



**XVIII  
World Water Congress**

International Water Resources Association (IWRA)  
Beijing, China | September 11-15, 2023



# Groundwater quality in Northwest China: Status and Challenges

**Prof. Peiyue Li**

**School of Water and Environment**

**Chang'an University**

**lipy2@163.com**

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# Report contents

## **1. Status of groundwater quality in Northwest China**

## **2. Challenges in groundwater protection and research in Northwest China**



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# Location of Northwest China

## 中国西北地理位置

**5 provinces**



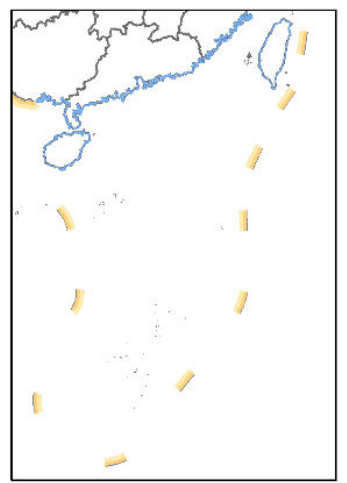
Shaanxi Province

Gansu Province

Qinghai Province

Ningxia Hui Autonomous Region

Xinjiang Uygur Autonomous Region





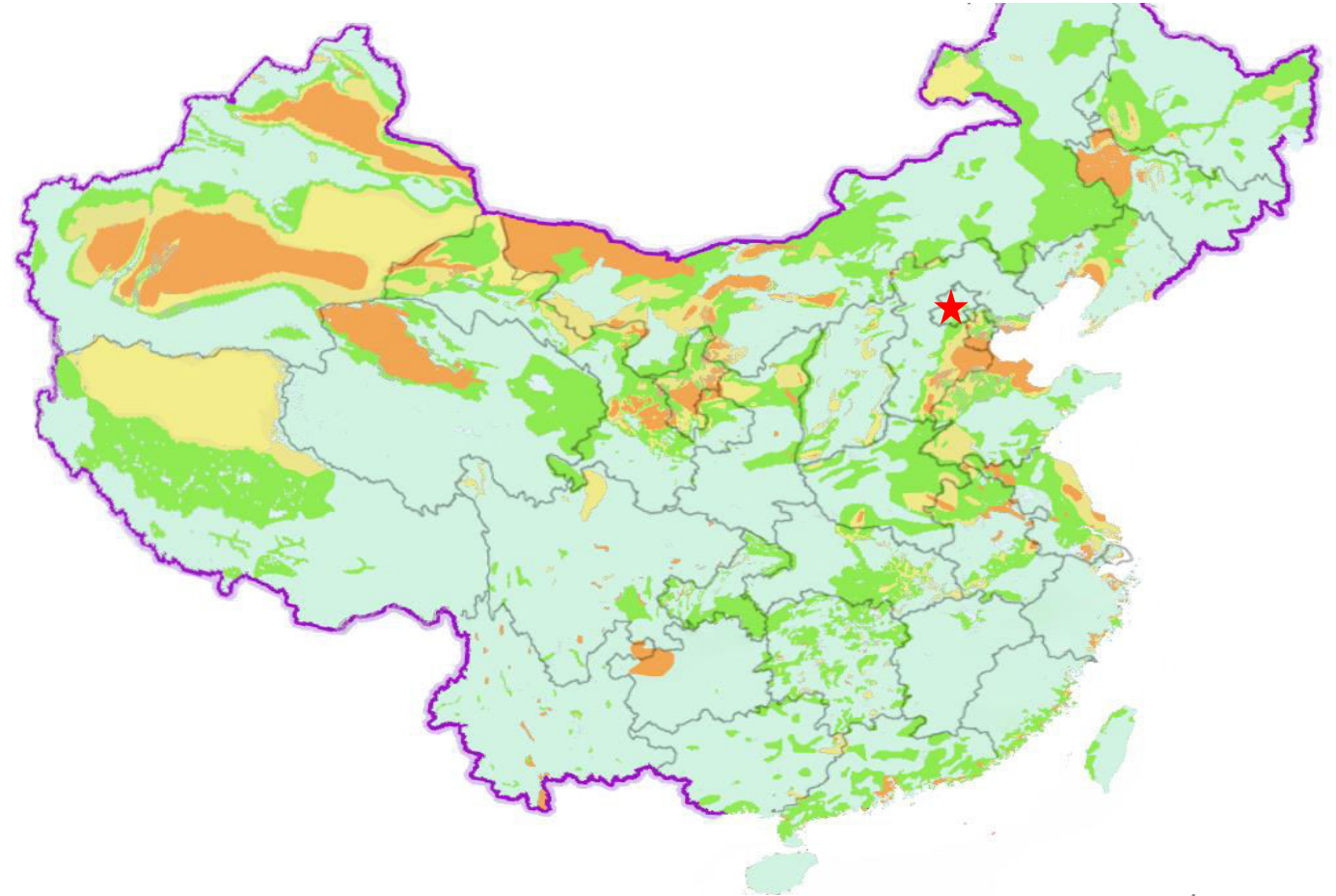
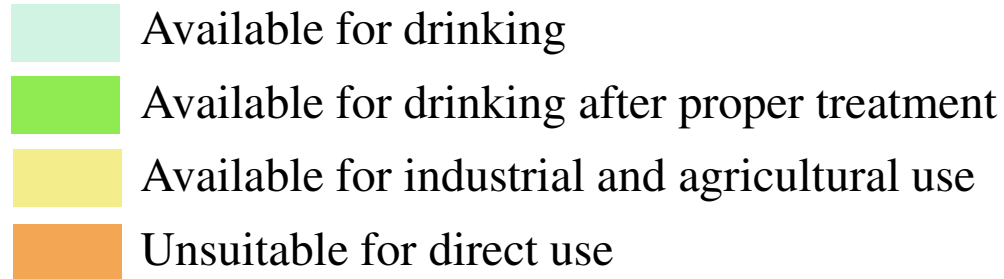
# Groundwater quality in China in 2010

