

A satellite image of the Yaqui Valley, showing a mix of green agricultural fields, brownish-grey urban and developed areas, and dark blue water bodies. The terrain is rugged with visible ridges and valleys. The text is overlaid on the image.

# Working in the Yaqui Valley Project, 2000-2006

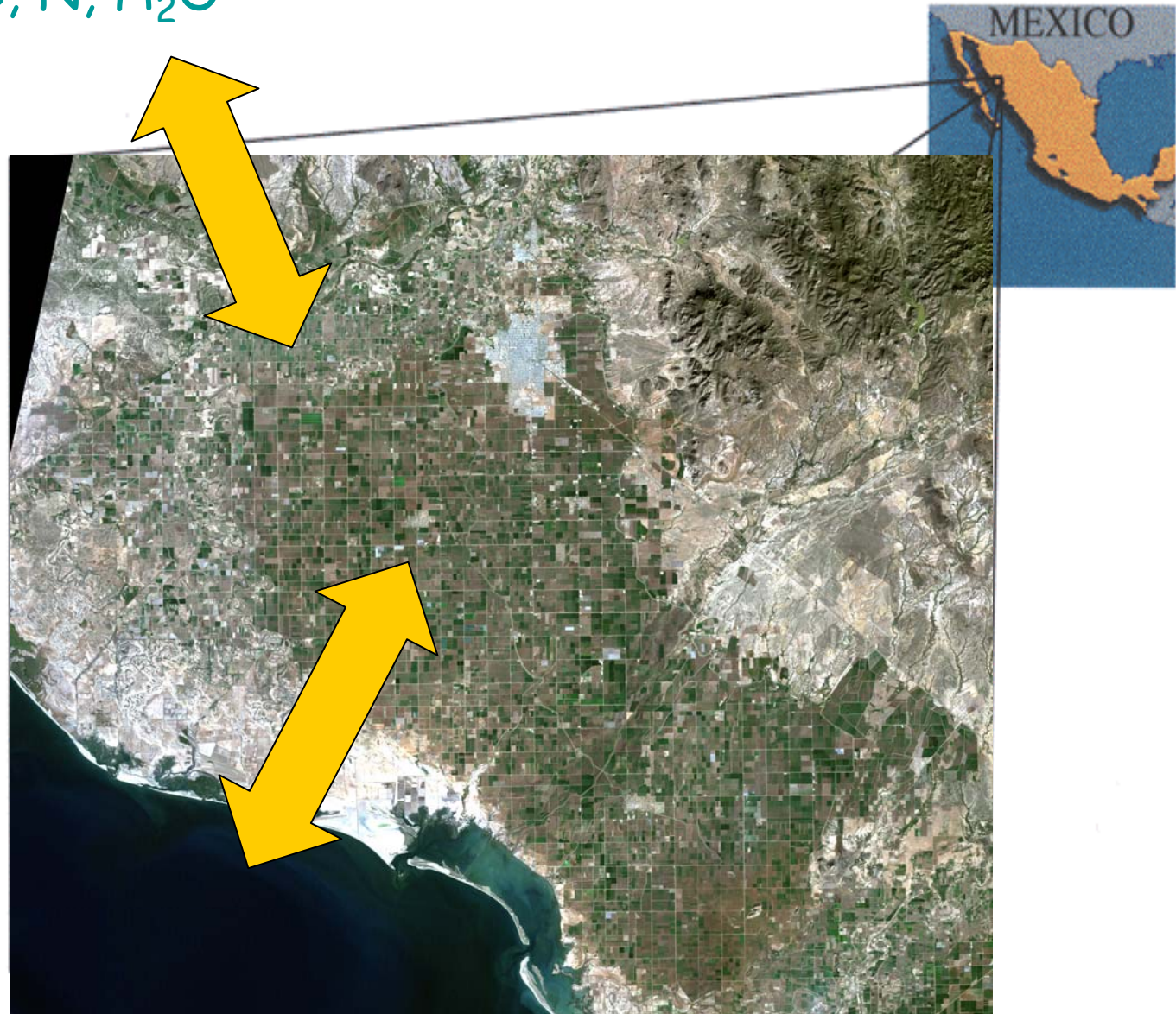
DISCCRS II Symposium  
March 28, 2006  
Asilomar Conference Center  
Pacific Grove, California

