



Are food security and climate stability both possible?

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Emissions from
Agriculture and
Land Use Change

Climate and
Air Pollution
Impacts on Agriculture



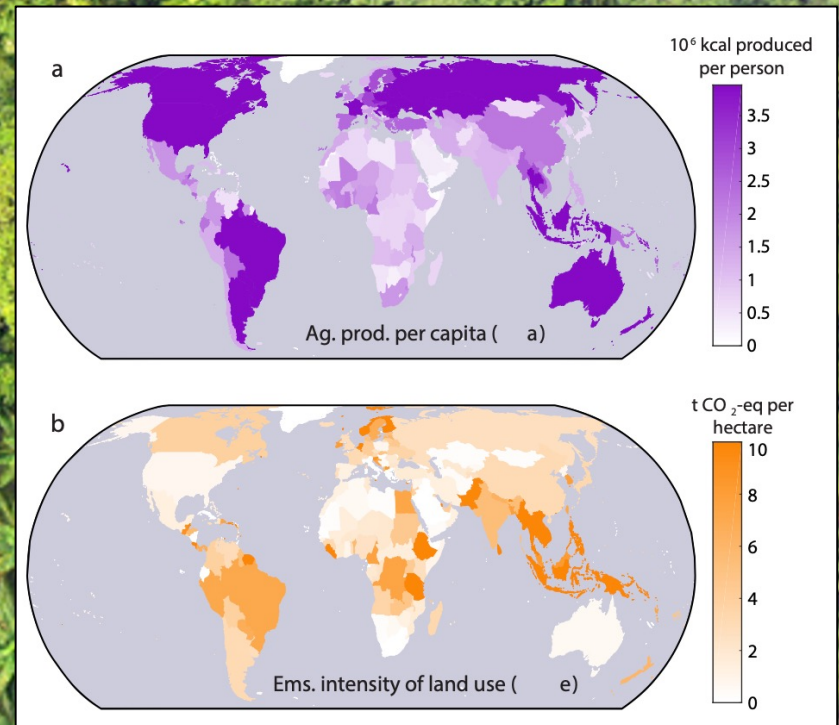
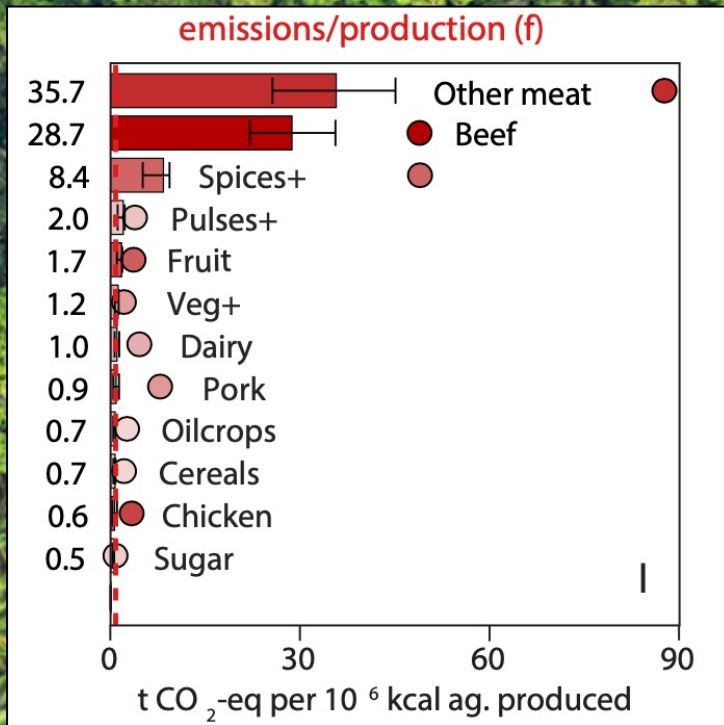
Farmer and System
Adaptation to Changing
Environment