## 中国2010年地下水水质总体概况

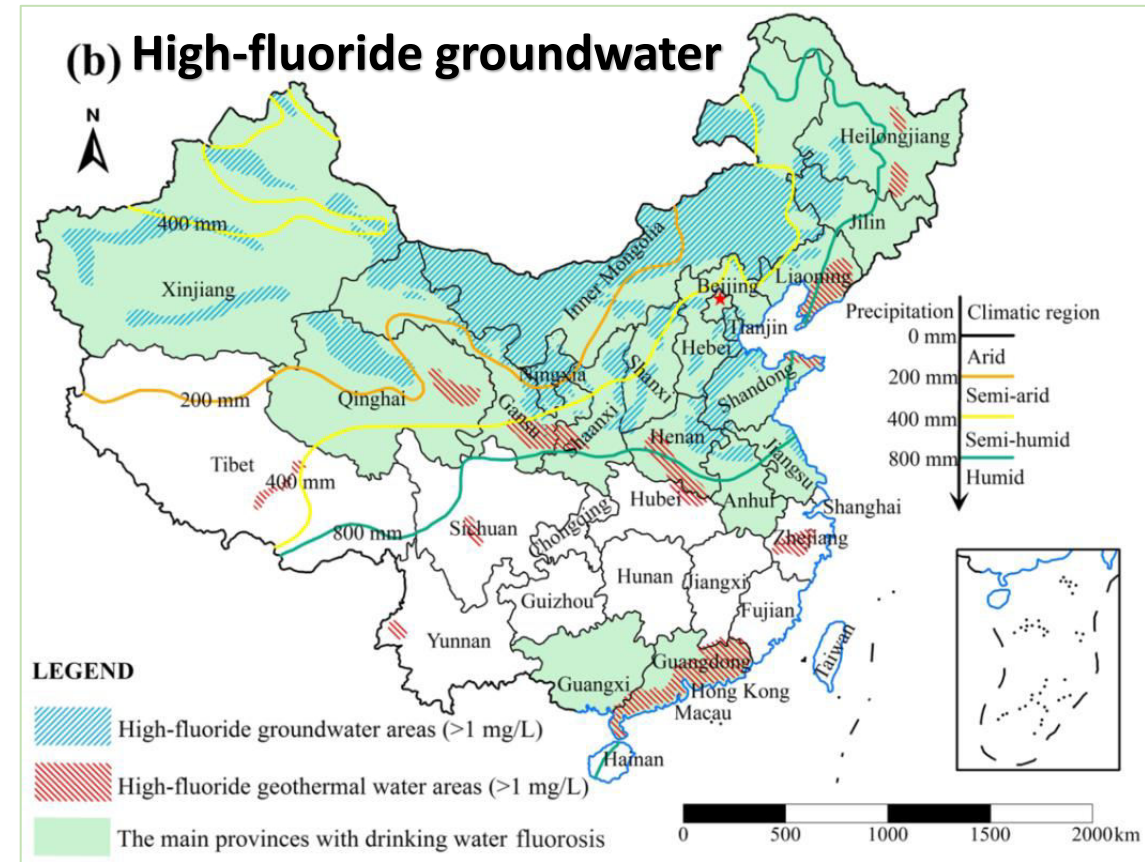
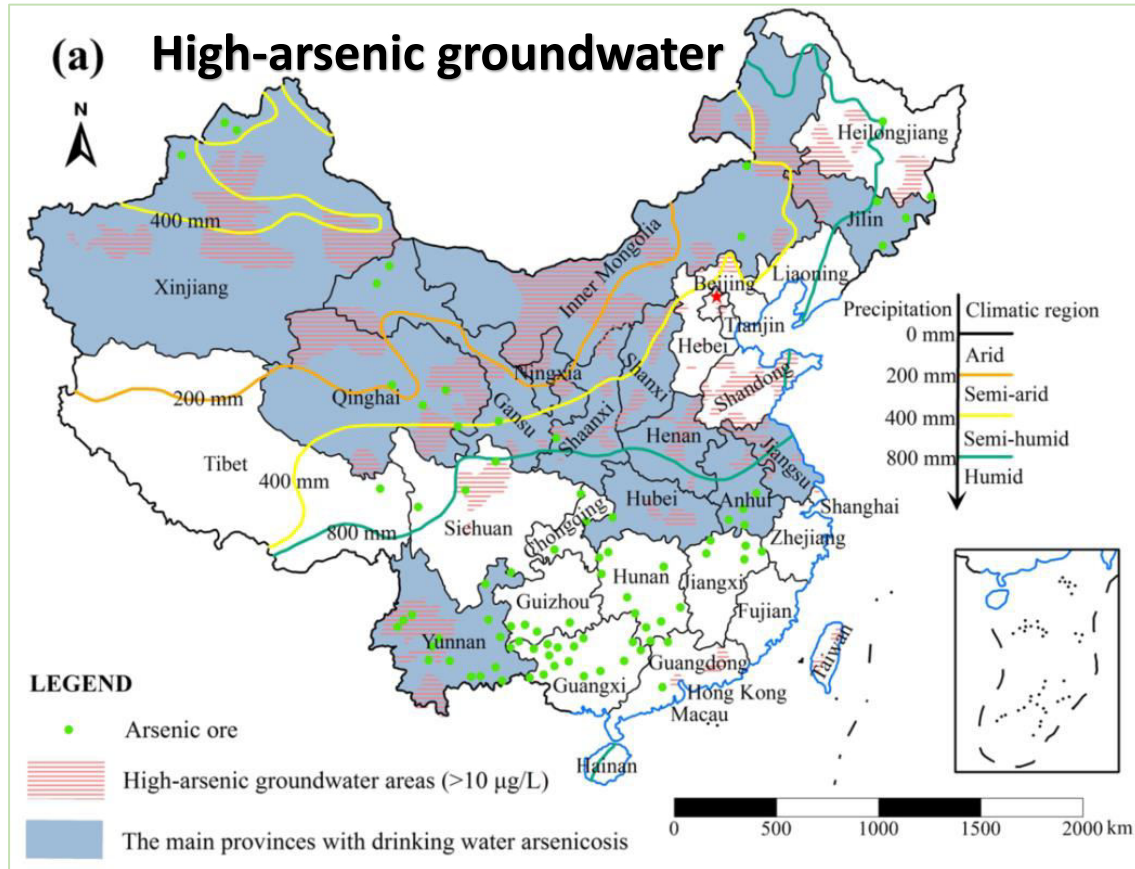
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# Distribution of high-arsenic and high-fluoride groundwater



He et al. (2020) in *Exposure and Health*

# Groundwater quality in China in 2020

## China's Ecological Environment Bulletin 2020

Ministry of Ecology and Environment, China

Shallow groundwater monitoring points distributed in plain areas, karst and hilly areas in China

