



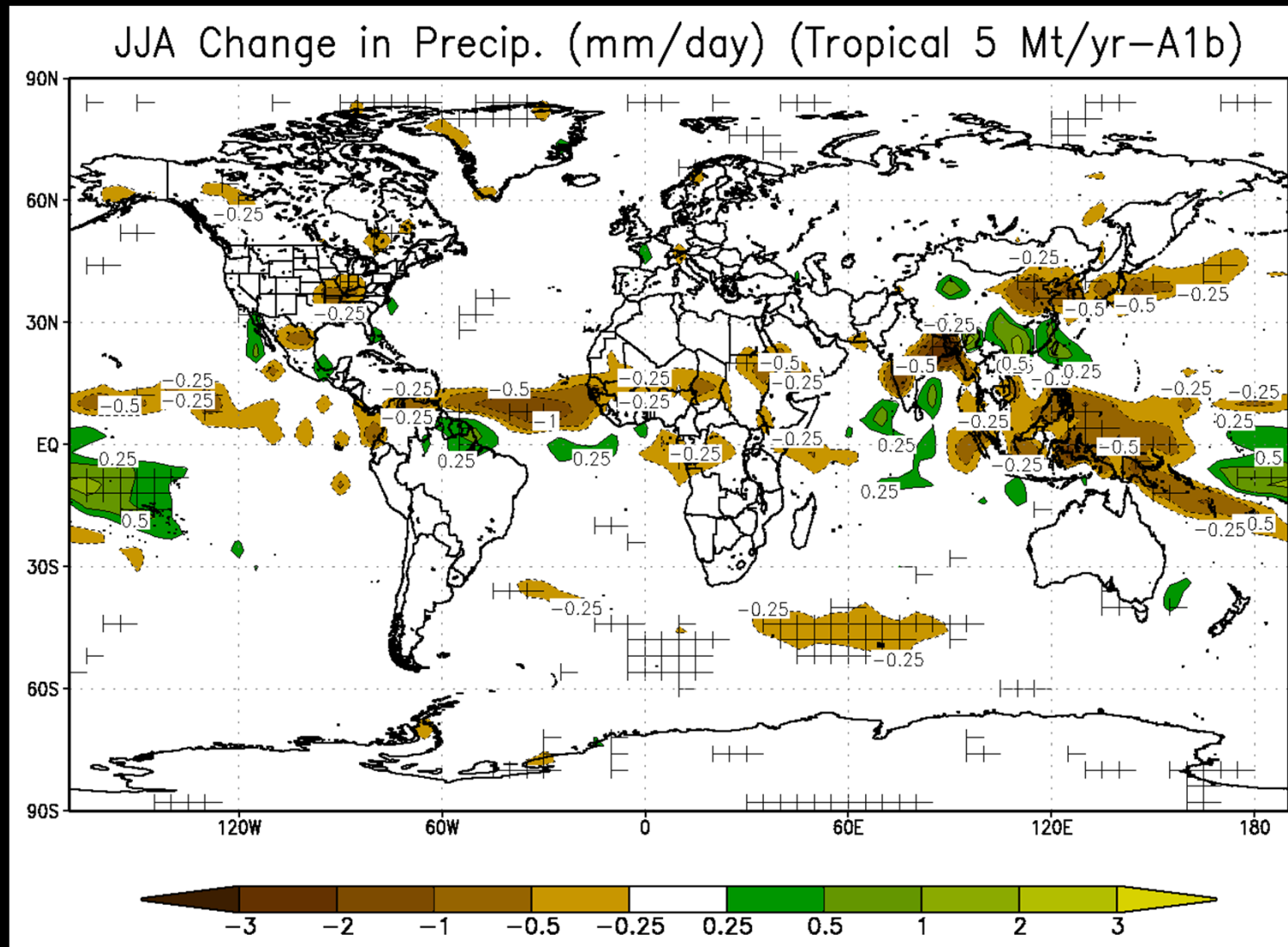
Impacts of Stratospheric Sulfate Geoengineering on Food Supply in China

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How does stratospheric sulfate geoengineering affect food supply in China?

