

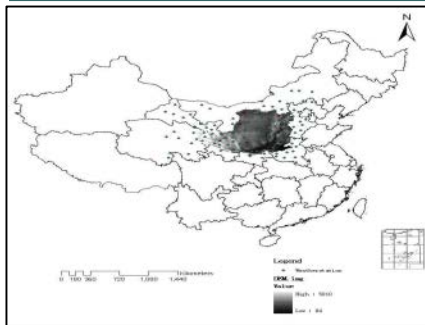
# The Dynamic Changes of Soil Moisture in Loess Plateau

between 1961-2000 and under climate changes

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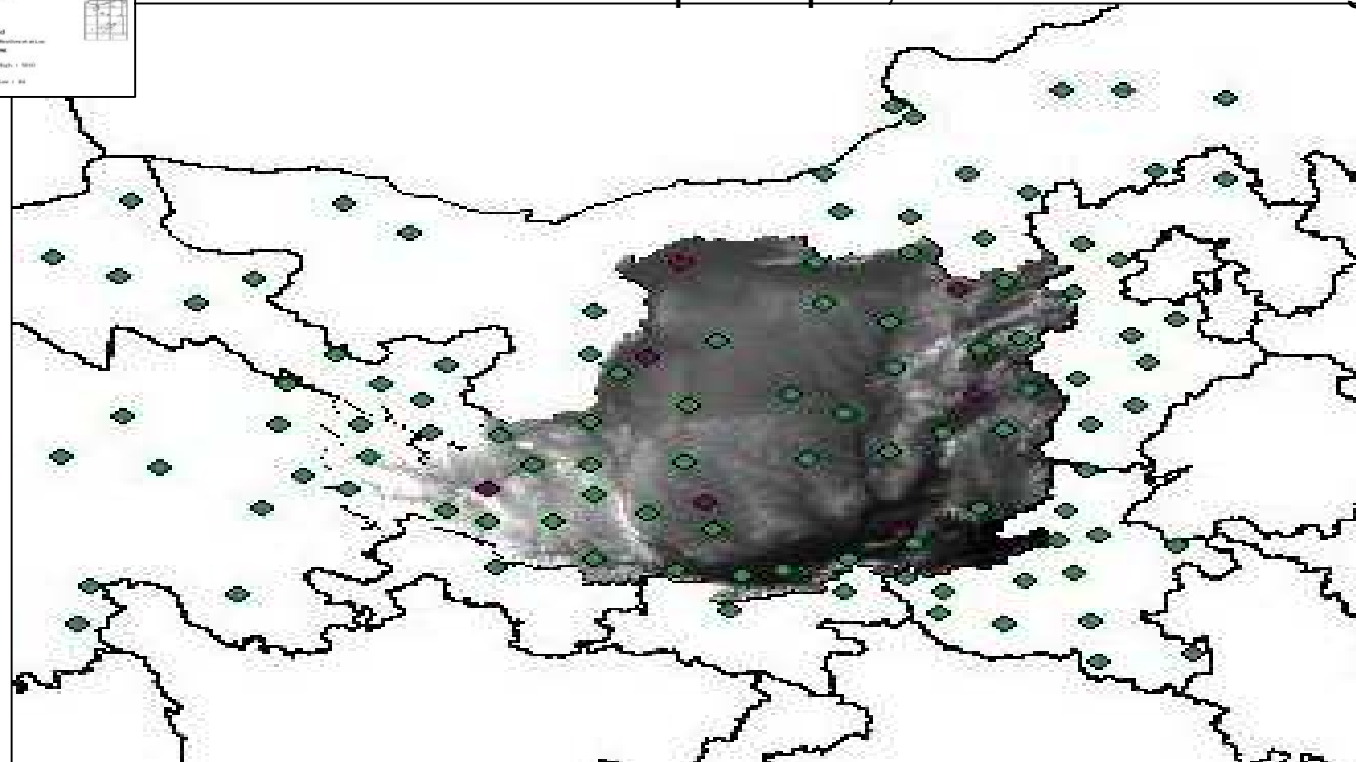
# 1. Location and Environmental Situation



Area: 517,000 km<sup>2</sup>, 5.3% of total land  
Precipitation: 70% in July, August and Sept.

Population: 87.42 millions (2000)

Water resource: 548 m<sup>3</sup> per capita, 1/5 of national average.





## 2. Models and Data

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- Soil water balance model

$$W_{s2} = W_{s1} + P - E_s - X$$

- Conversion model of soil mechanical classification between Intl. standard and U.S. standard

$$P(r) = \frac{1}{1 + (1/P(r_0) - 1) \exp(-uR^c)}$$

- Pedotransfer functions for soil field capacity estimation

$$\psi = A\theta^B$$

## 2. Models and Data

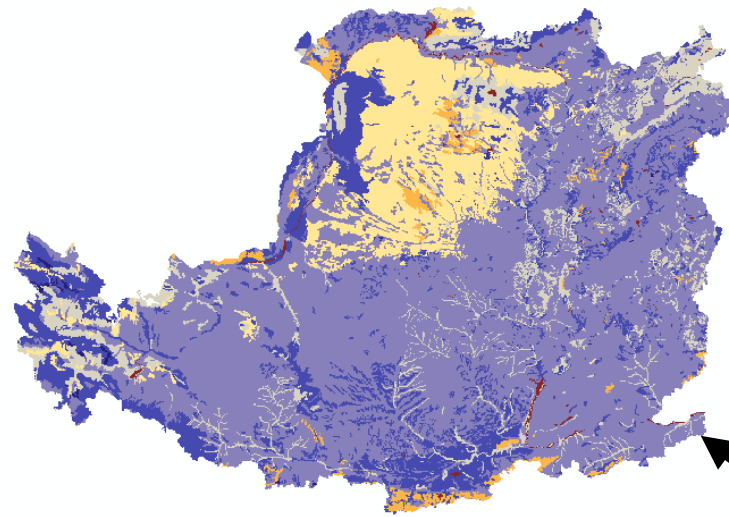
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- Soil effective depth (by Saxton etc, 1989), depending on soil texture and vegetation type
- Other models: Evaporation (Penman-Monteith), interpolation (by ANUSPLINE, Hutchinson, 1989 ), etc.
- Data
  - Soil map, soil profile data, climate data, land use map, GCM data (CCSR/NIES, A1B ),DEM data (SRTM)

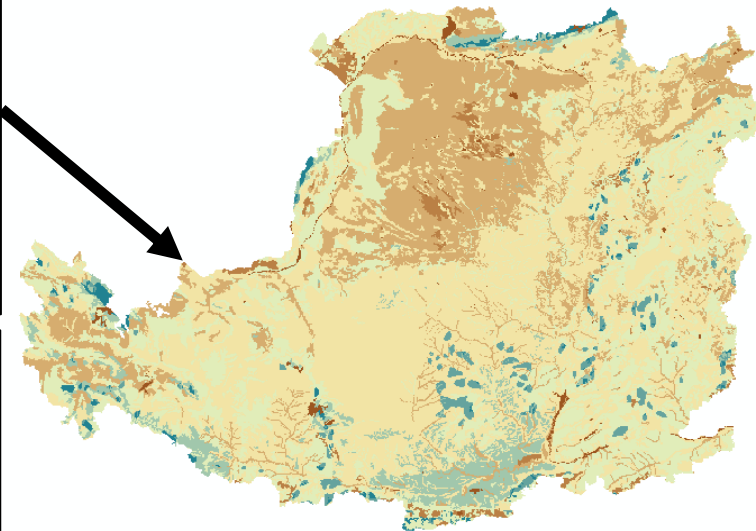
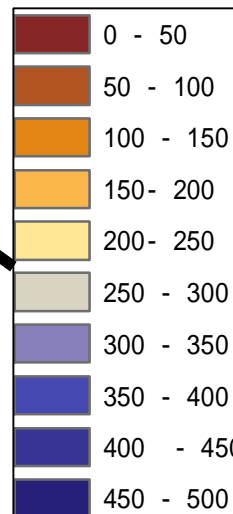
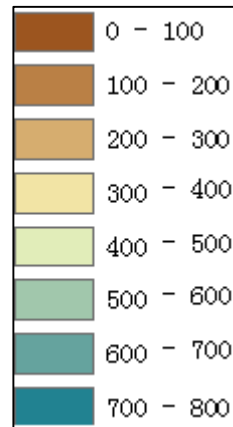