**Groundwater quality monitoring points**

**20,413**

Grades I-III

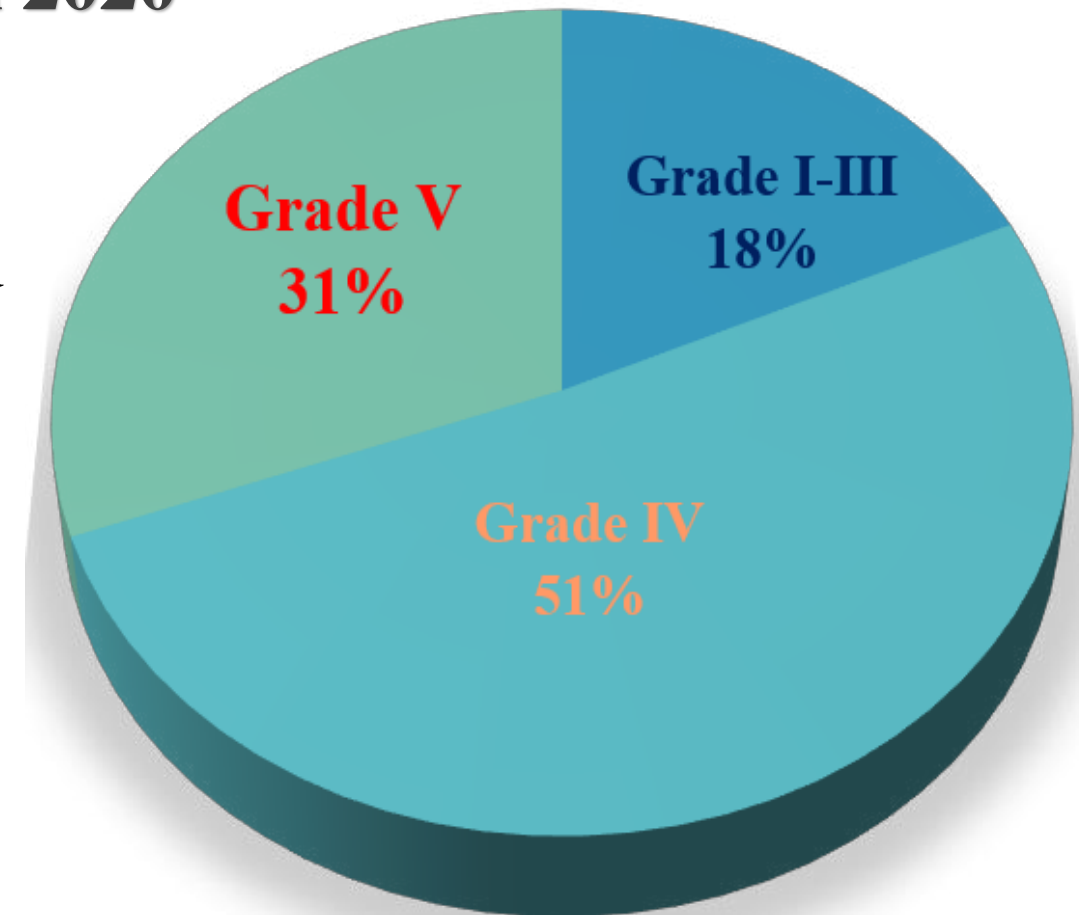
18%

Grade IV

51%

Grade V

31%



# Groundwater quality in Northwest China in 2020

➤ **Shaanxi Province**  
Groundwater quality sample points  
242

|                 |                  |                    |                   |                  |
|-----------------|------------------|--------------------|-------------------|------------------|
| Grade I<br>0.0% | Grade II<br>5.3% | Grade III<br>31.4% | Grade IV<br>31.9% | Grade V<br>31.4% |
|-----------------|------------------|--------------------|-------------------|------------------|

➤ **Ningxia Hui Autonomous Region**  
Groundwater quality monitoring points  
408

|                 |                   |                   |                   |                  |
|-----------------|-------------------|-------------------|-------------------|------------------|
| Grade I<br>1.5% | Grade II<br>10.5% | Grade III<br>0.5% | Grade IV<br>54.9% | Grade V<br>32.6% |
|-----------------|-------------------|-------------------|-------------------|------------------|

➤ **Xinjiang Uygur Autonomous Region**  
Groundwater quality key monitoring points  
45

|                 |                   |                    |                   |                |
|-----------------|-------------------|--------------------|-------------------|----------------|
| Grade I<br>4.5% | Grade II<br>31.1% | Grade III<br>13.3% | Grade IV<br>31.1% | Grade V<br>20% |
|-----------------|-------------------|--------------------|-------------------|----------------|