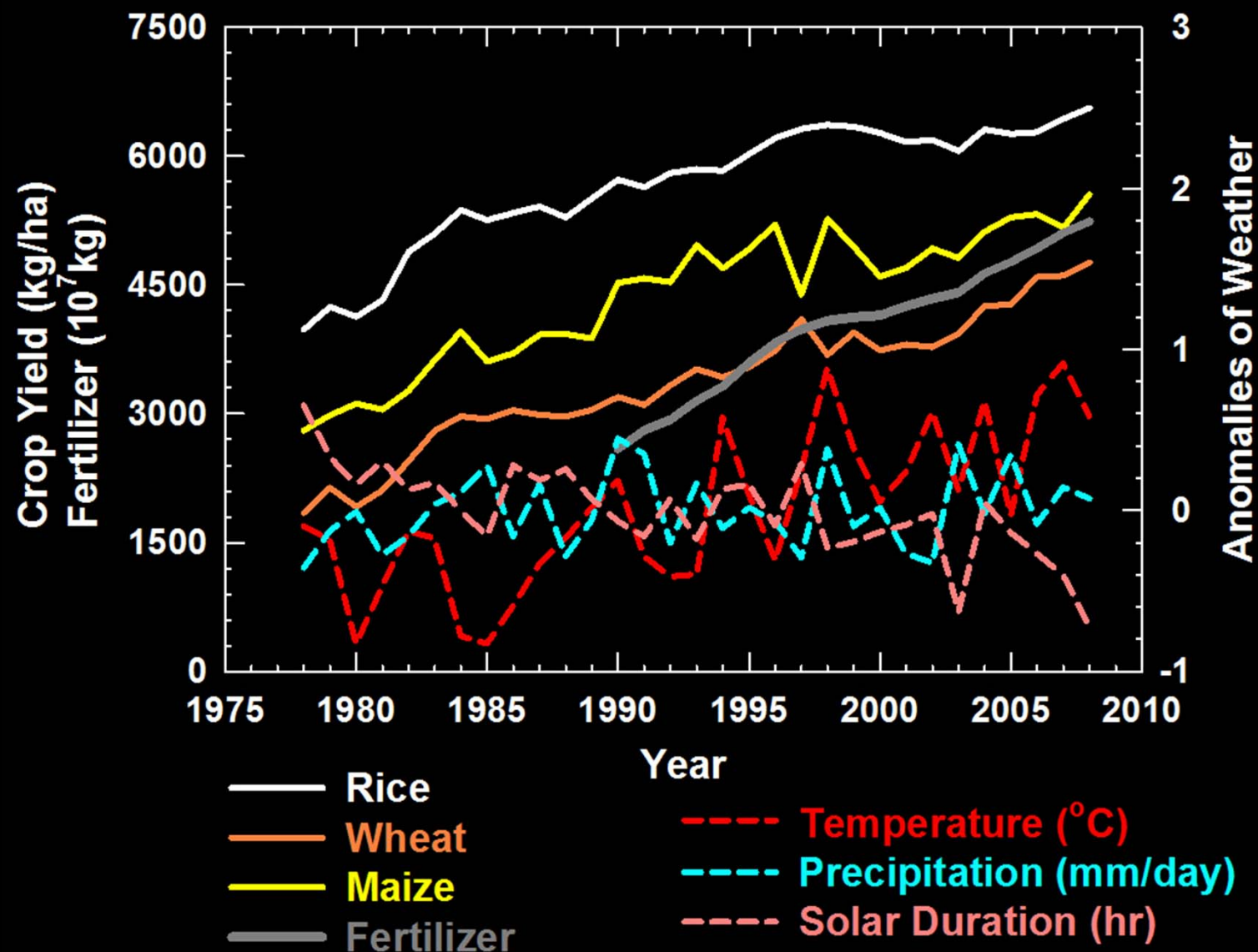


⦿ = significant at the 95% level (Robock et al., 2008)

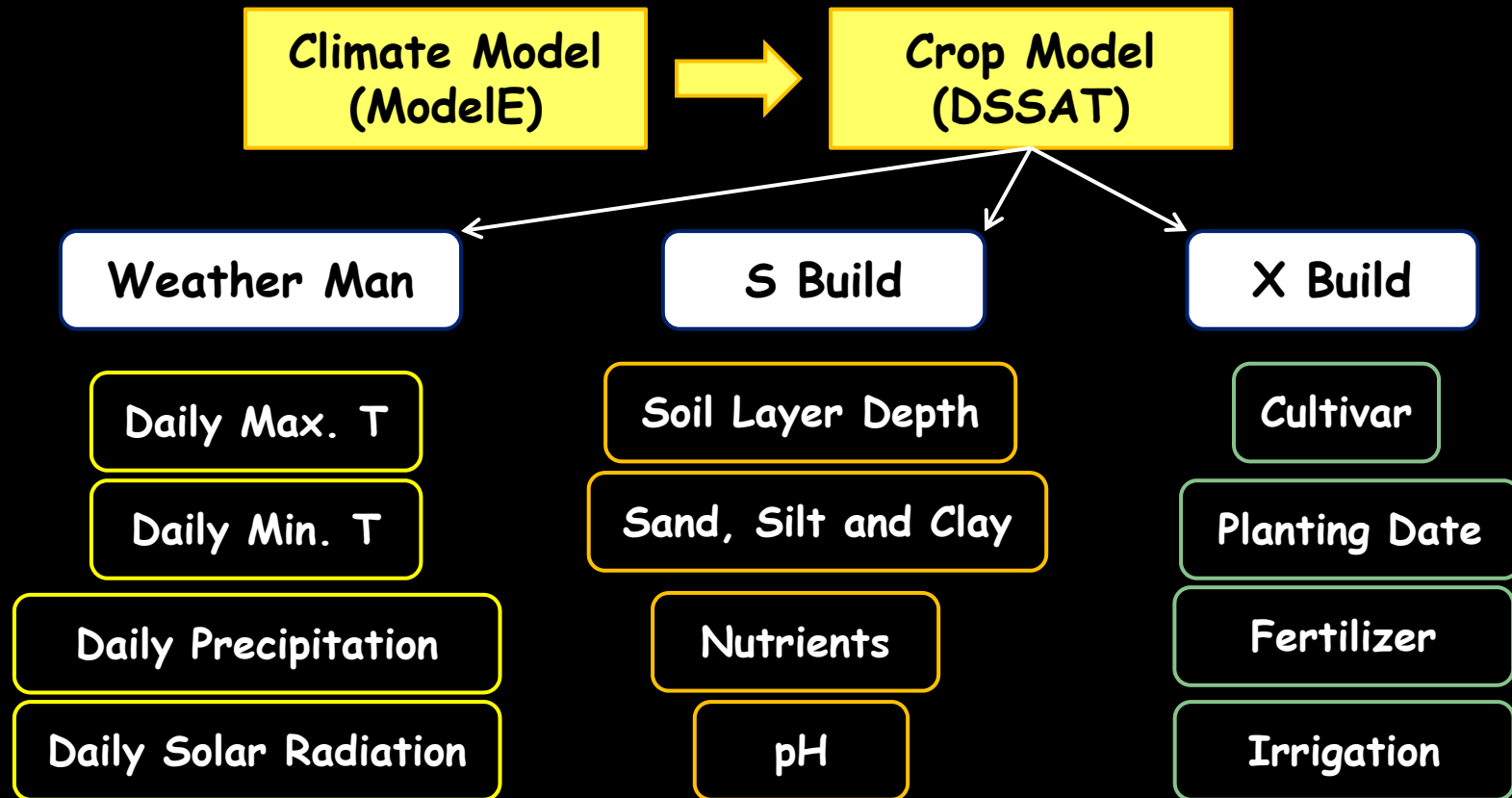
Factors that affect crop yields

Natural	Agricultural techniques
Temperature	Timing of planting and harvest
Precipitation	Fertilizer
Solar radiation	Cultivar (type of seed)
CO ₂	Pesticides
O ₃	Irrigation
Soil	Tilling