Agriculture & Land Use Emissions

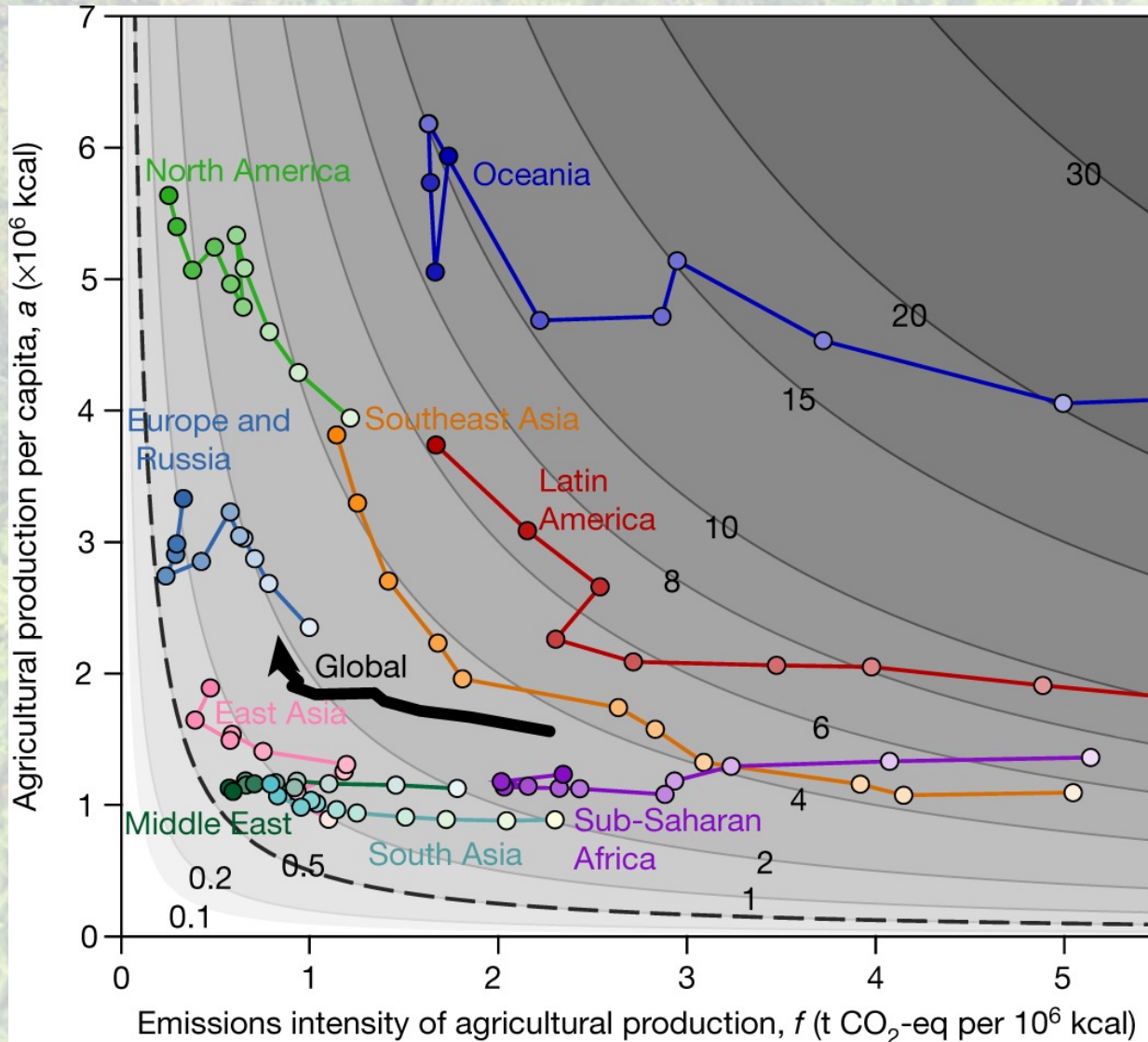
A database of all land use emissions, by year, place, process, and product:

Opportunities:

Efficiencies from Trading:



Agriculture & Land Use Emissions



Is there a “floor” on emissions from the food system?

