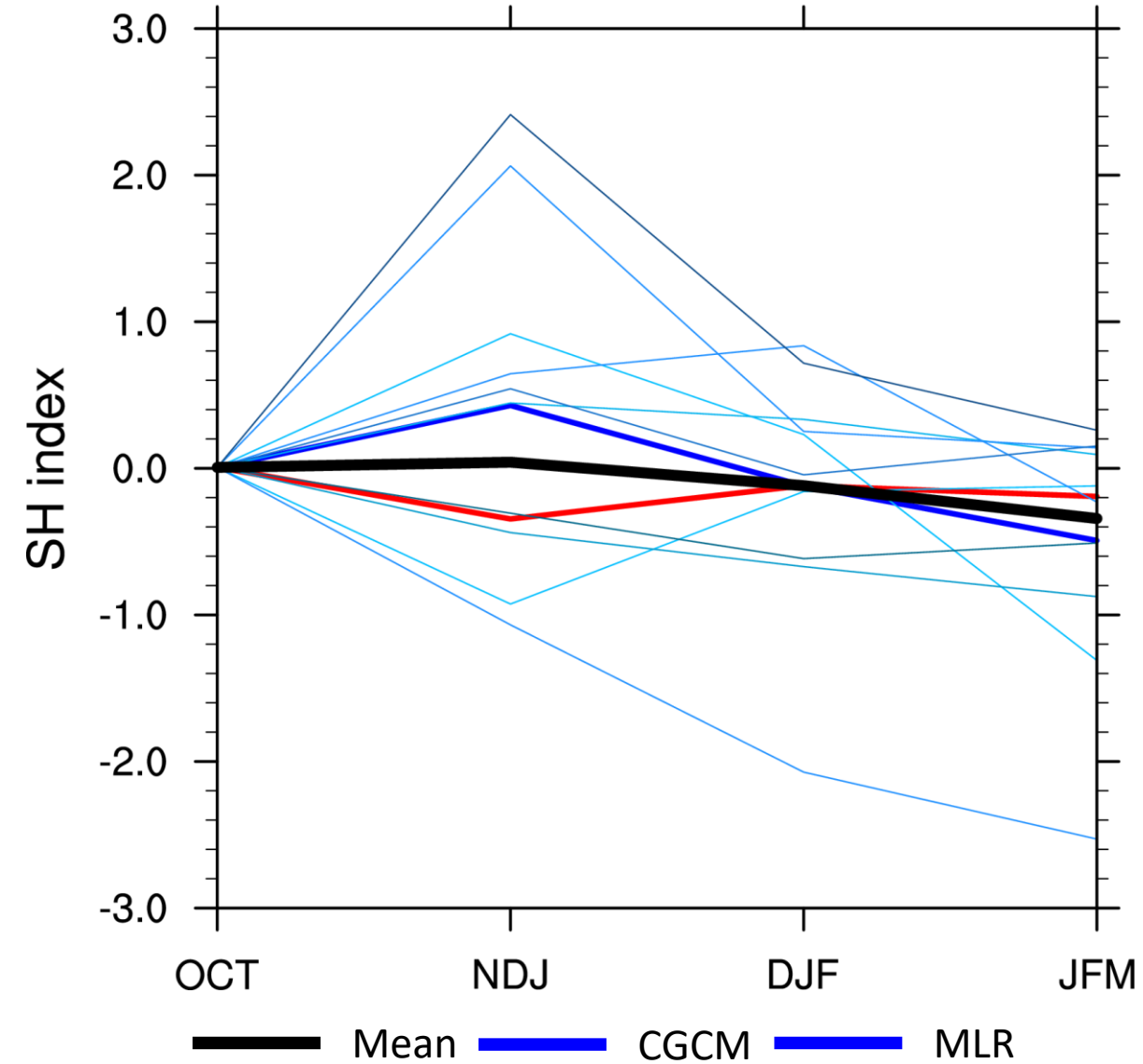
### Ranked Probabilistic Skill Score





# Results

## SHI and aT2m prediction for winter 2018/2019



# Outlook for 2018/2019

SHI expected to be weak in this winter according to dynamical and statistical model

| Region | Temperature | Precipitation |
|--------|-------------|---------------|
| DEC    |             |               |
| W      | 0/-         | -/0           |
| C      | -/0         | +/0           |
| E      | 0/-         | +/0           |
| S      | 0           | 0             |
| JAN    |             |               |
| W      | +/0         | 0             |
| C      | 0           | 0             |
| E      | -/0         | 0/+           |
| S      | +/0         | -/0           |

| Region | Temperature | Precipitation |
|--------|-------------|---------------|
| FEB    |             |               |
| W      | 0           | +/0           |
| C      | 0           | 0/+           |
| E      | 0           | -/0           |
| S      | +/0         | -/0           |
| DJF    |             |               |
| W      | 0           | 0/+           |
| C      | 0           | 0/+           |
| E      | 0/-         | +/0           |
| S      | +/0         | 0/-           |

|   |       |   |        |   |       |
|---|-------|---|--------|---|-------|
| + | above | 0 | normal | - | below |
|---|-------|---|--------|---|-------|