### 3. Outputs

#### ◆ Soil field capacity (in mm)



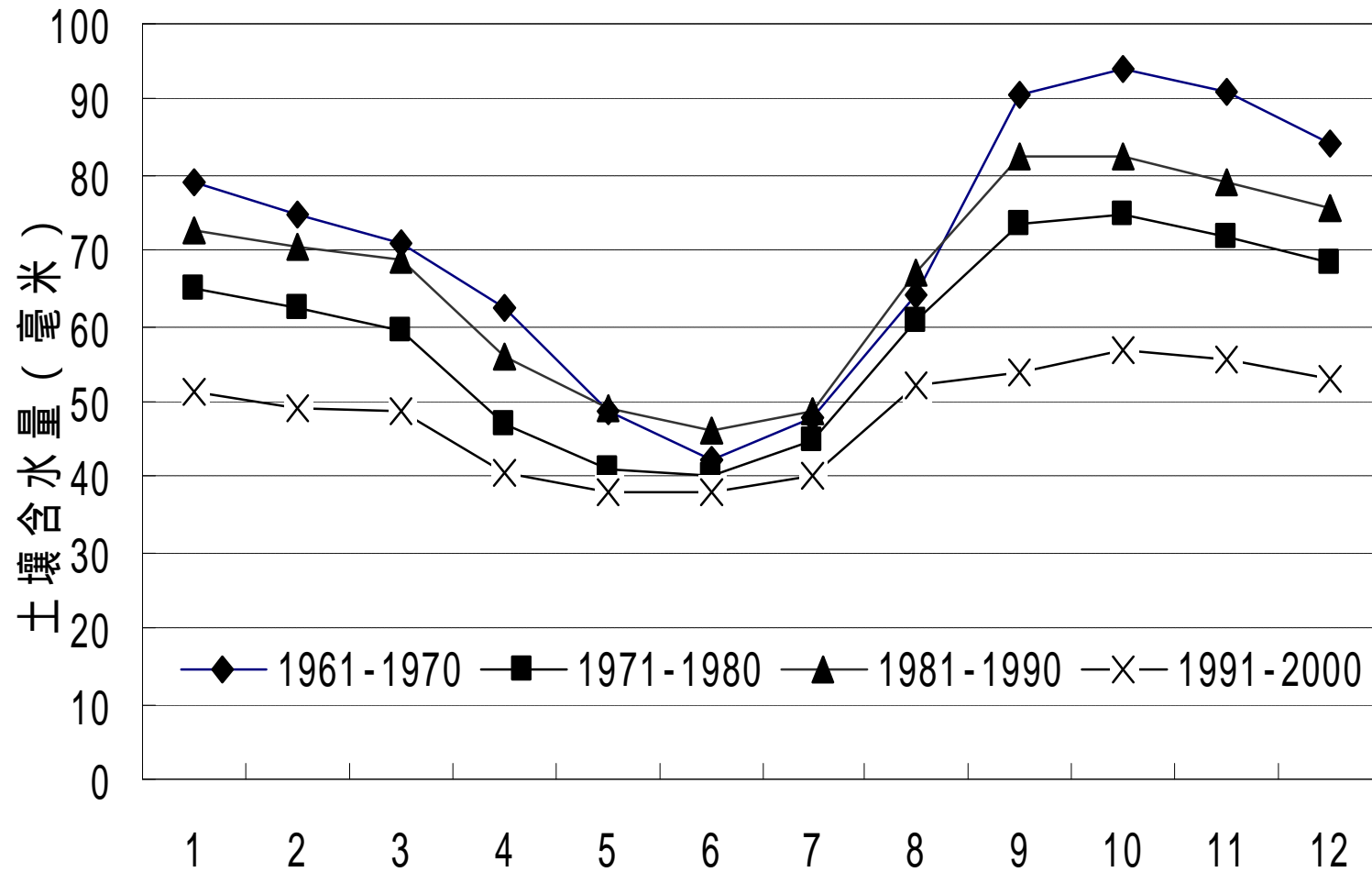
In 1 meter depth, without considering the soil effective depth



Taking soil effective depth into account

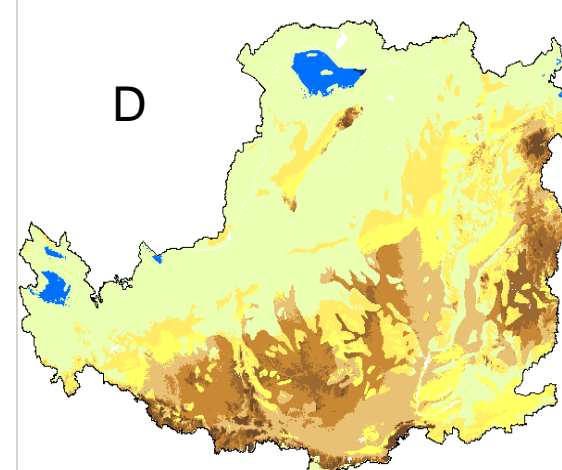
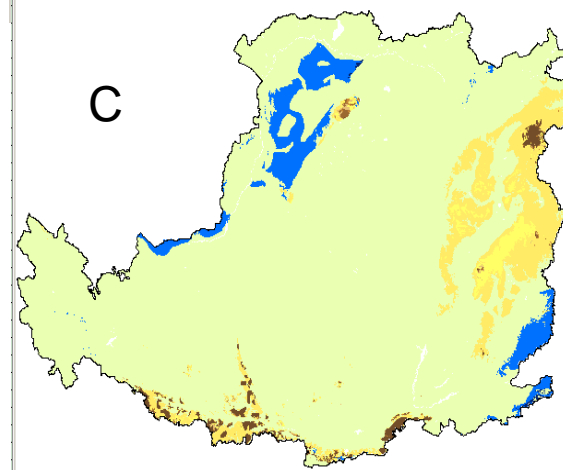
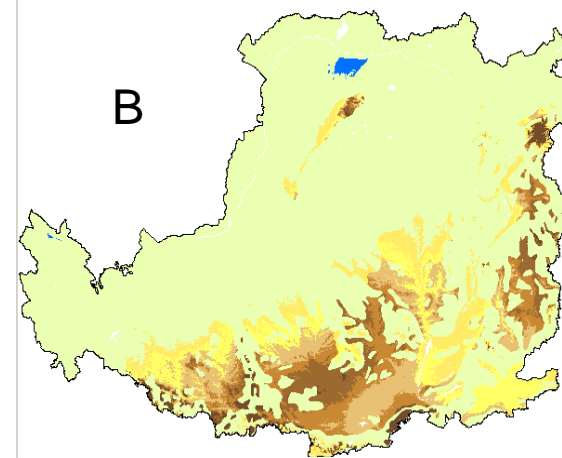
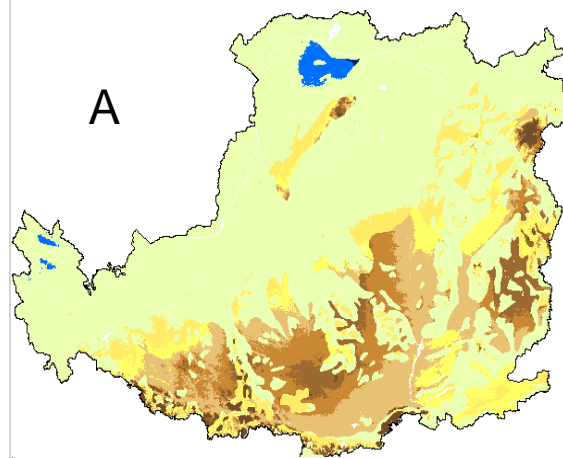
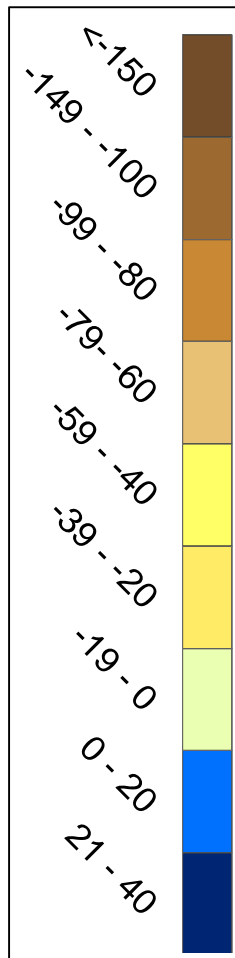
### 3. Outputs