0.5 tons CO₂e per year per person

=

A large and persistent perturbation to the climate.



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Climate & Air Pollution Impacts on Agriculture

Greenhouse Gases

Centuries

Particles

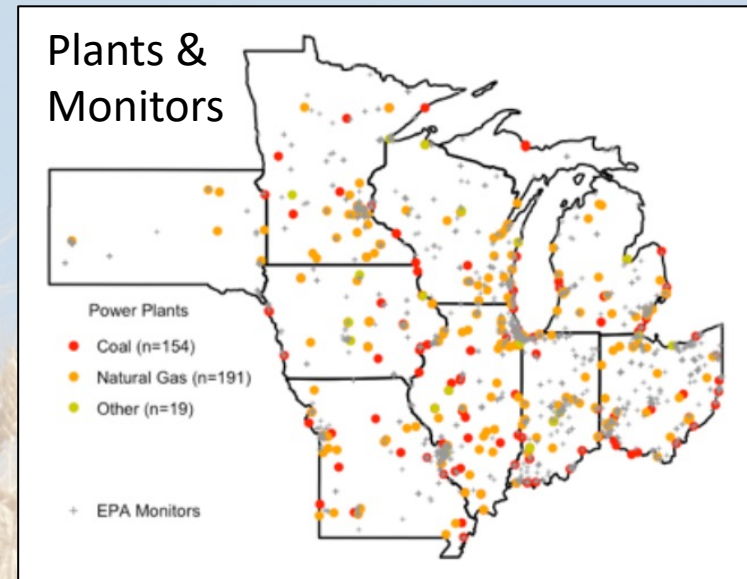
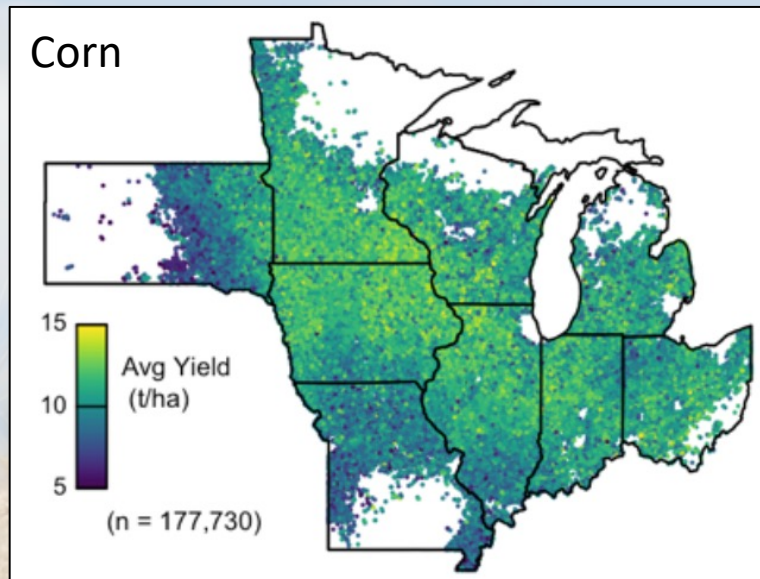
Ozone, SO₂, NO₂