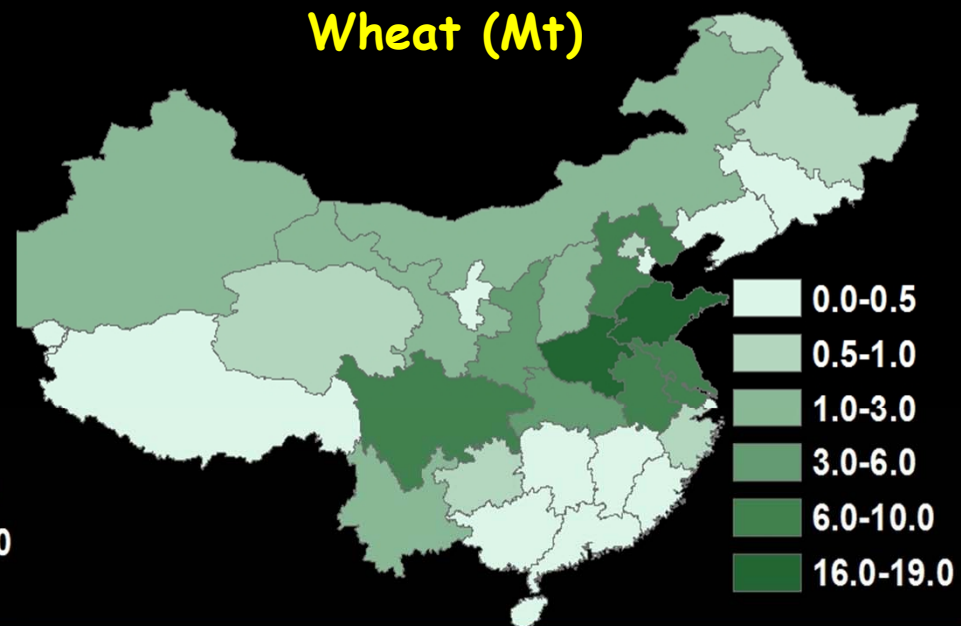
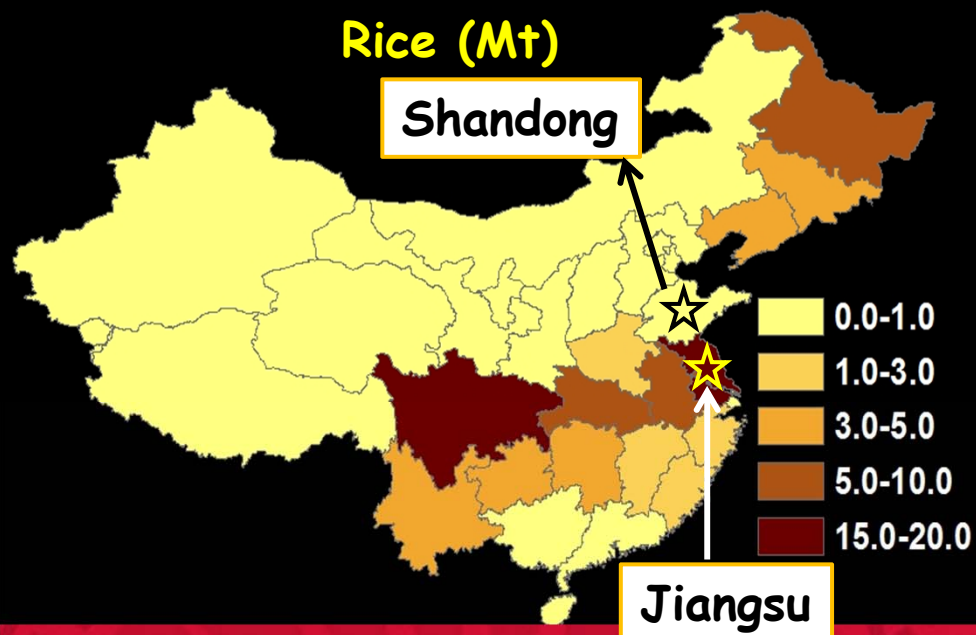
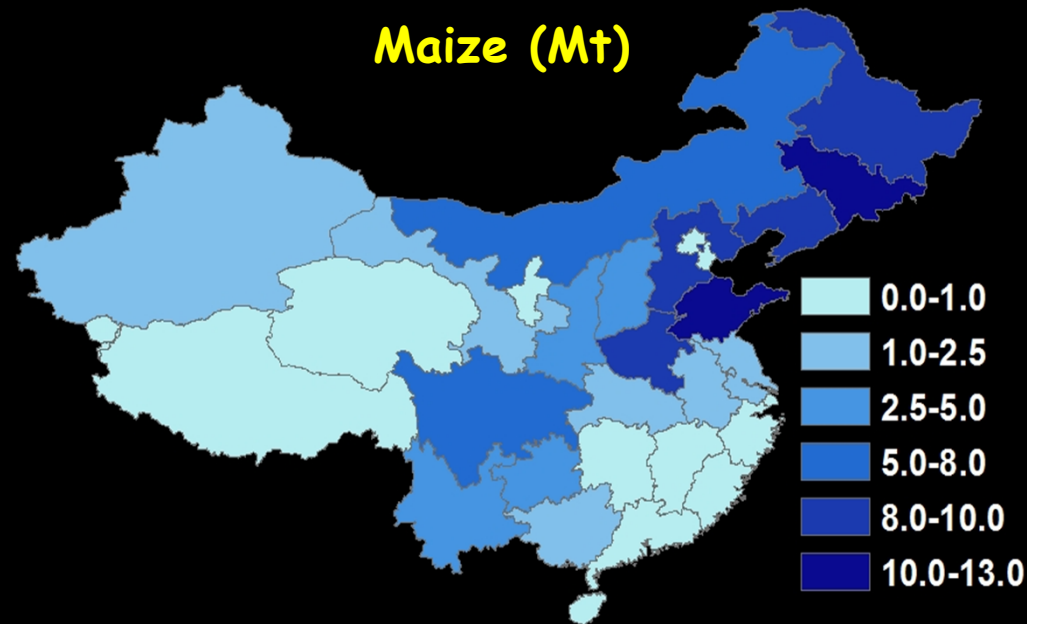
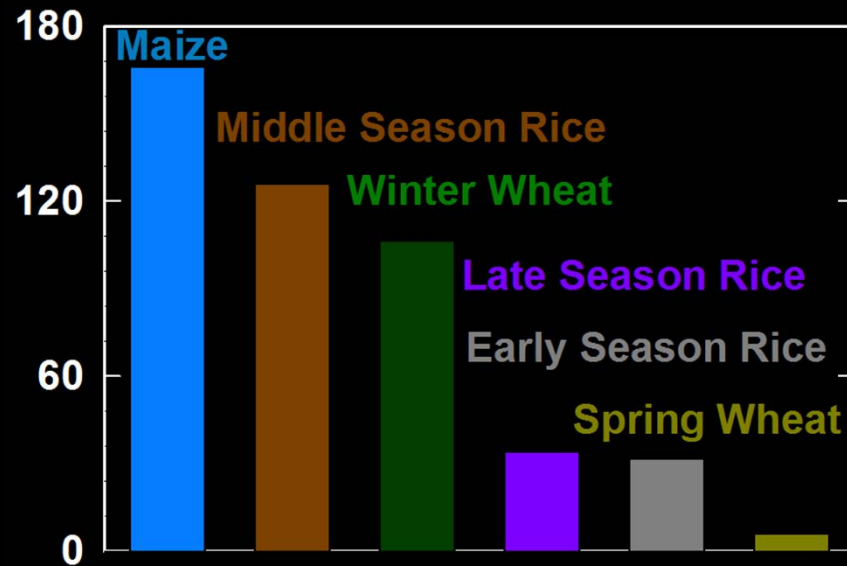
Yields of major crops and annual weather anomalies in mainland China