◆ Soil water content in Loess Plateau Region (in mm)



### 3. Outputs

◆ Soil water change (1961-2000) (A: Jan, B: Apr, C: Jul, D: Oct)



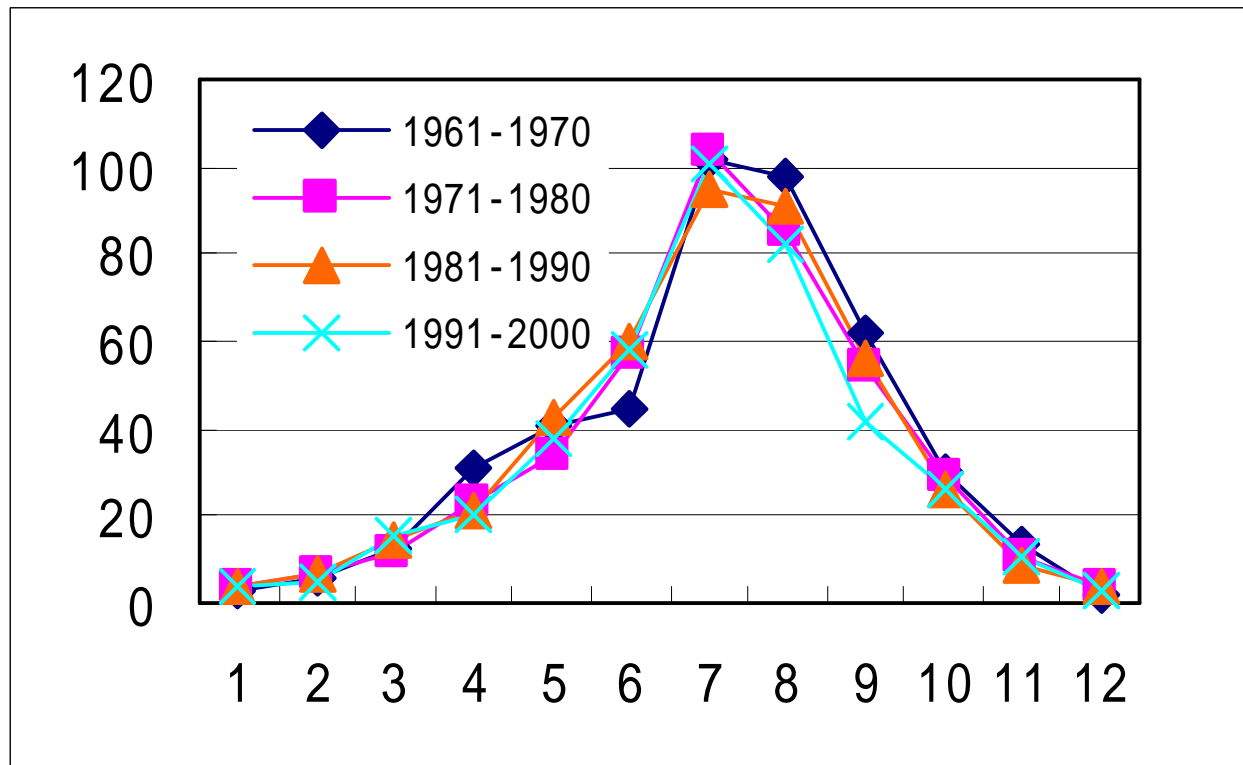


## 4. Reasons

### ◆ Precipitation change

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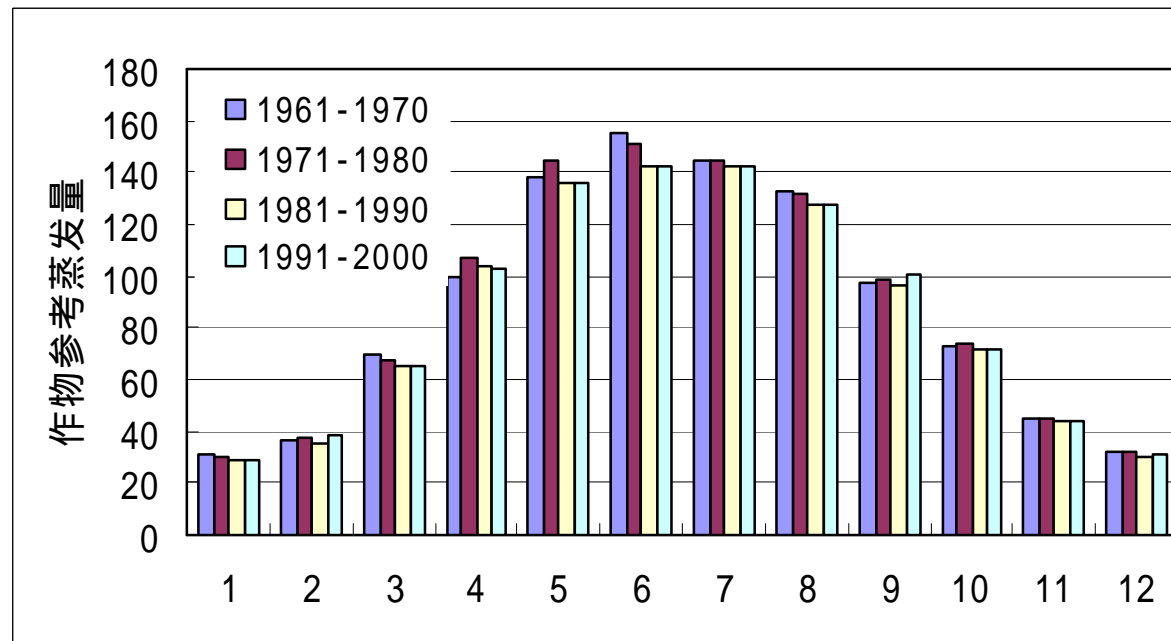
The mean annual precipitation decreased by 8.4% from 443.0 mm in 1960s to 405.7 mm in 1990s.