➤ **Qinghai Province**  
National groundwater quality monitoring point  
27

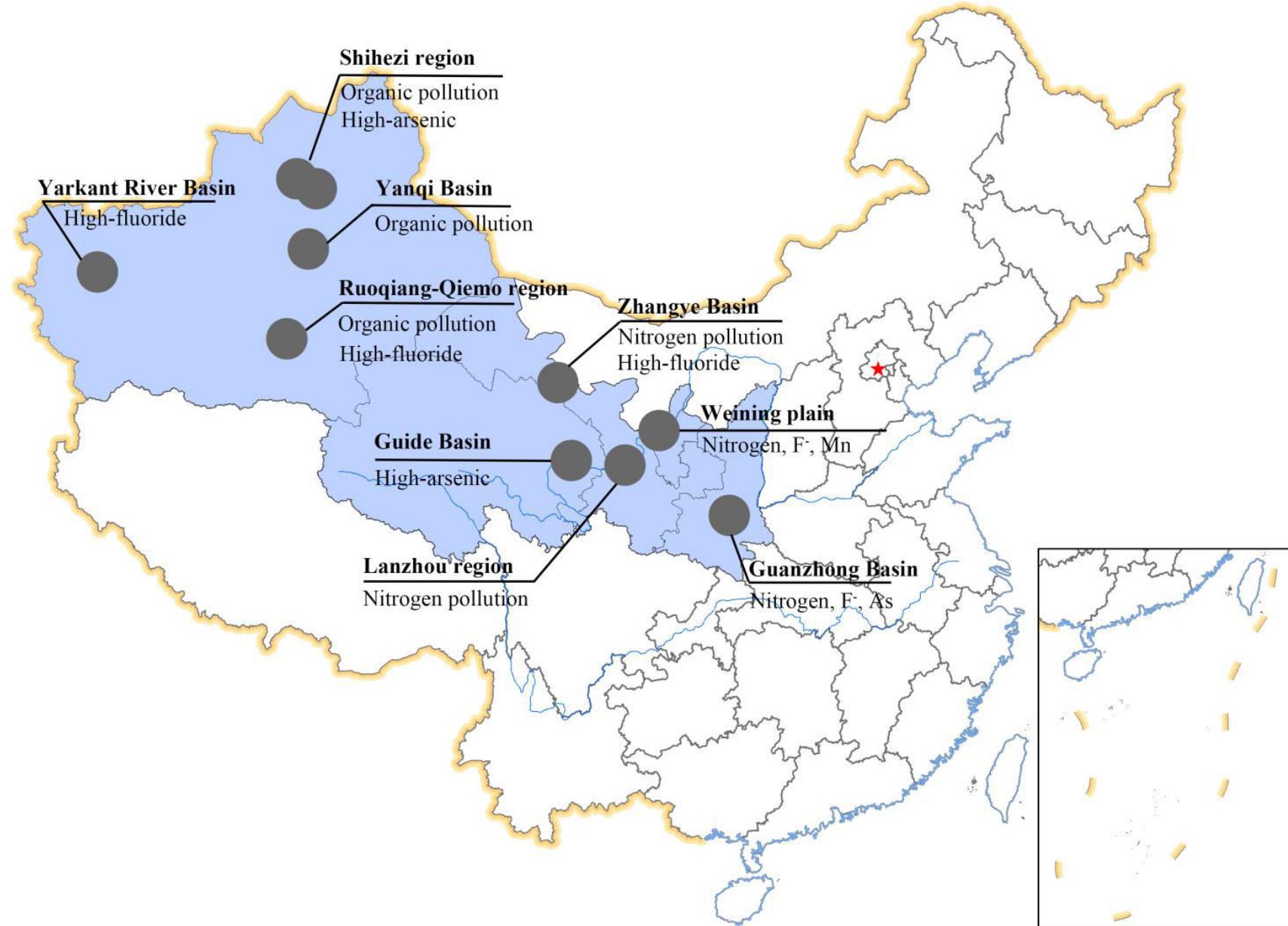
|                    |                      |
|--------------------|----------------------|
| Grade III<br>48.1% | Grade IV- V<br>51.9% |
|--------------------|----------------------|

➤ **Gansu Province**  
Provincial groundwater monitoring points  
44

|                      |                      |
|----------------------|----------------------|
| Grade I-III<br>88.6% | Grade IV- V<br>11.4% |
|----------------------|----------------------|