Days to Months

Change Temperature, Precipitation

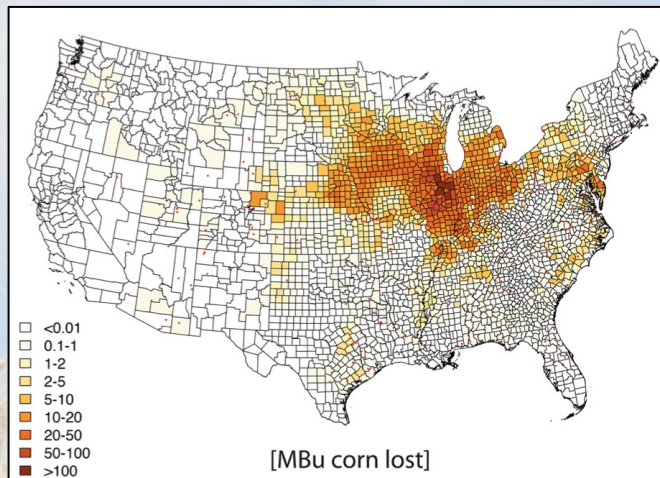
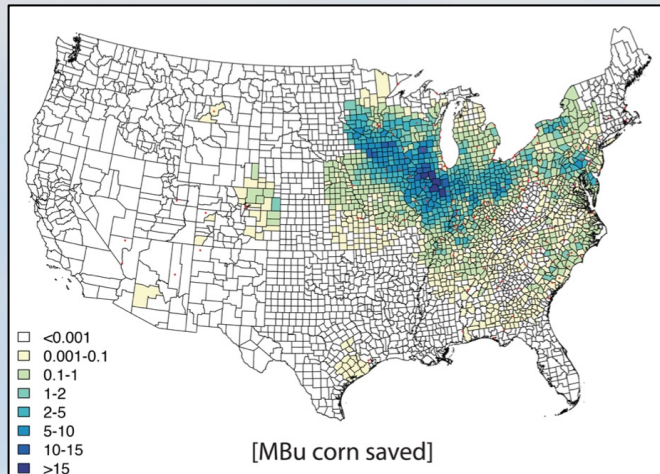
Reduce and Scatter Sunlight
Change Temperature and Precipitation

Directly Toxic

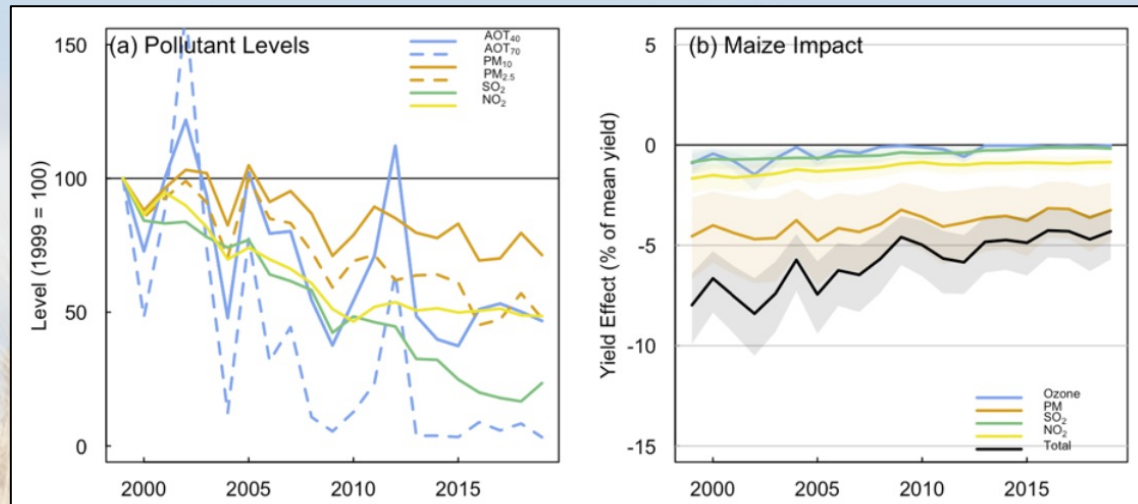
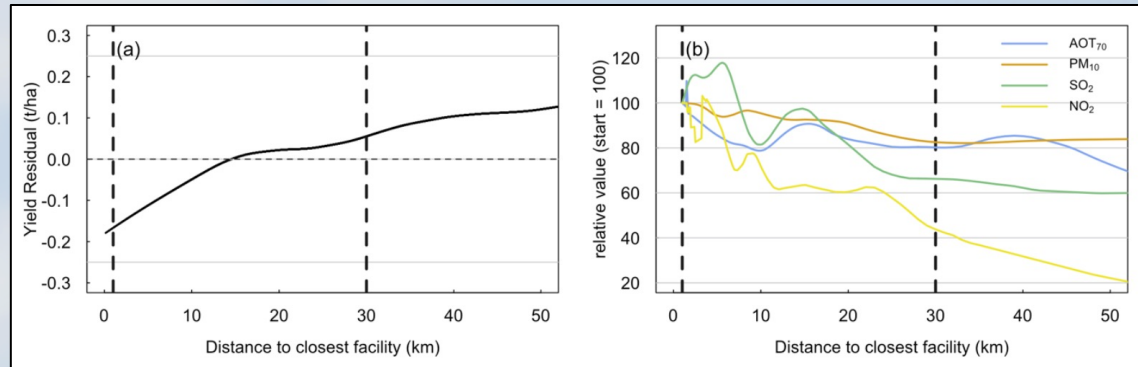