## 4. Reasons

### ◆ Evapotranspiration change

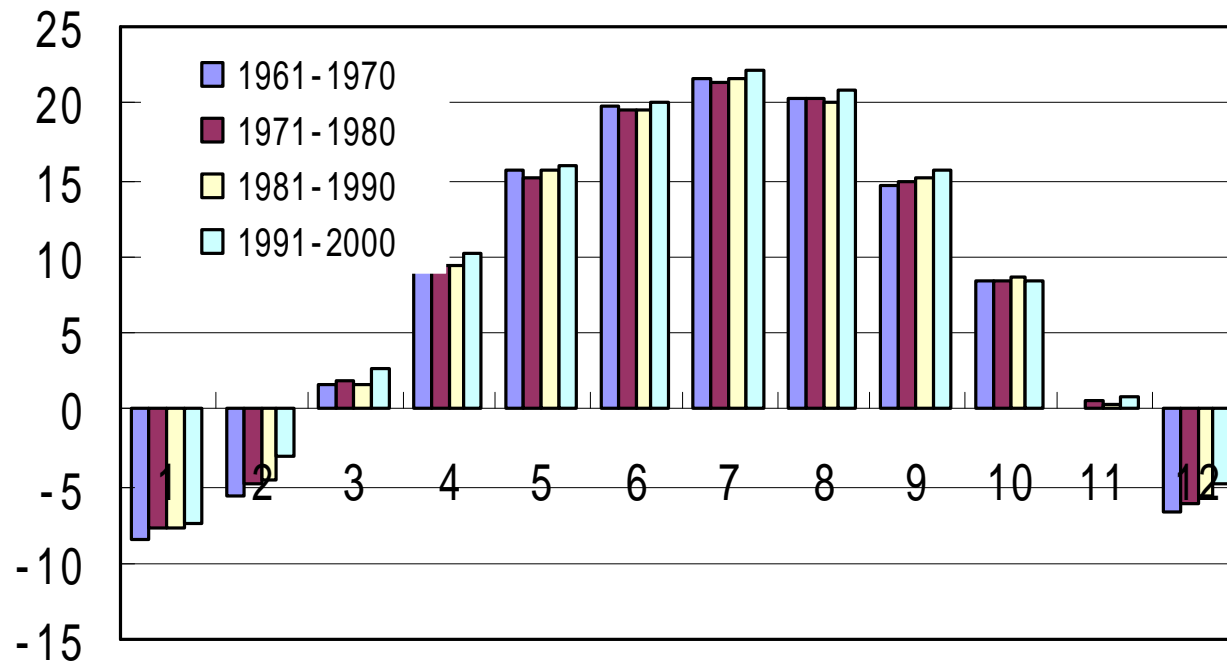
The mean annual evapotranspiration slightly decreased by 2.3%, from 1055.1 mm in 1960s to 1031.1mm in 1990s. The sunshine time decreased from 2754.1 hrs in 1960s to 2626.7 hrs in 1990s.



## 4. Reasons

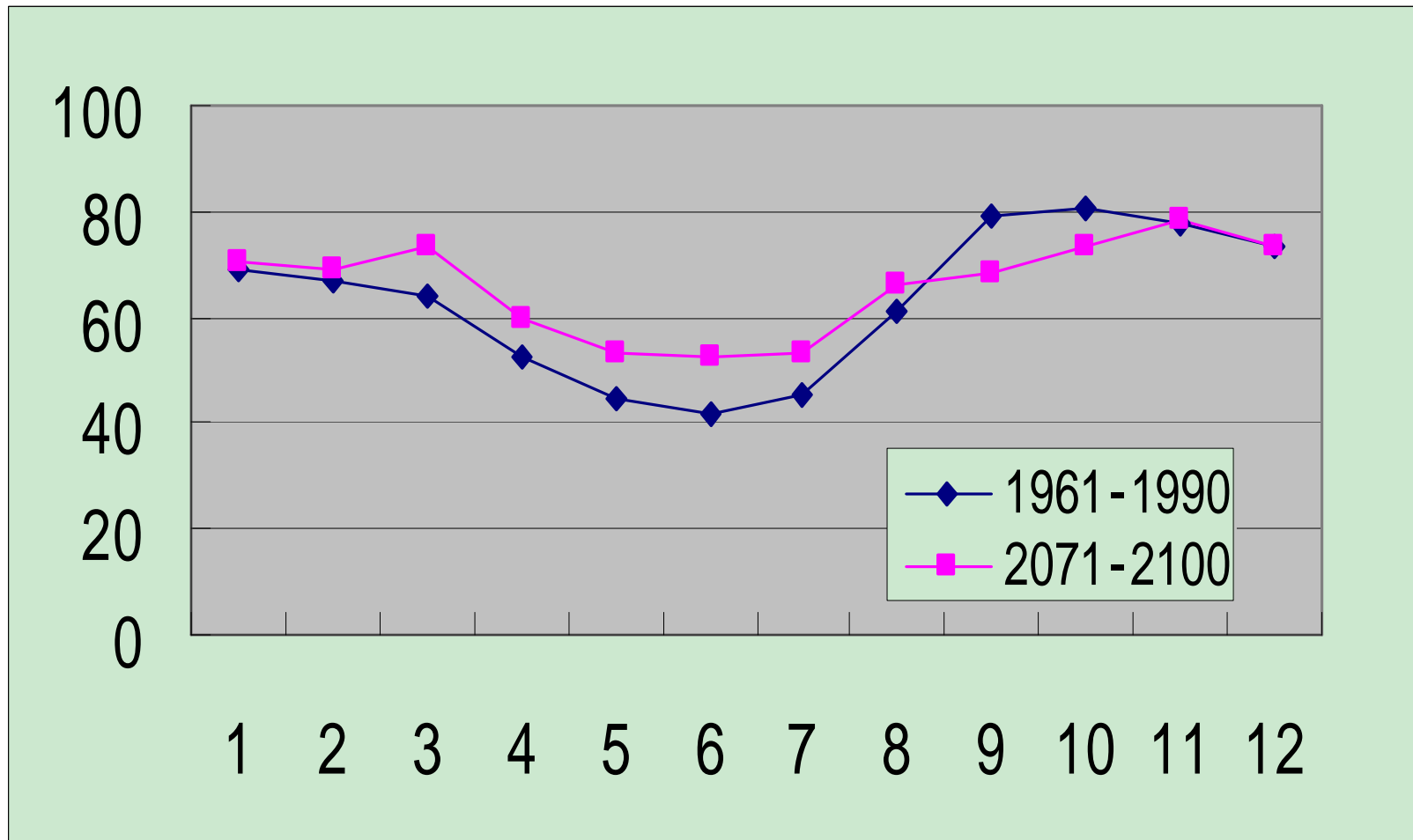
### ◆ Temperature changes

The lowest temperature increased by 1.8 °C, from -6.7 °C in 1960s to -4.9 °C in 1990s. The highest temperature increased by 0.6 °C, from 21.7 °C in 1960s to 22.3 °C in 1990s.