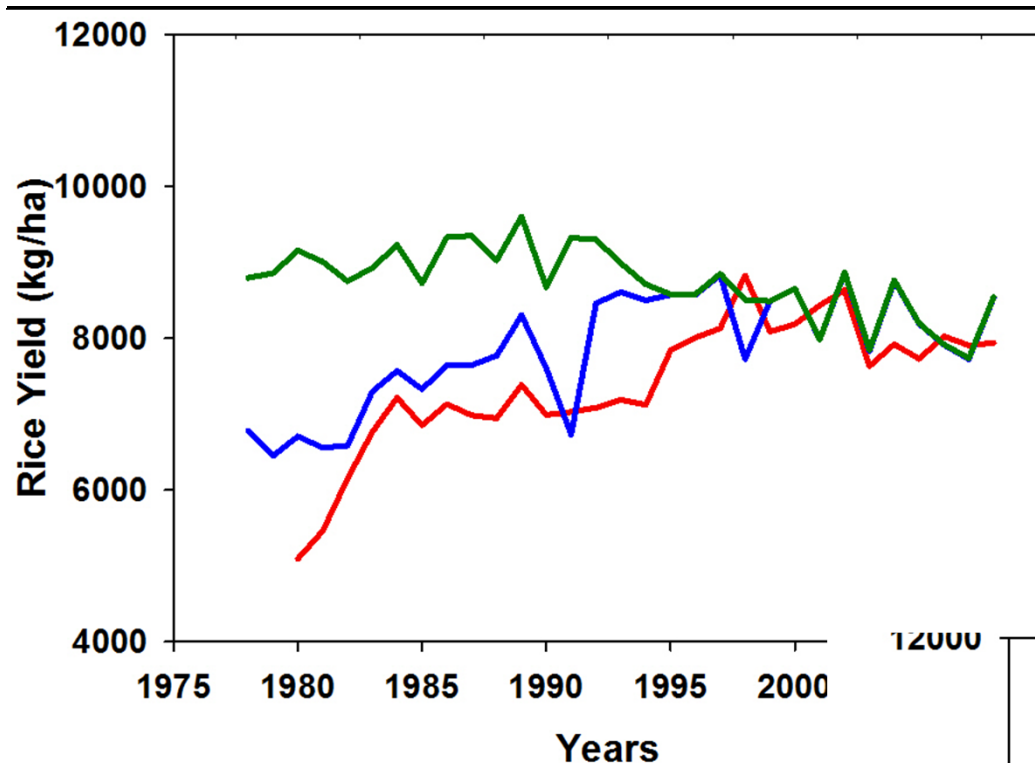


How does stratospheric sulfate geoengineering affect food supply in China?



Crop Production in China 2008 (Mt)

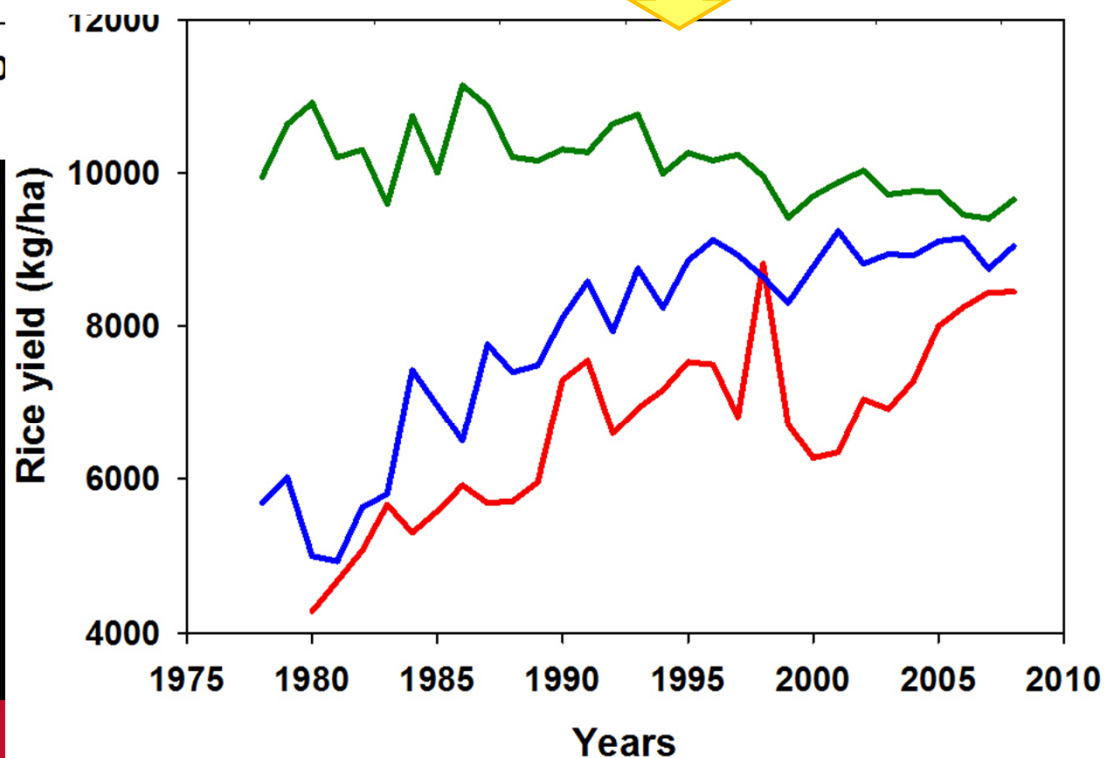




How well does DSSAT do?