Climate & Air Pollution Impacts on Agriculture

Recent coal plant shutdowns led to increased corn yields.



There is a crop yield gradient around power plants that can only be explained by pollution.





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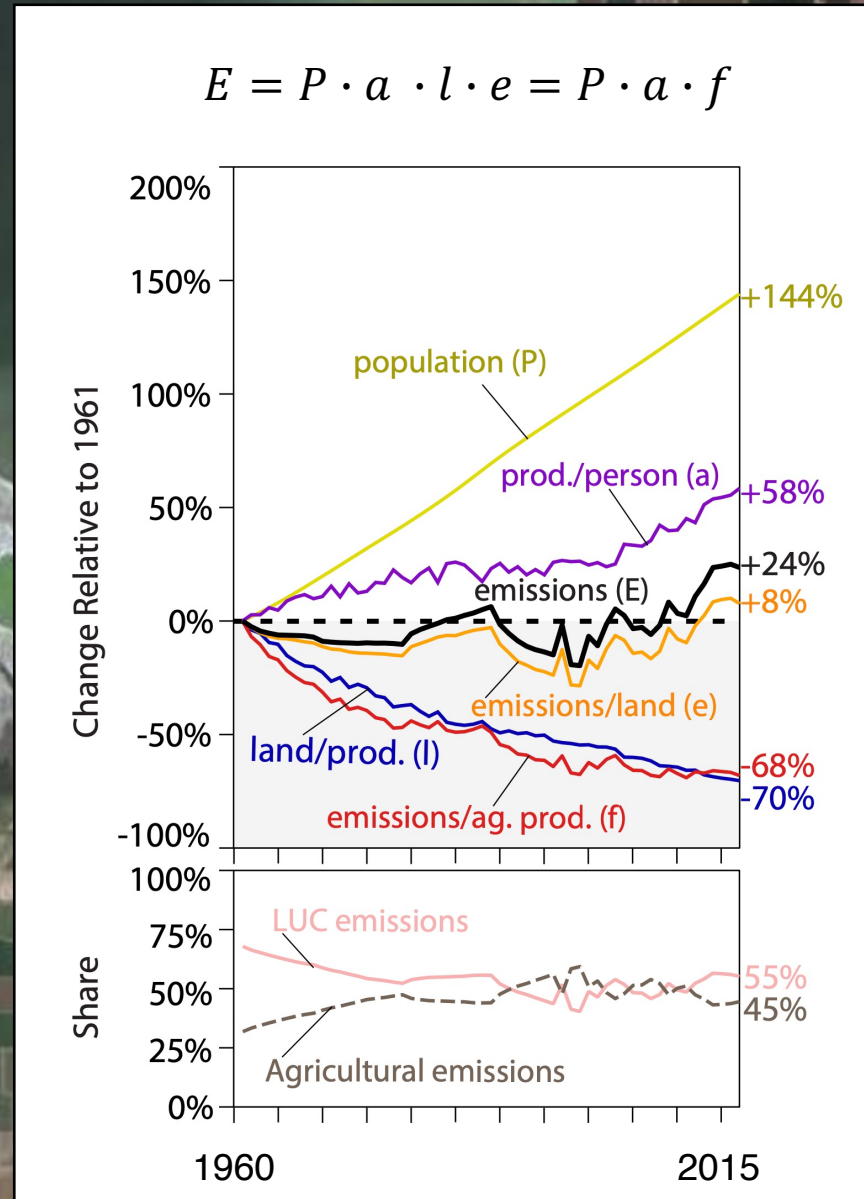
Climate and
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Farmer and System
Adaptation to Changing
Environment