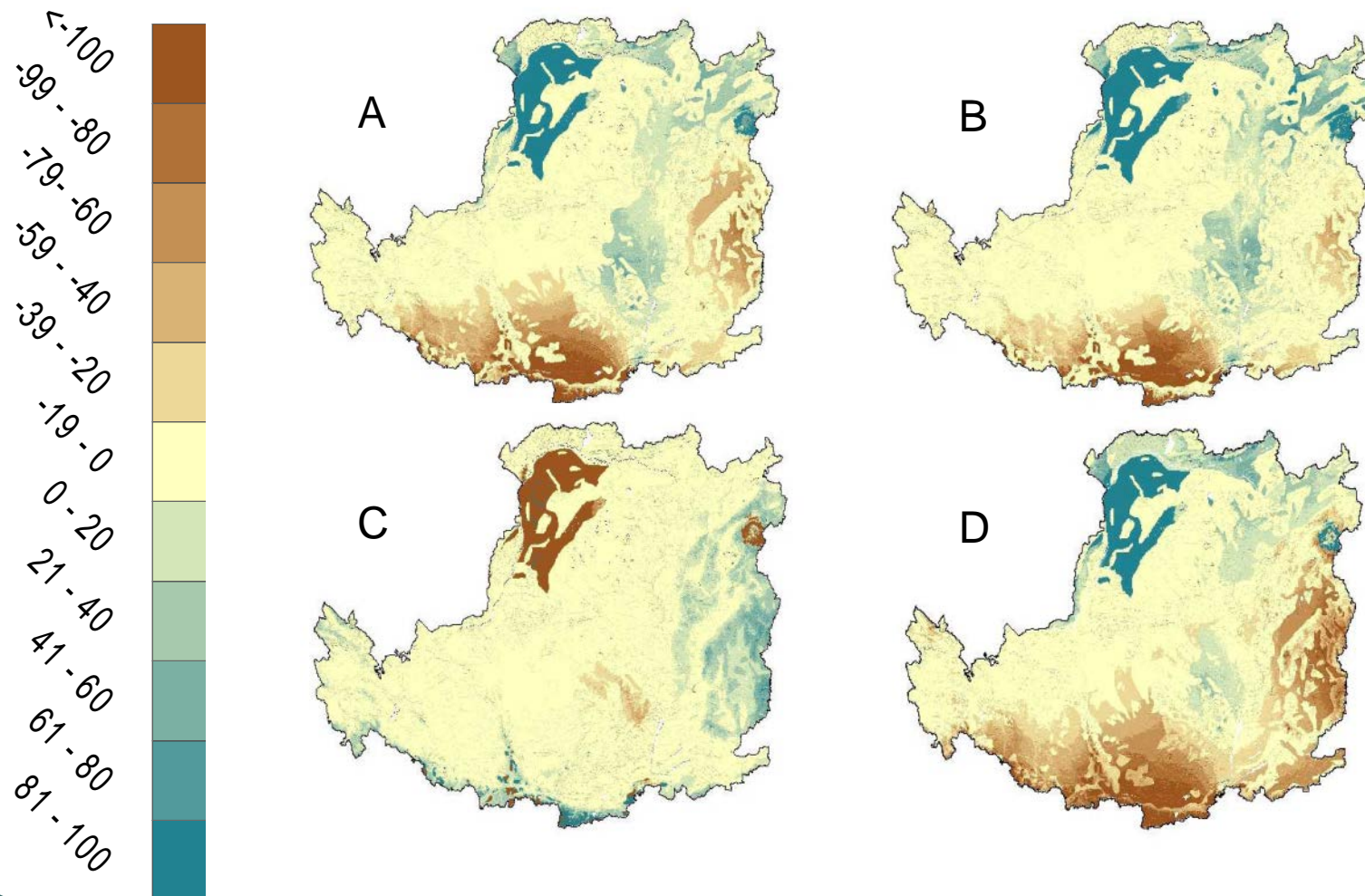
## 5. Changes under climate changes

◆ Soil water content (in mm)



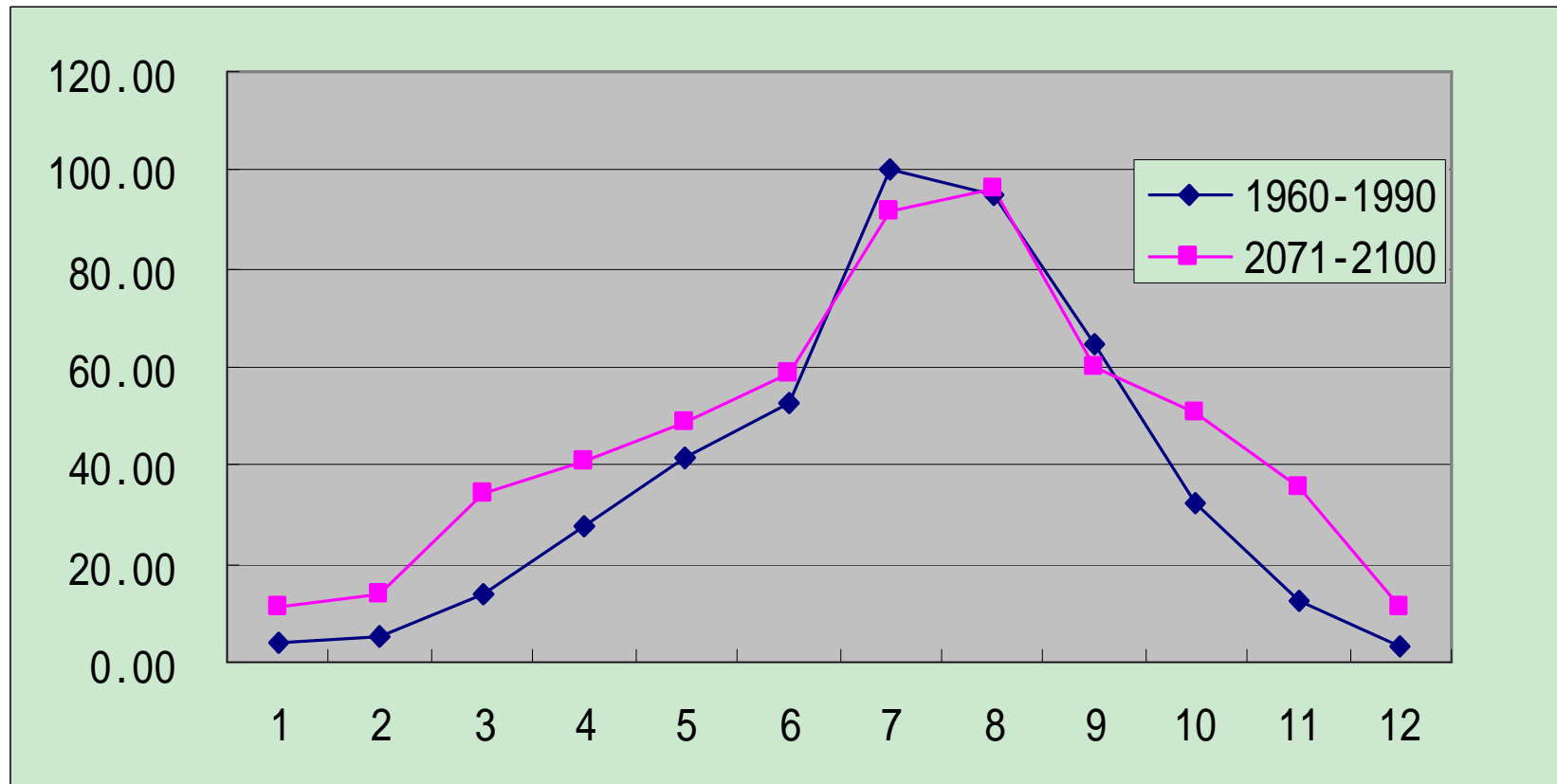
## 5. Changes under climate changes

◆ Soil water changes (in mm) (A: Jan, B: Apr, C: Jul, D: Oct)