Rice in Jiangsu

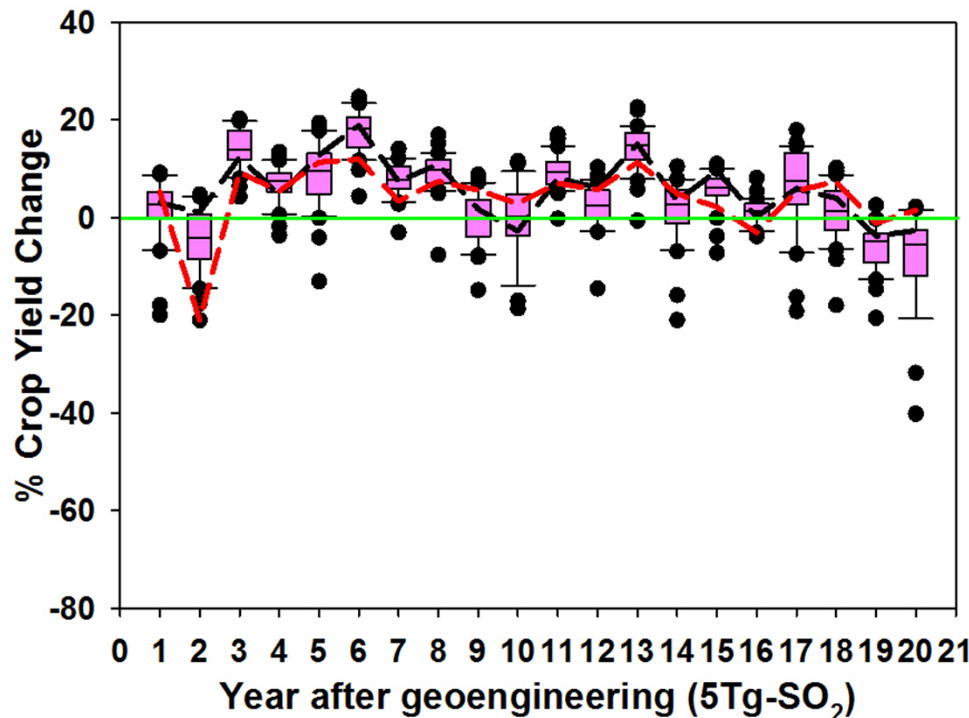
Rice in Shandong



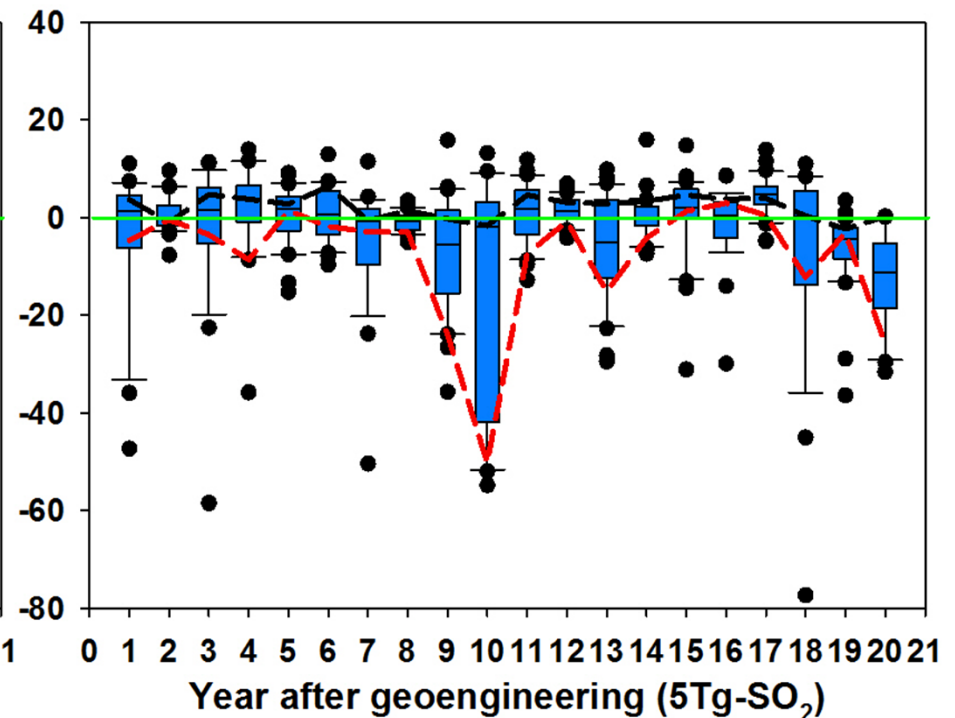
— Observation
— Reported fertilizer &
Auto Irrigation
— No water &
Nitrogen Stress

Difference responses after geoengineering

Rice yield change at Jiangsu after
5Tg-SO₂ Geoengineering



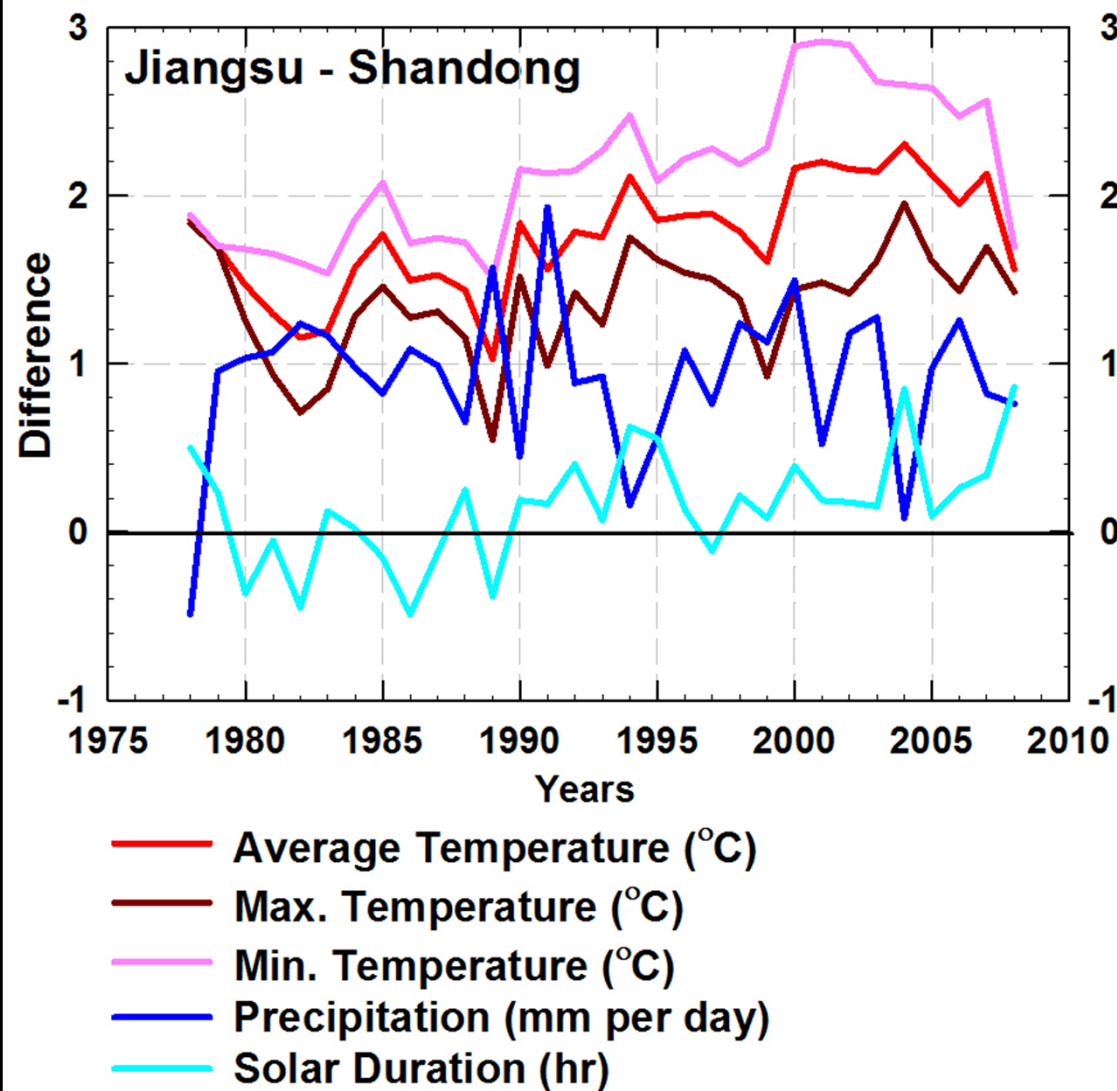
Rice yield change at Shandong
after 5Tg-SO₂ Geoengineering