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Original Idea: Spatial Models of Land-Air and Land-Water  
Exchanges = carbon cycle and climate change focus

C, N, H<sub>2</sub>O





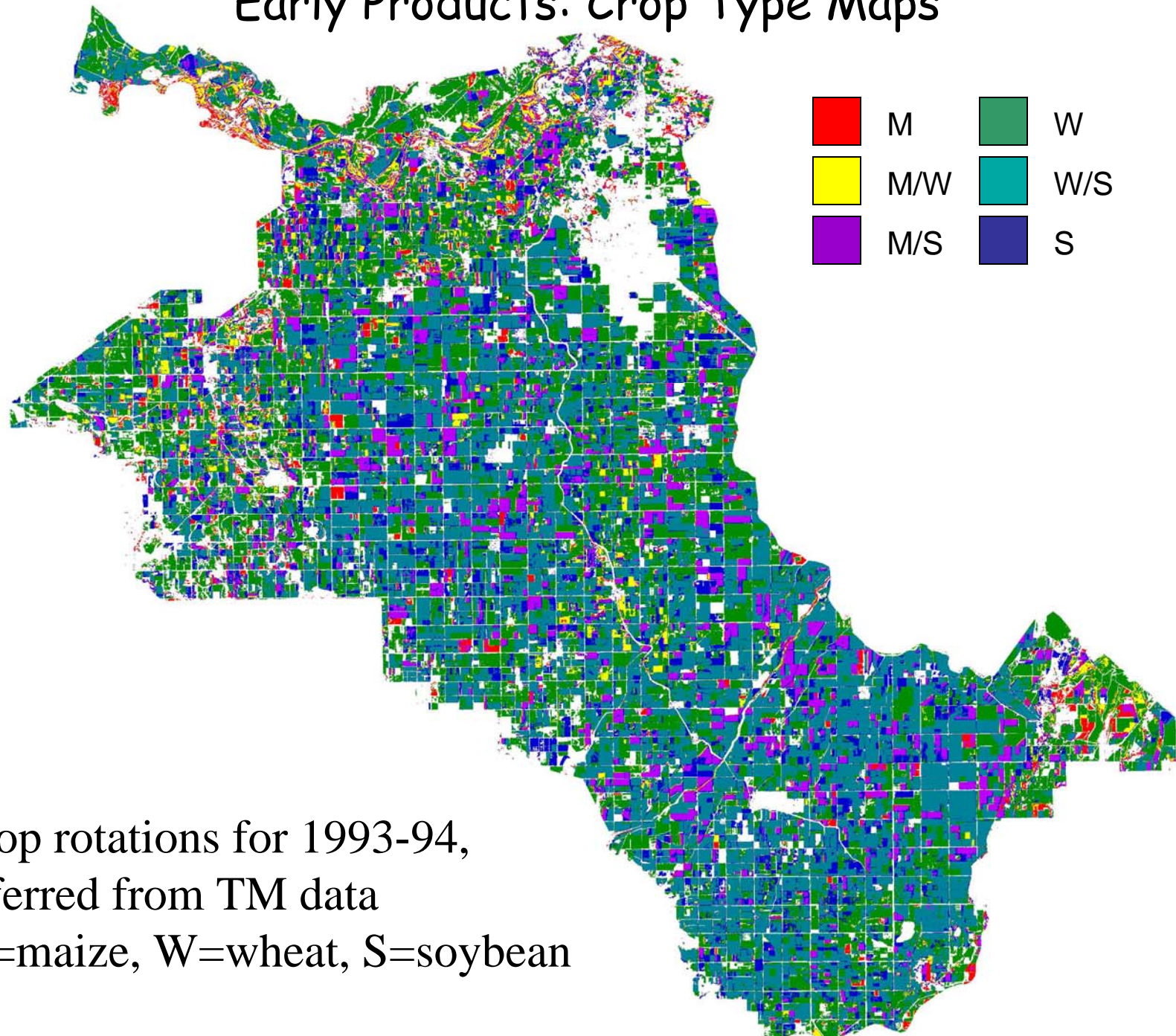
# Original Idea: Biogeochemical models require many inputs