## 5. Changes under climate changes

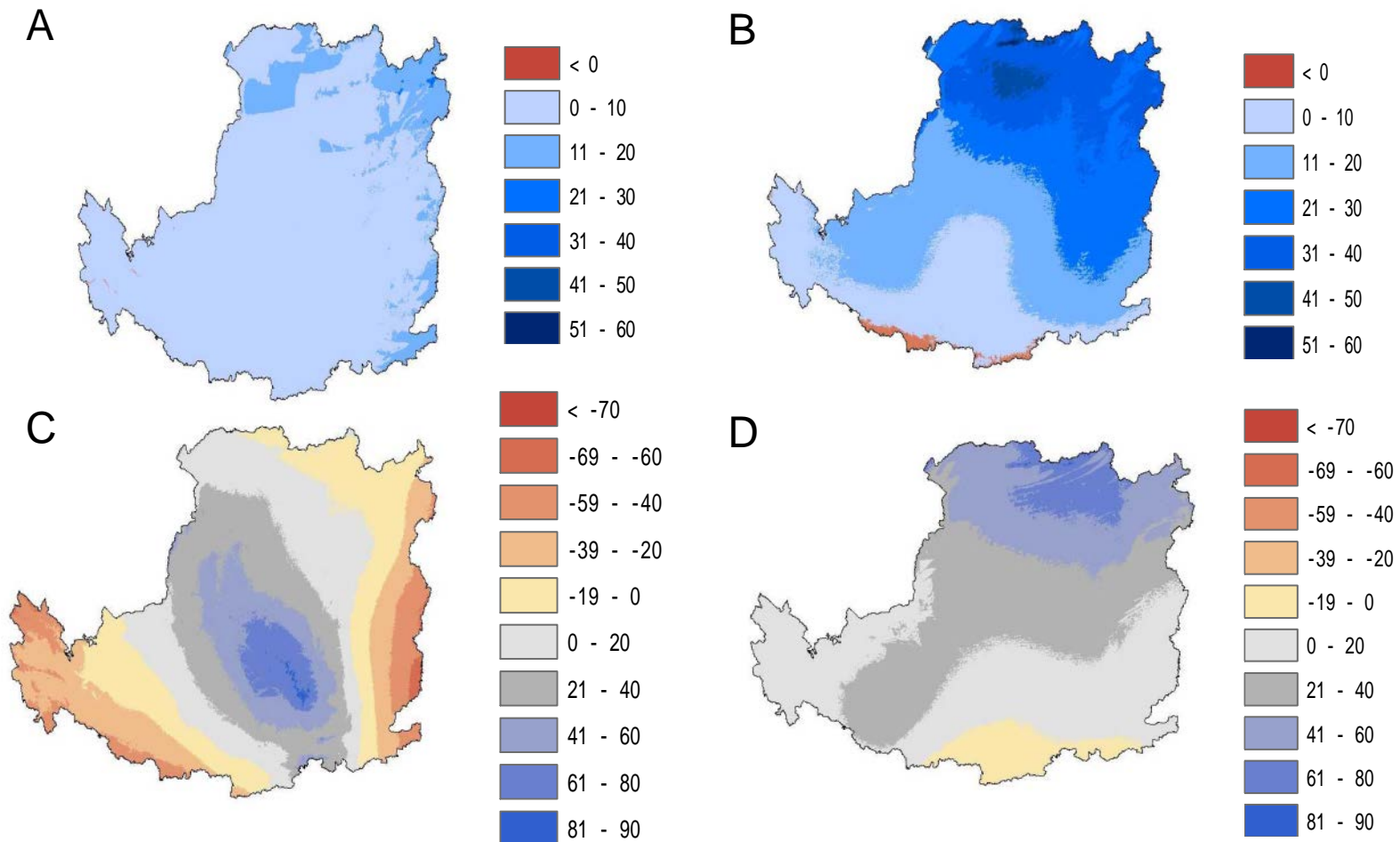
### ◆ Precipitation (in mm)





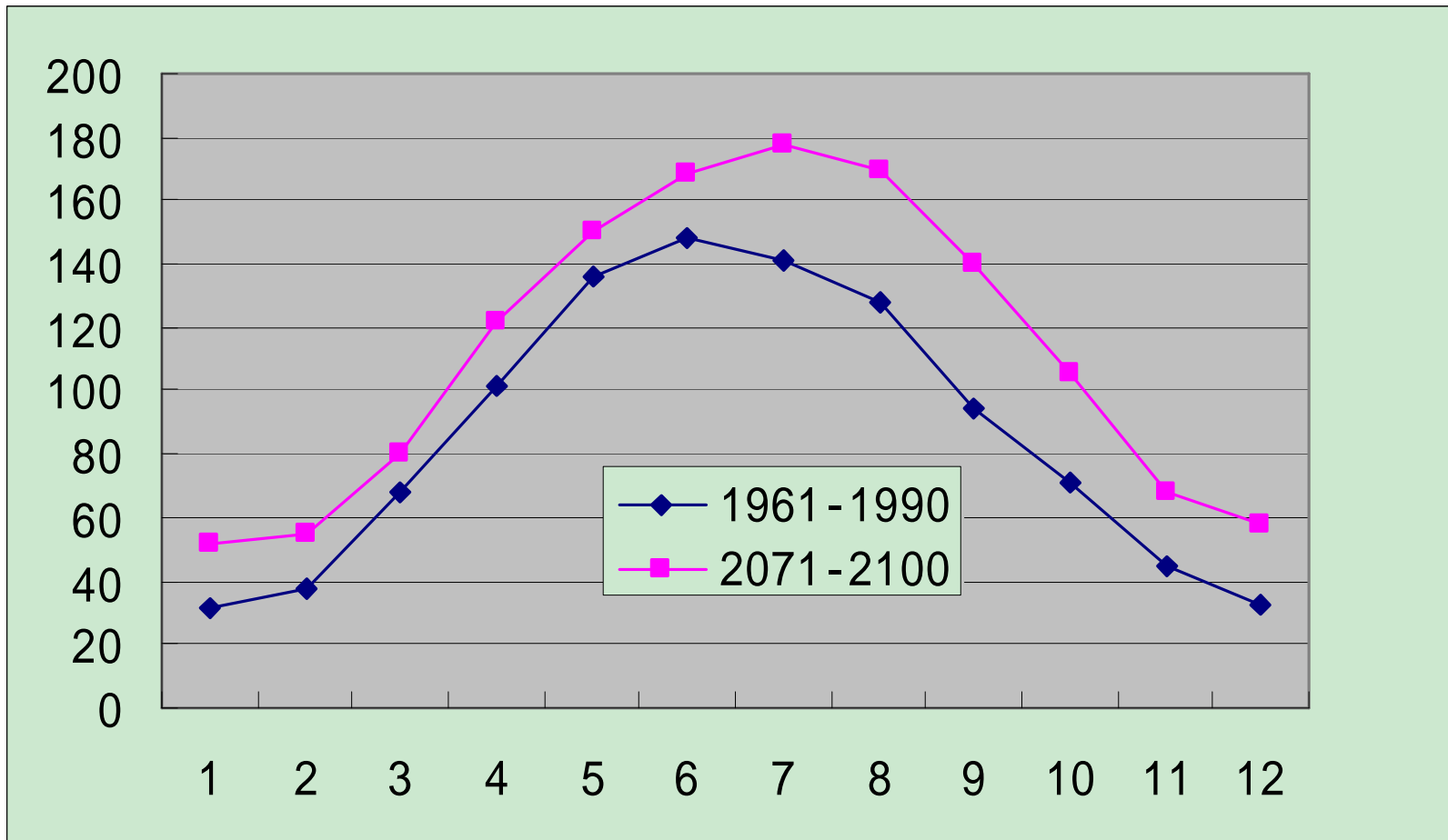
# 5. Changes under climate changes

◆ Precip. changes (in mm) (A: Jan, B: Apr, C: Jul, D: Oct)