-- 1978

-- 2008

- (1) 31 individual years (1978-2008) (observations)
20 yr anomalies (model simulation of geoengineering)
- (2) No irrigation
- (3) Fertilizer applied 150kg/ha when planting
- (4) No previous crop
- (5) CO₂: constant 386ppm
- (6) Fixed planting date: March 5; transplant date: March 30
- (7) Harvest at mature

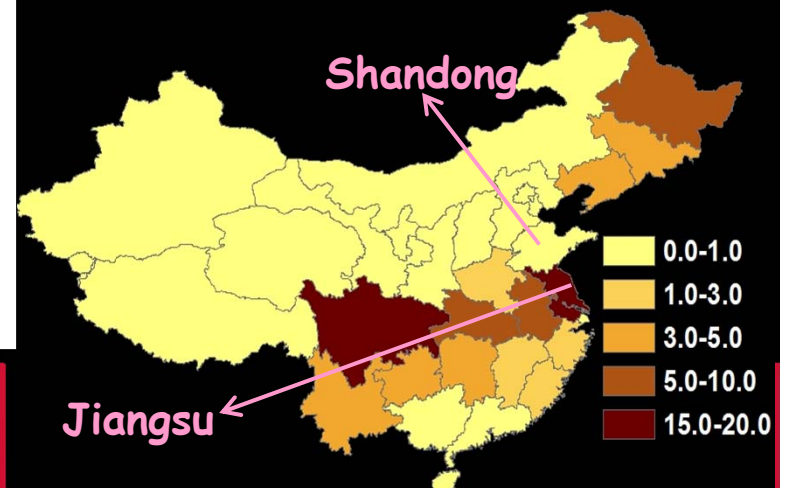


Three differences between two locations:

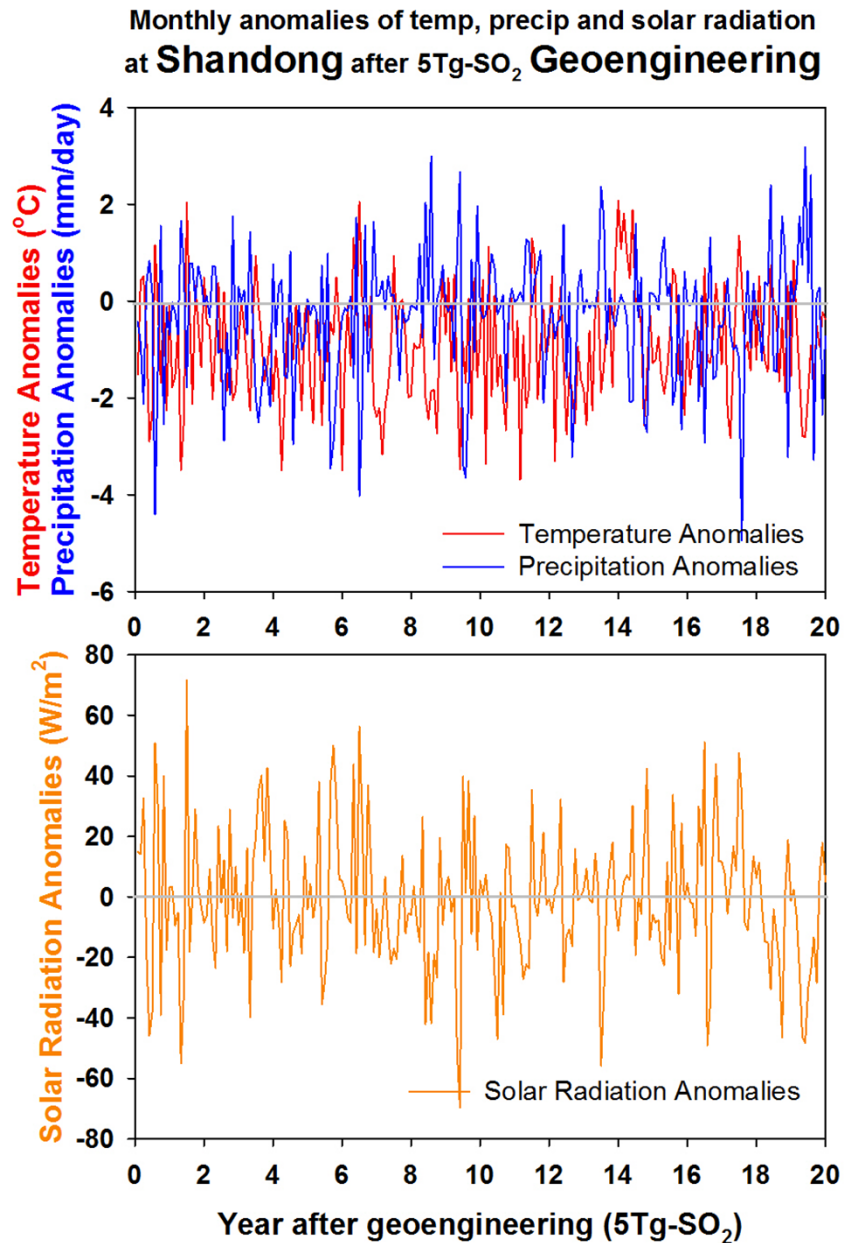
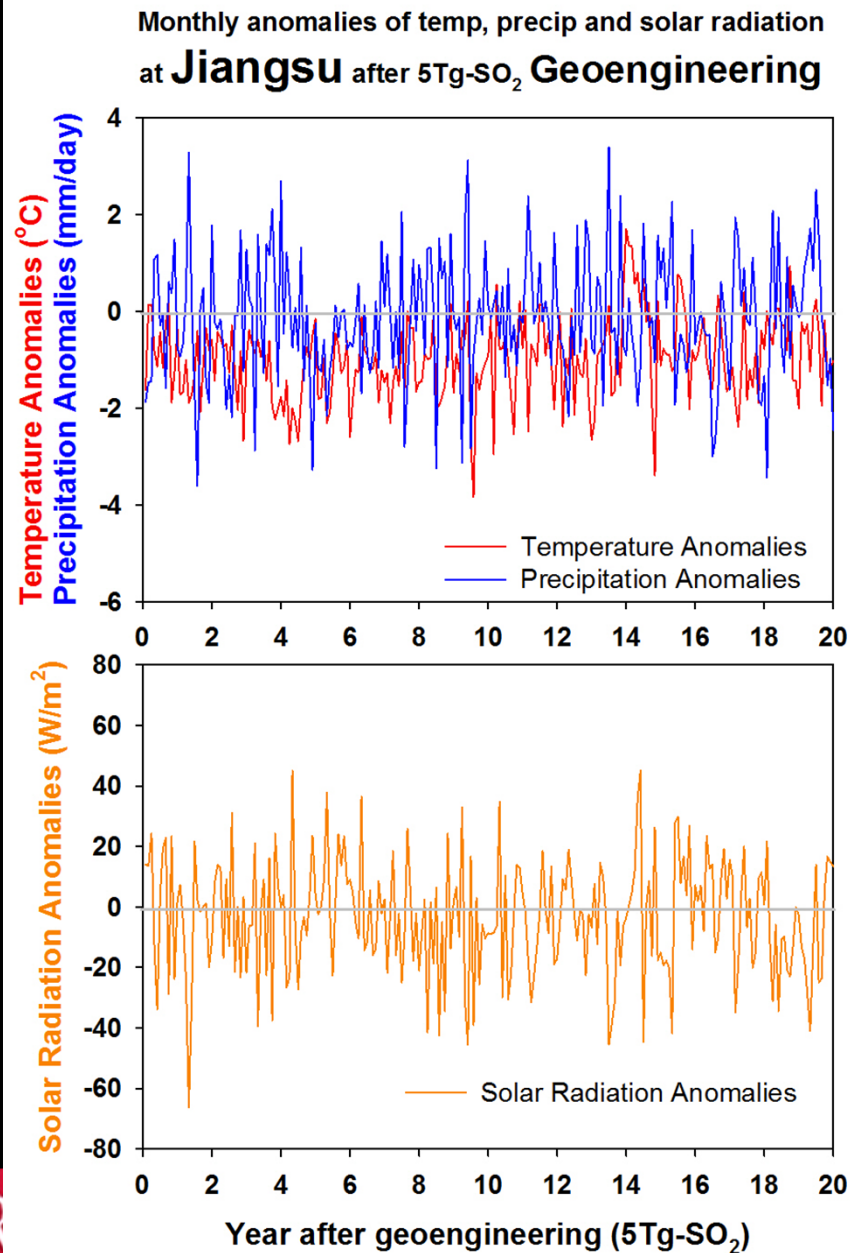
Soil profile