Crop types, Biomass, Soil properties, Tillage practices



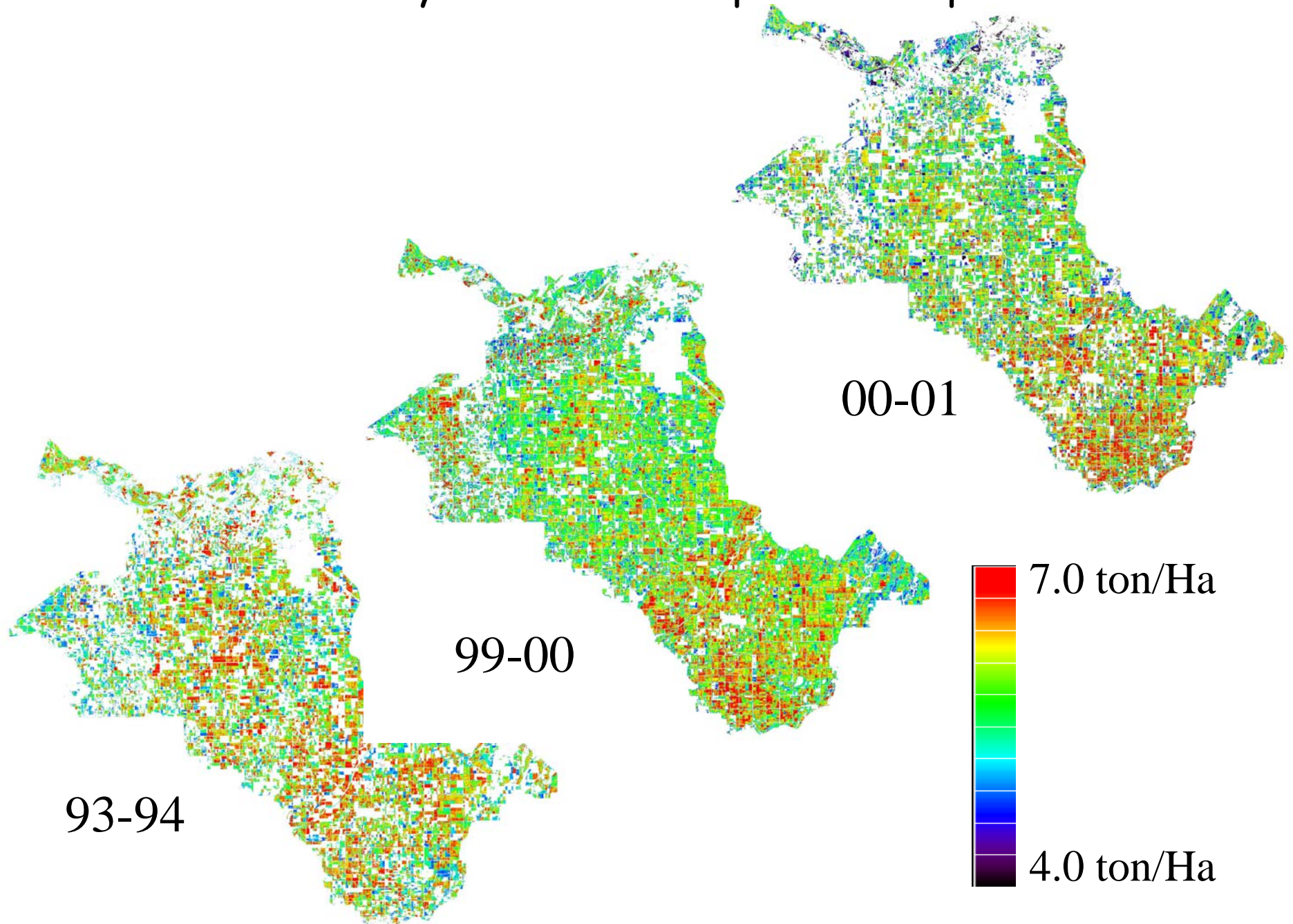


## Early Products: Crop Type