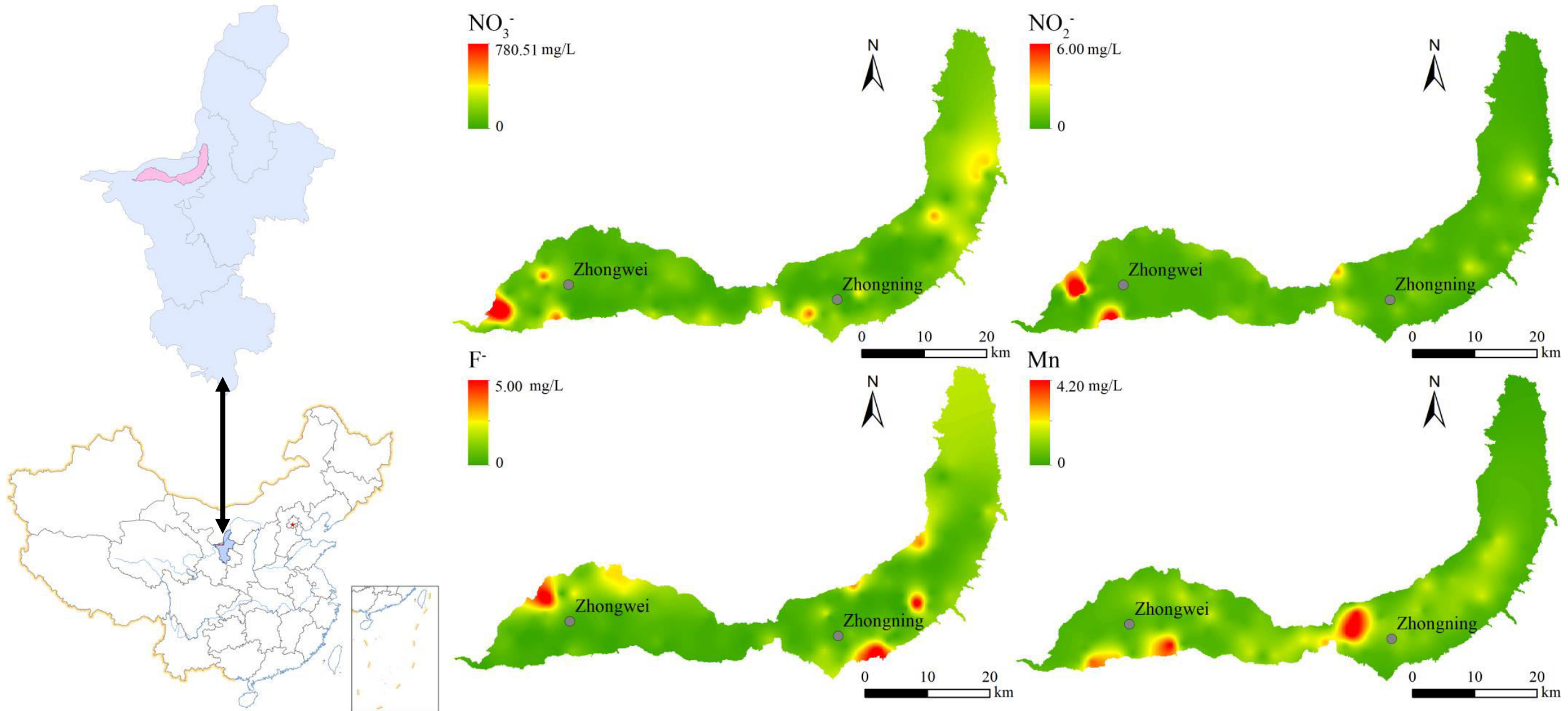


# Main groundwater contaminants in northwest China

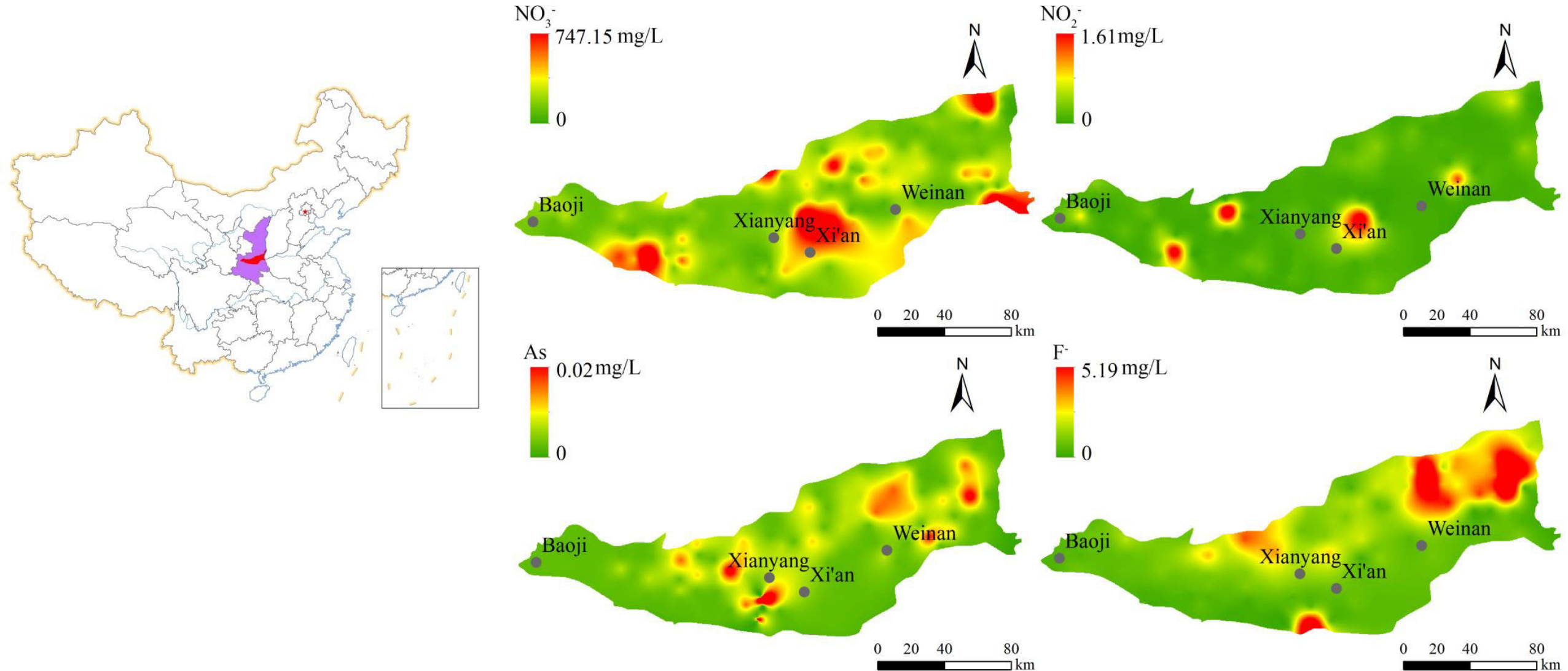




# Groundwater quality in Weining Plain, Ningxia



# Groundwater quality in the