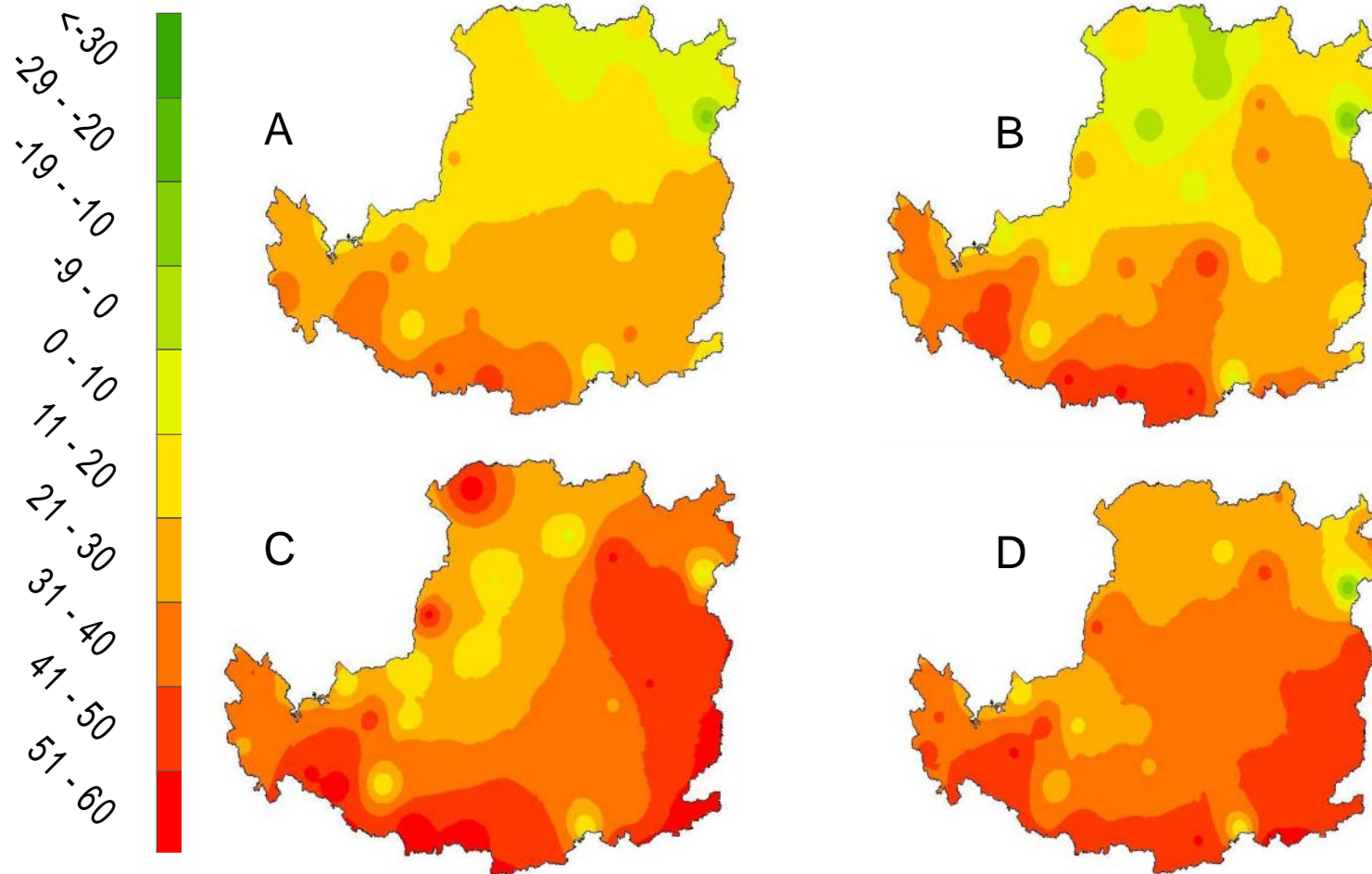
## 5. Changes under climate changes

### ◆ Evapotranspiration (in mm)



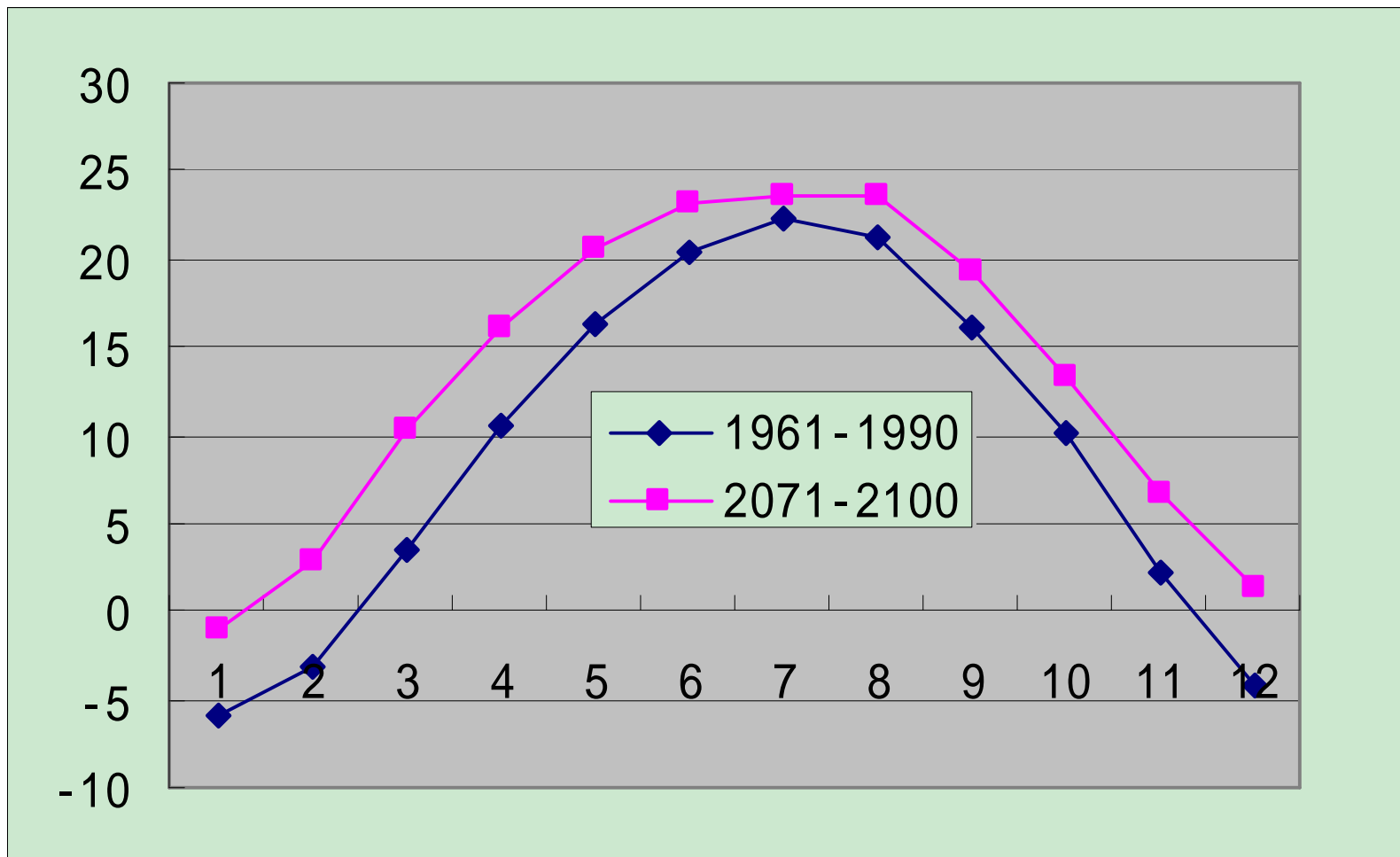
## 5. Changes under climate changes

◆ Evapotran. changes (in mm) (A: Jan, B: Apr, C: Jul, D: Oct)