Farmer & System Adaptation

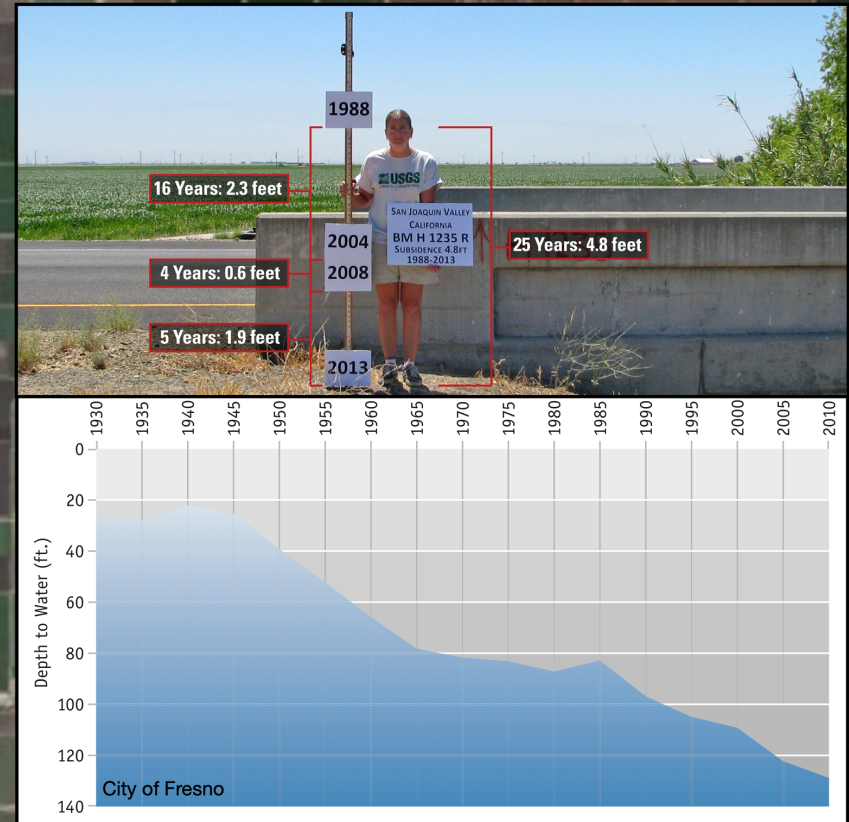


Farmer & System Adaptation

Irrigation is:

Incredibly beneficial at low levels of development.