Maps



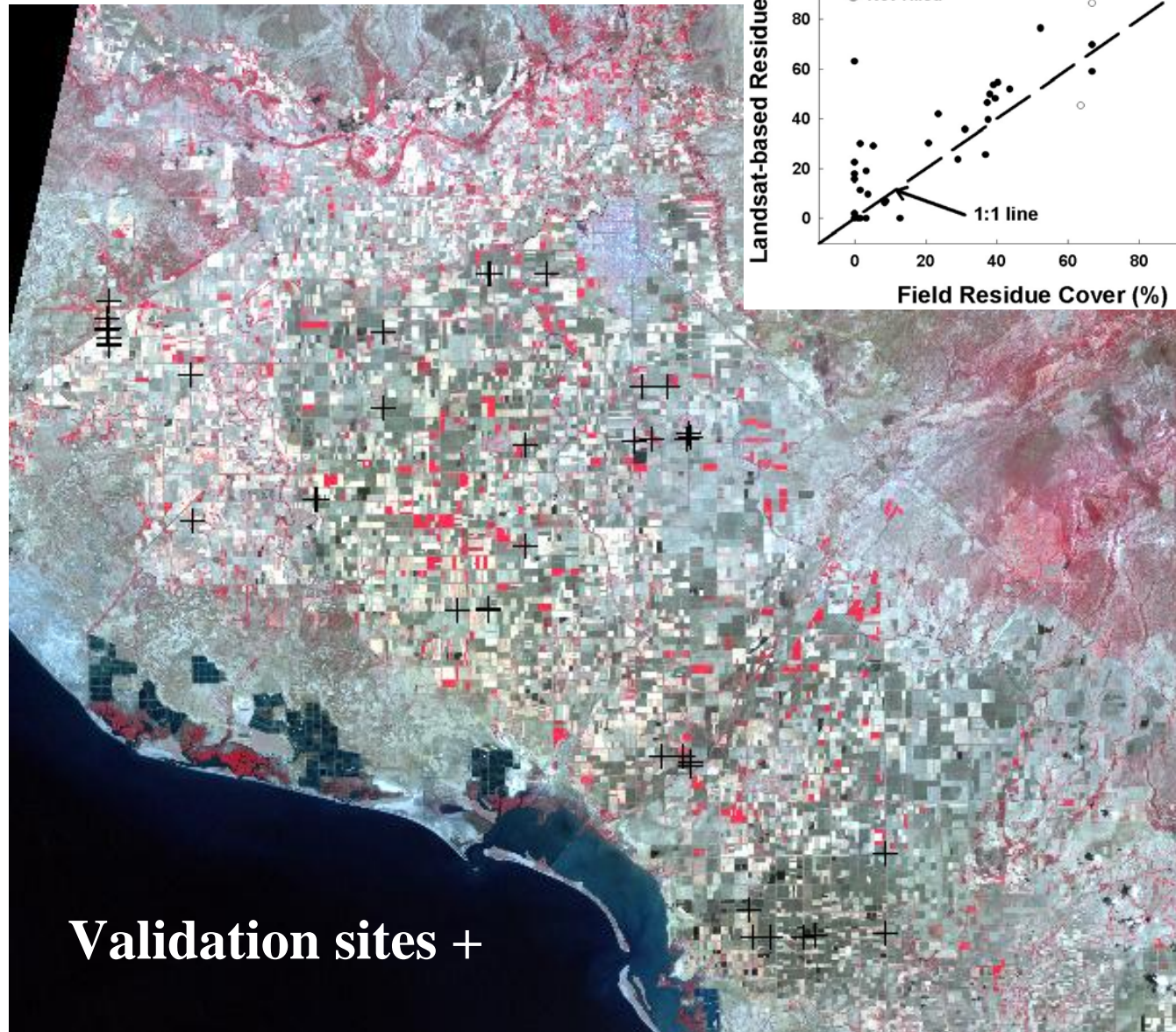
Crop rotations for 1993-94,  
Inferred from TM data  
M=maize, W=wheat, S=soybean