Guanzhong Basin, Shaanxi



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# Challenges

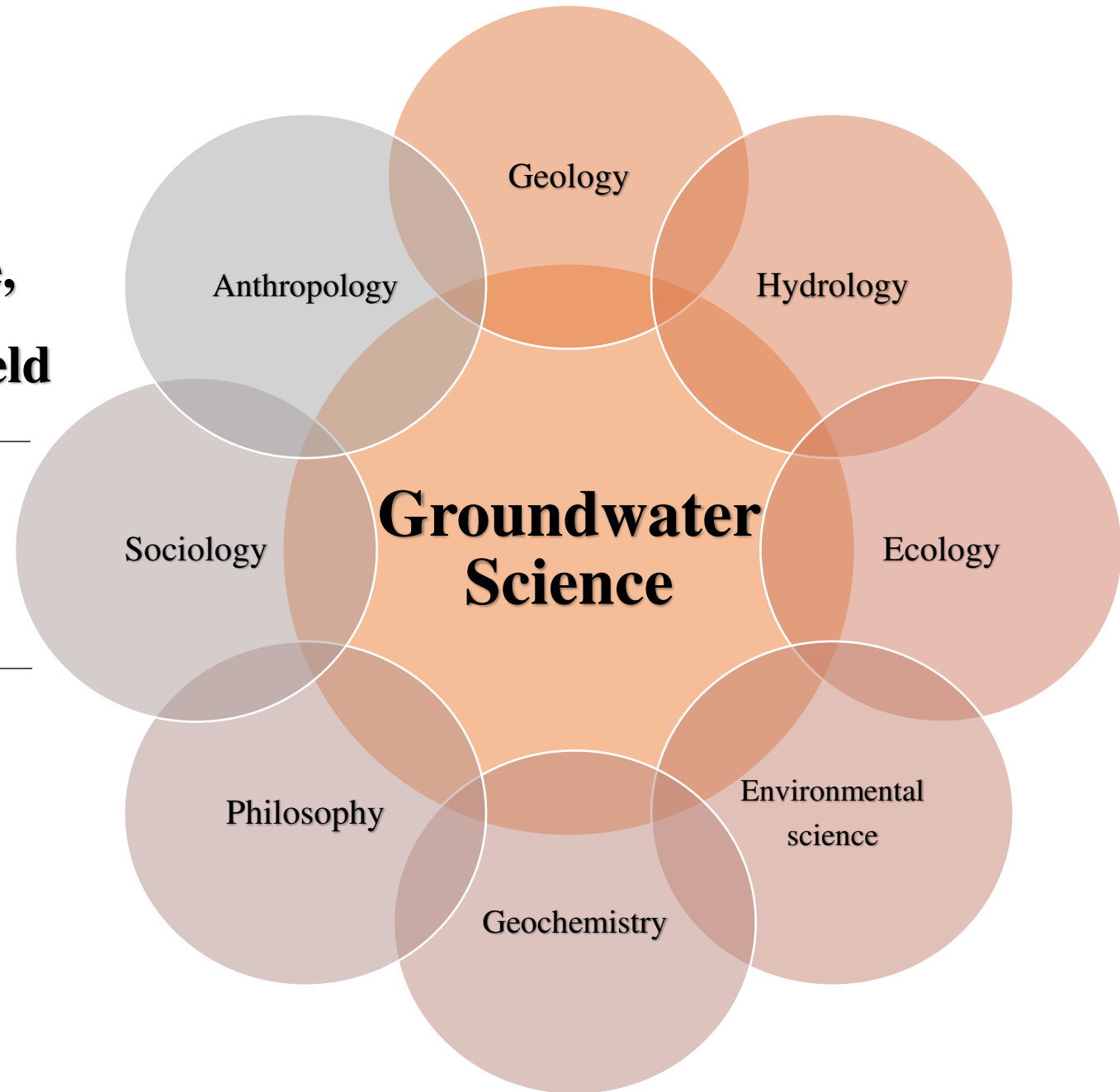
**Groundwater science is a comprehensive, multidisciplinary and complex research field**