Often unsustainable at high levels of development

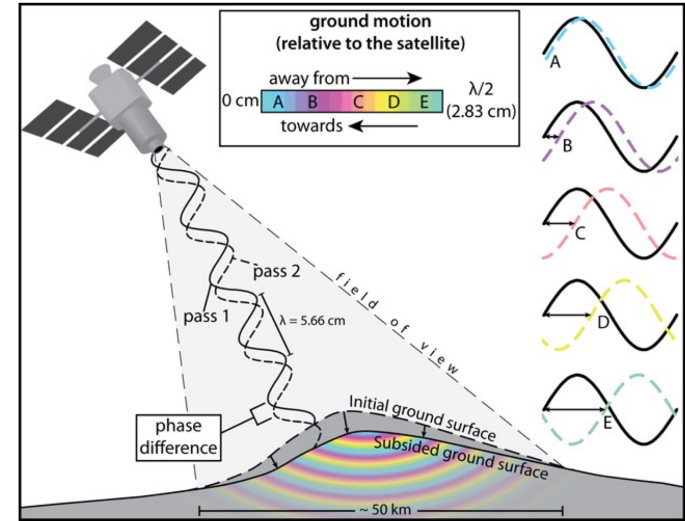


Farmer & System Adaptation

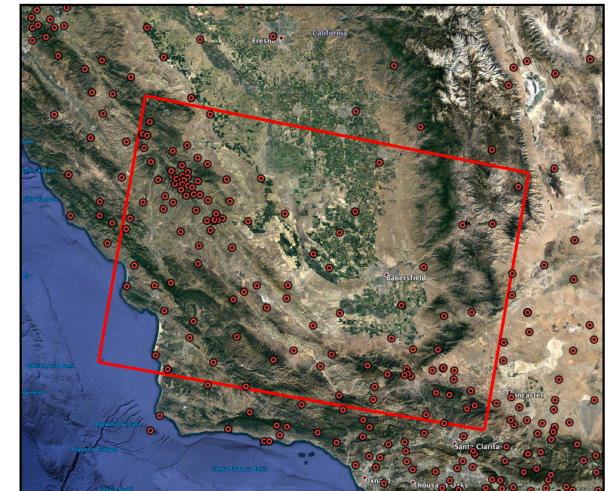
Interferometric Synthetic Aperture Radar



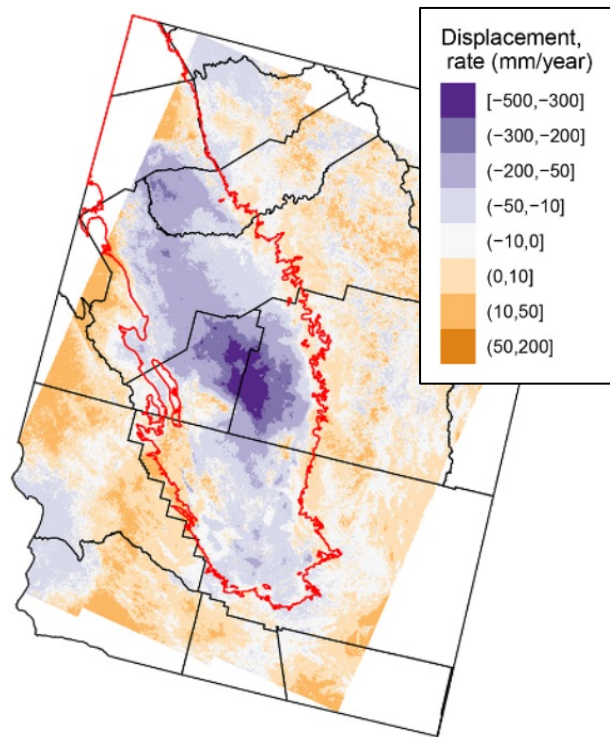
Sentinel-1 (ESA instrument)
C-Band Radar
(5.405 GHz / 18cm)
10x10m & 40x40m versions