Climate before geoengineering

Geoengineering impacts on climate



Geoengineering impacts on climate at two locations:



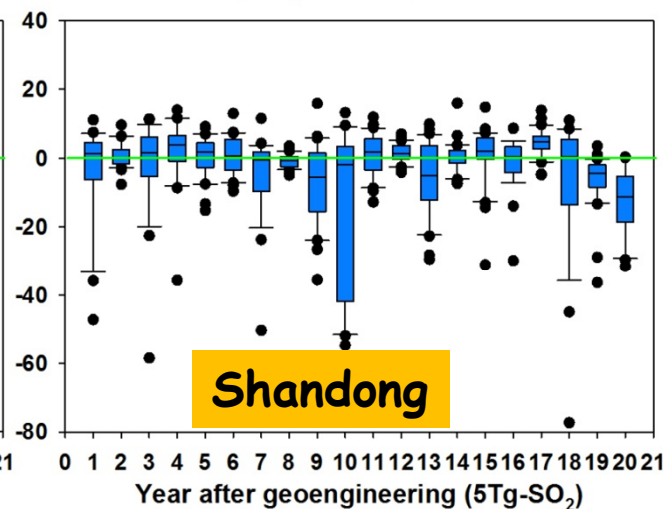
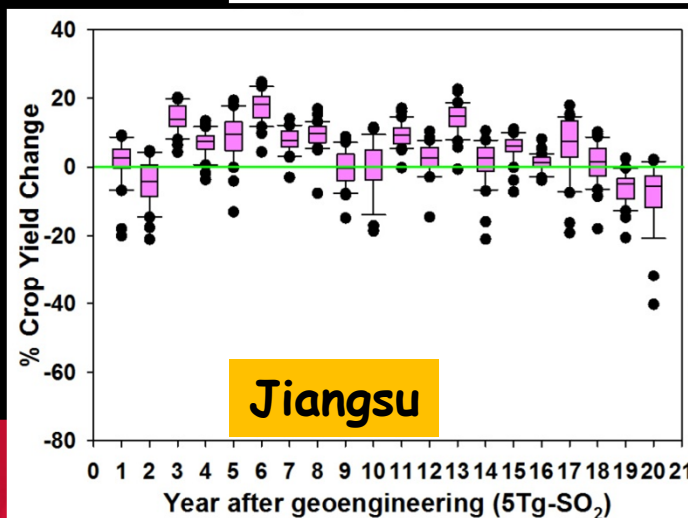
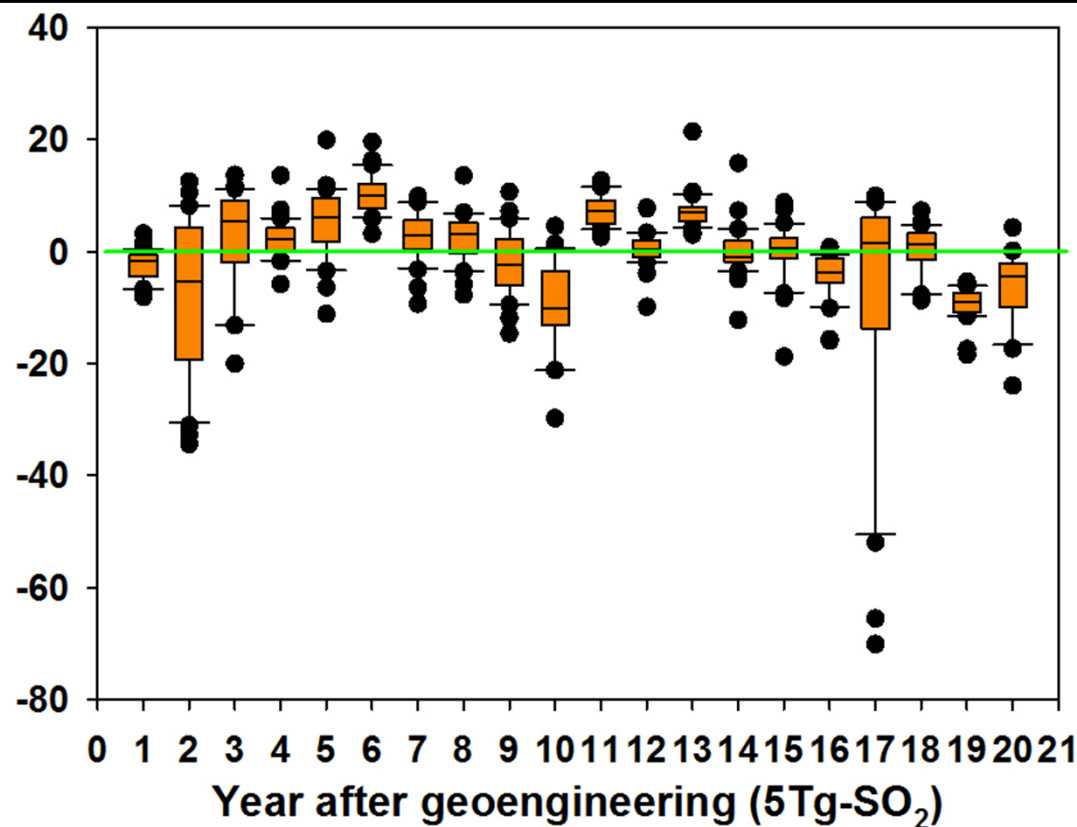
Jiangsu:

Soil profile

Climate ←

Impacts
(Geoengineering)

Climate
(Shandong)



Jiangsu:

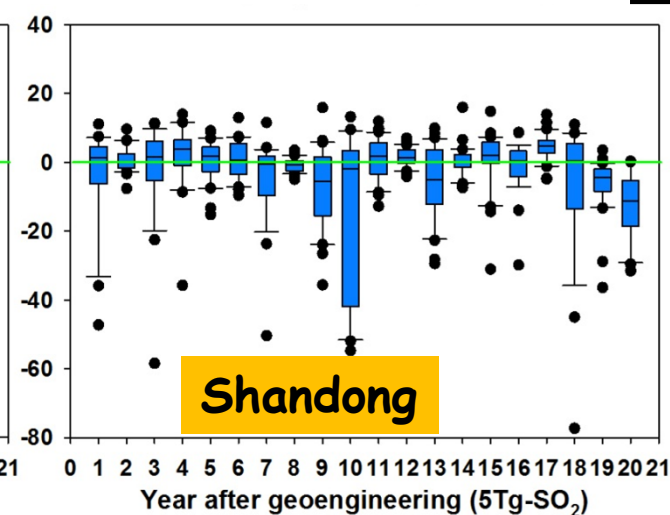
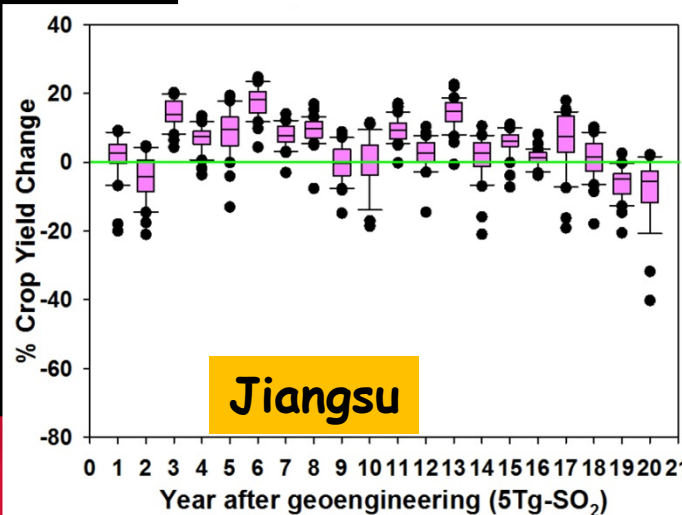
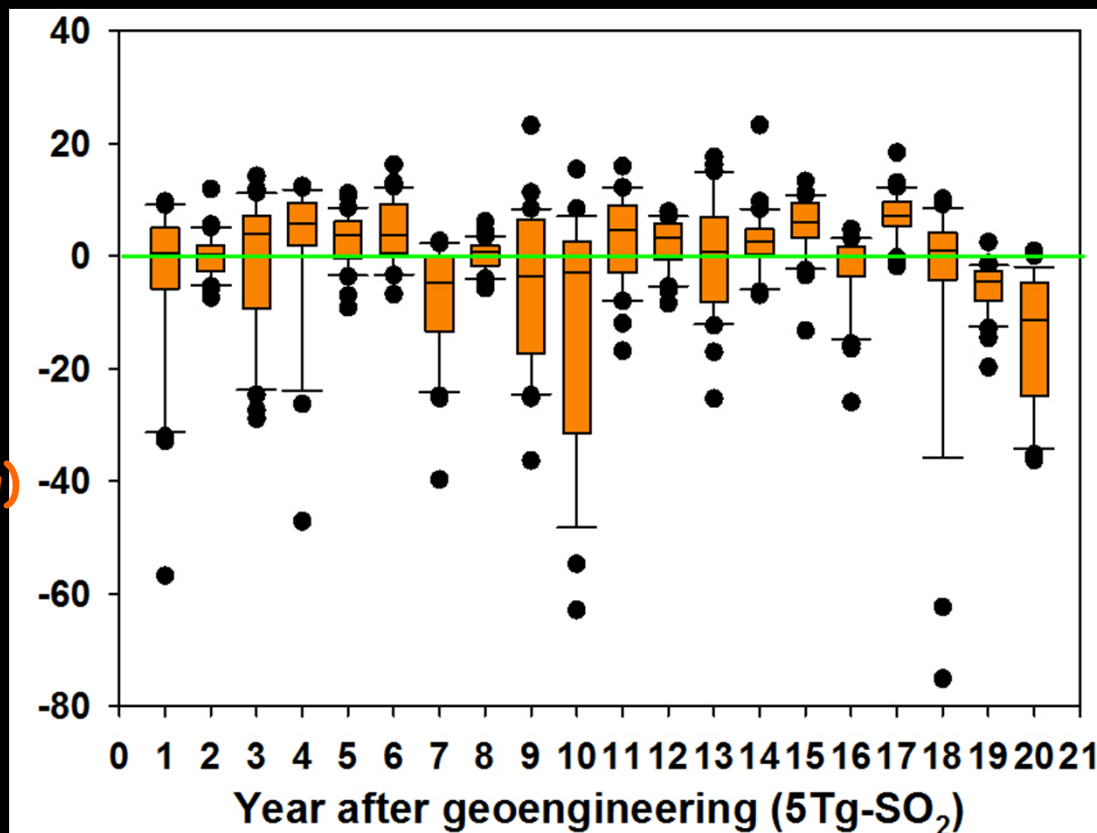
Soil profile

Climate

Impacts
(Geoengineering)

Climate
(Shandong)

Impacts
(Shandong)



Preliminary results:

Different regions response differently;

Regional climate and climate perturbations from geoengineering both matter;

To adapt to geoengineering, shifting crop grows region.

More study is needed.