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**Natural sciences:** Geology, Hydrology, Ecology, Geochemistry and Environmental Science

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**Social sciences:** philosophy, anthropology, Sociology, and management science



# Challenges

## ➤ Complexity



## ◆ Long-term



## ● Uncertainty

➤ Inherent complexity of groundwater system

➤ Diversity of human activities

➤ Complexity of study area

◆ The long-term of human social development

◆ Groundwater problem treatment

◆ Related technologies development

● Uncertainty in the development of human society

● Uncertainty of national policy



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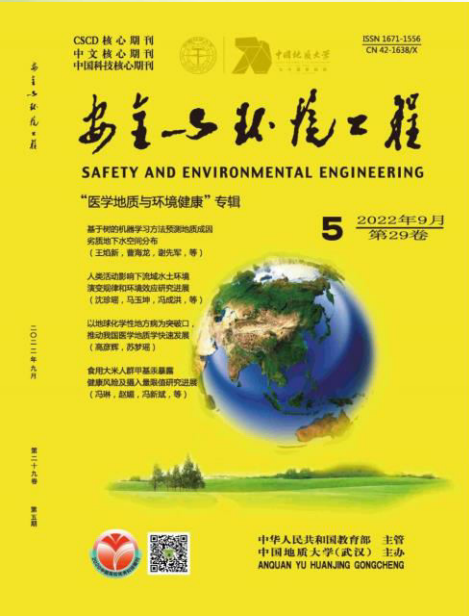


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Bulletin of Geological Science and Technology

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电话：0027-67886470

E-mail：

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网址：

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# 南水北调与水利科技(中英文)

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CN 13-1430/TV

2003 年创刊

South-to-North Water Transfers and  
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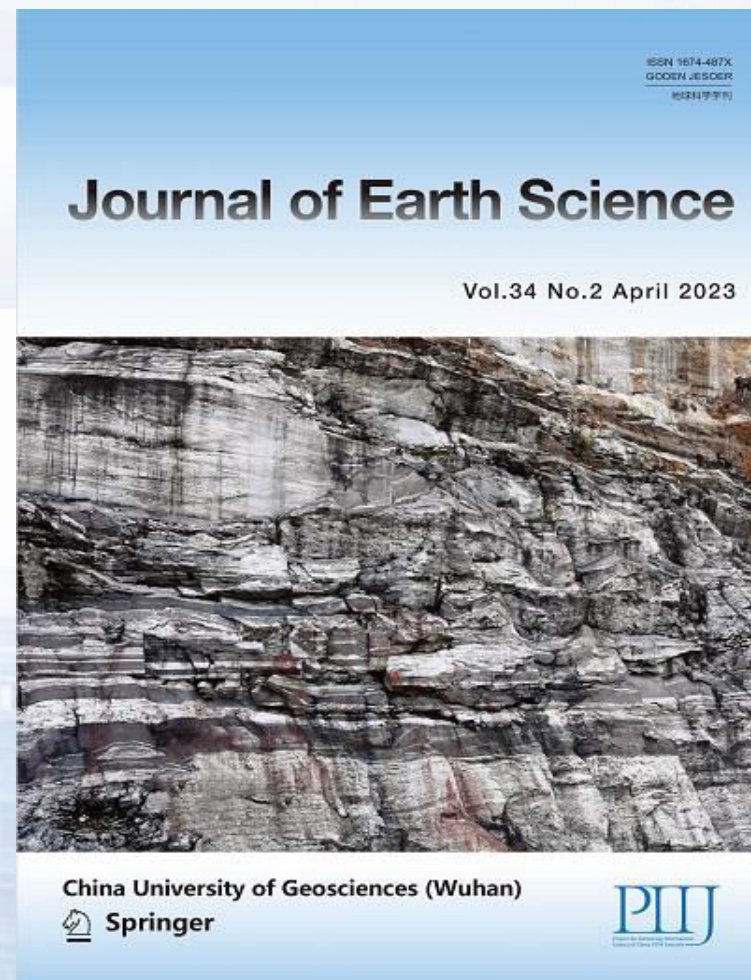
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**Let's join hands together to protect the  
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**让我们携起手来共同保护地下水！**

**THANK YOU !**