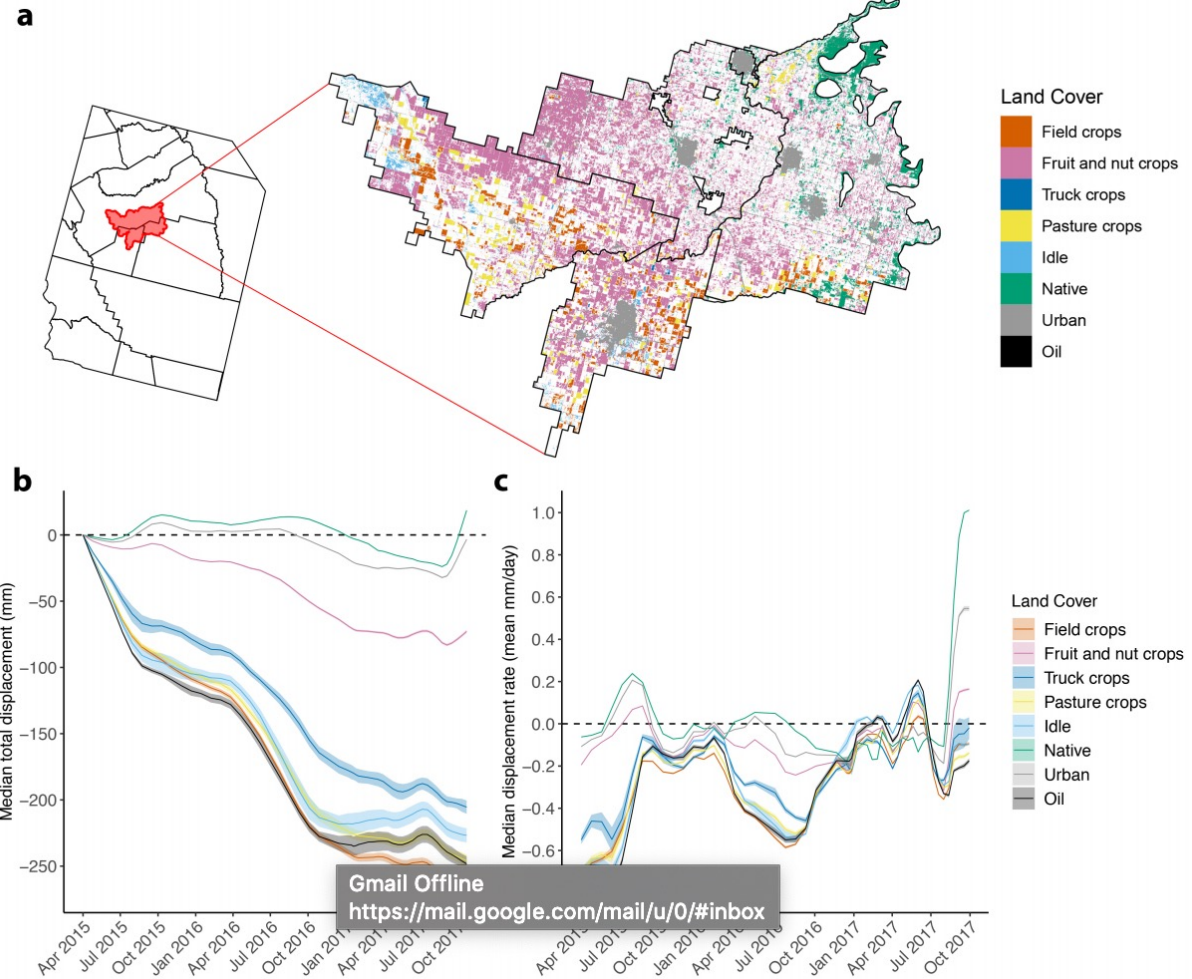
Surface-Mounted Continuous Global Positioning System Monitors



Farmer & System Adaptation



Can resolve land surface motion at very high spatial and temporal resolution...and can thus infer where and when groundwater is being withdrawn



A scenic landscape of terraced rice fields in a mountain valley at sunset. The foreground shows lush green terraced fields on a hillside, with a small wooden hut on the left. The middle ground features more terraced fields and a dense forest. The background consists of misty, layered mountain ranges under a vibrant orange and yellow sunset sky.

~~Are food security and climate stability both possible?~~
Food security and climate stability are both possible.