## 5. Changes under climate changes

### ◆ Temperature ( )

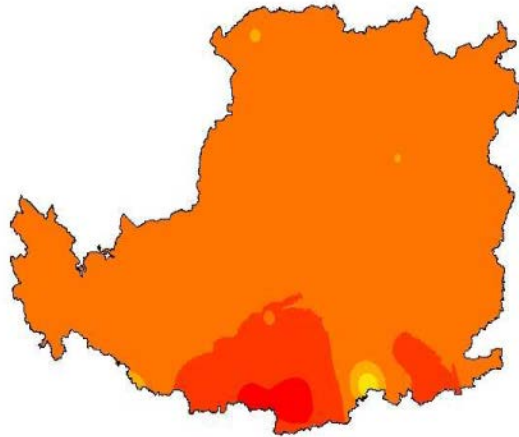


## 5. Changes under climate changes

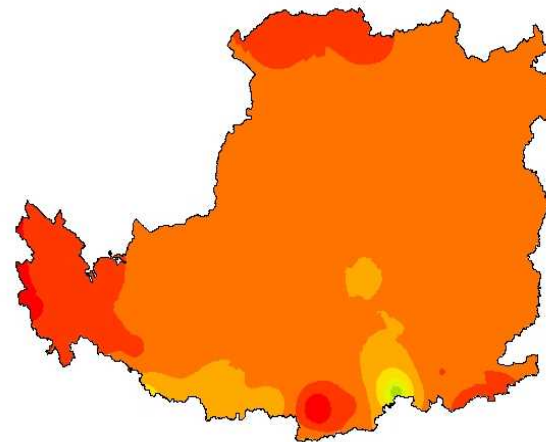
◆ Temperature ( ) (A: Jan, B: Apr, C: Jul, D: Oct)

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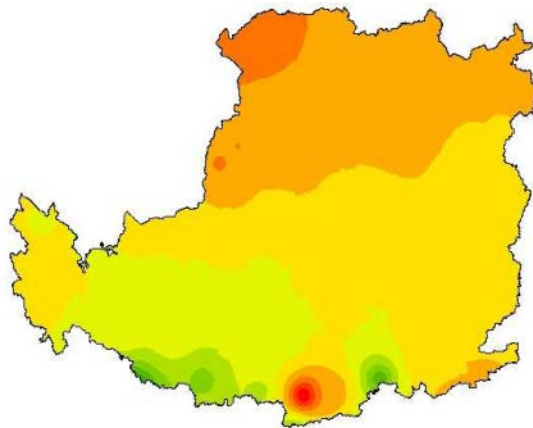
A



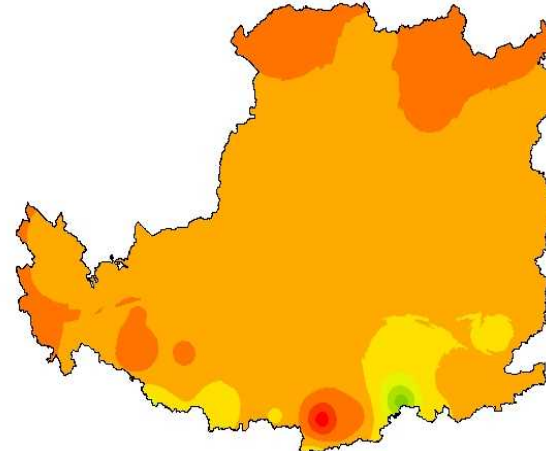
B



C

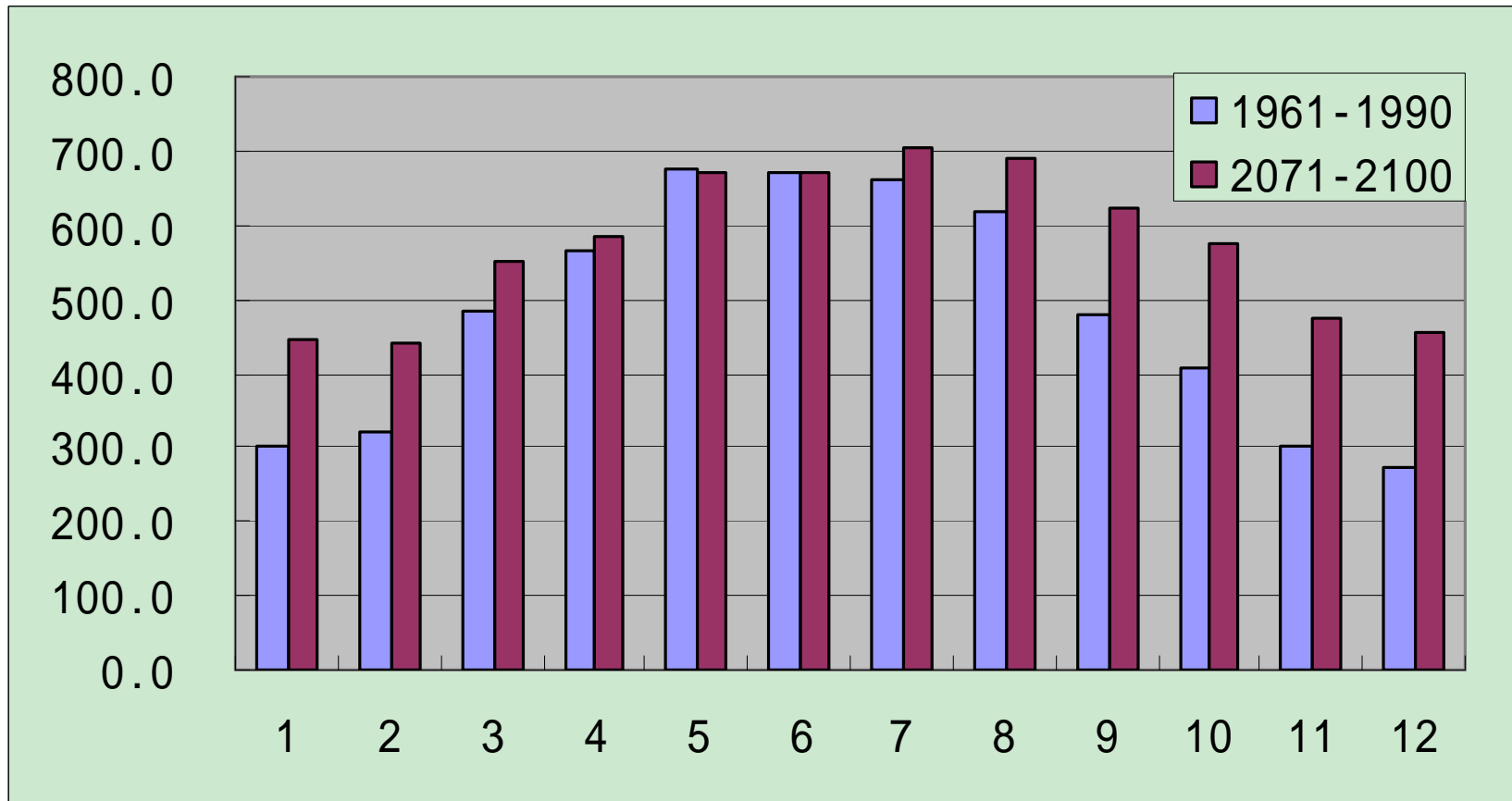


D



## 5. Changes under climate changes

### ◆ Solar radiation (in MJ/m<sup>2</sup>/month)





## 6. Conclusions

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1. The soil water content decreased compared between 1960s and 1990s,
2. Though precipitation will increase according to the projected scenario from CCSR/NIES (A1B), soil water content will decreased, as the ranges of temperature and radiation increase are more bigger than that of temperature.