## Early Products: Crop Yield Maps





# Early Products: Crop Residue and Tillage Maps





# Early Interactions: *Gaining new perspectives*

Field work



Working at CIMMYT

## Early Interactions: *Gaining new perspectives*



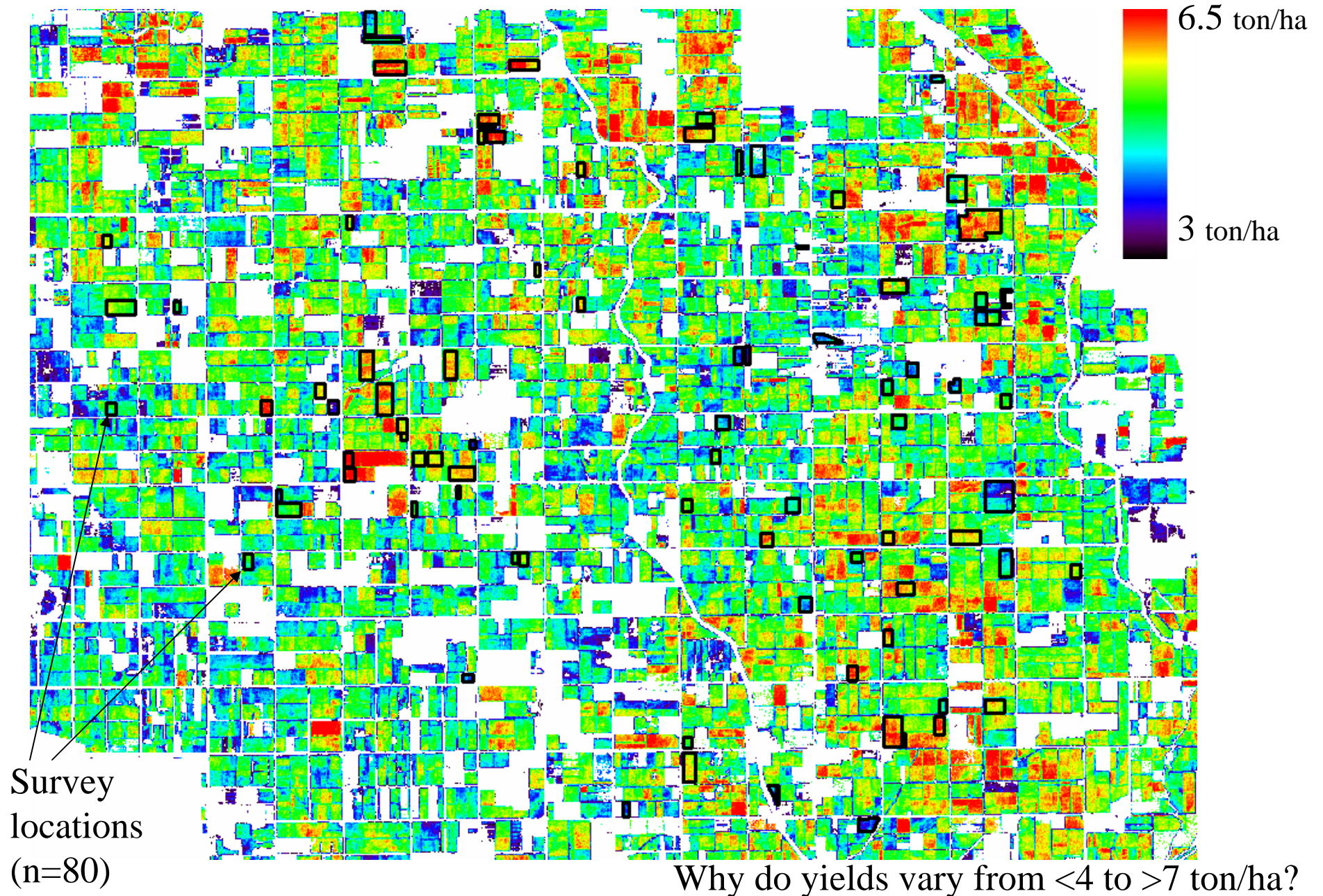
Talking with farmers

Project Meetings



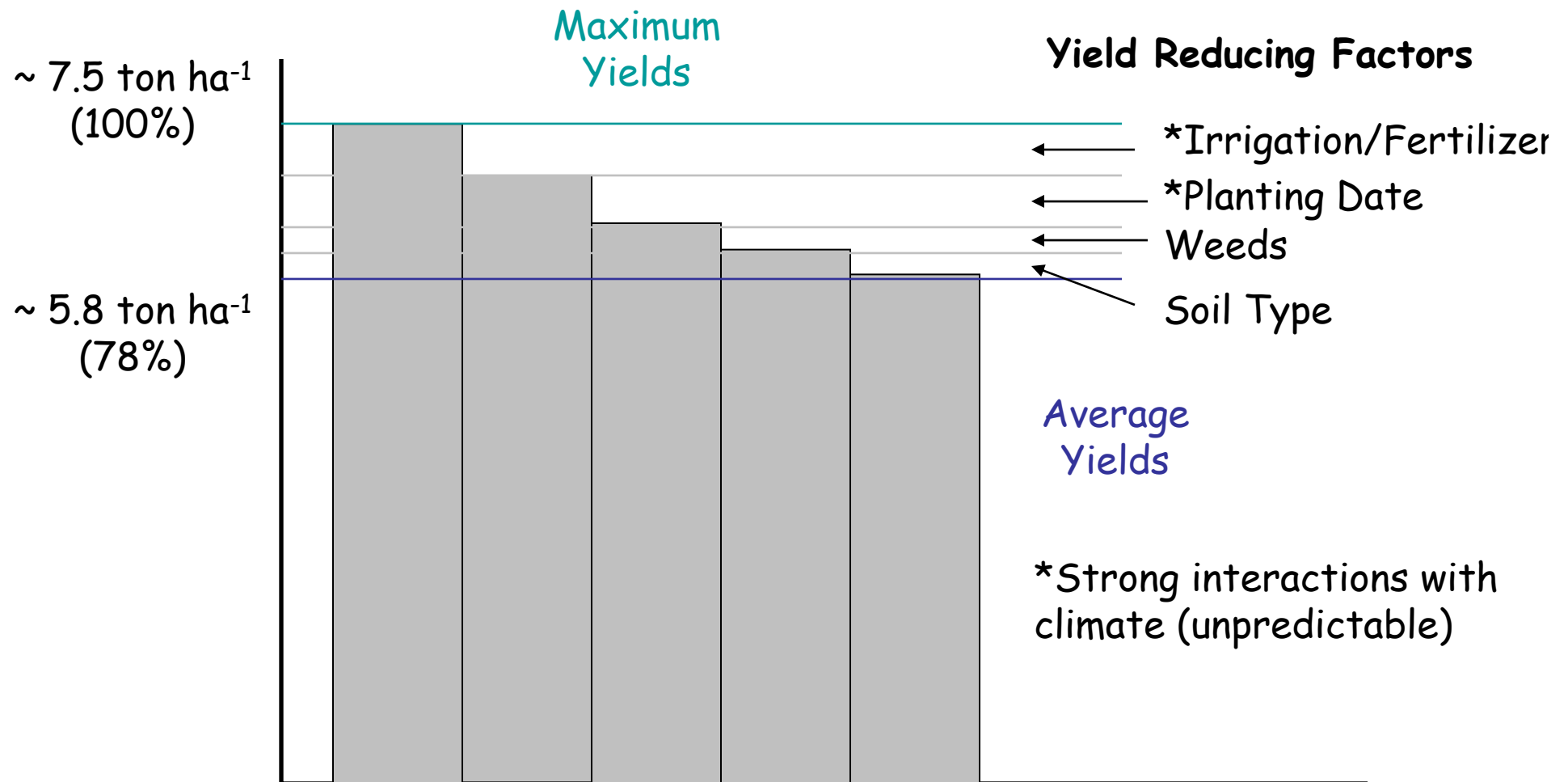


# New goals, same tools: Understanding yield variability





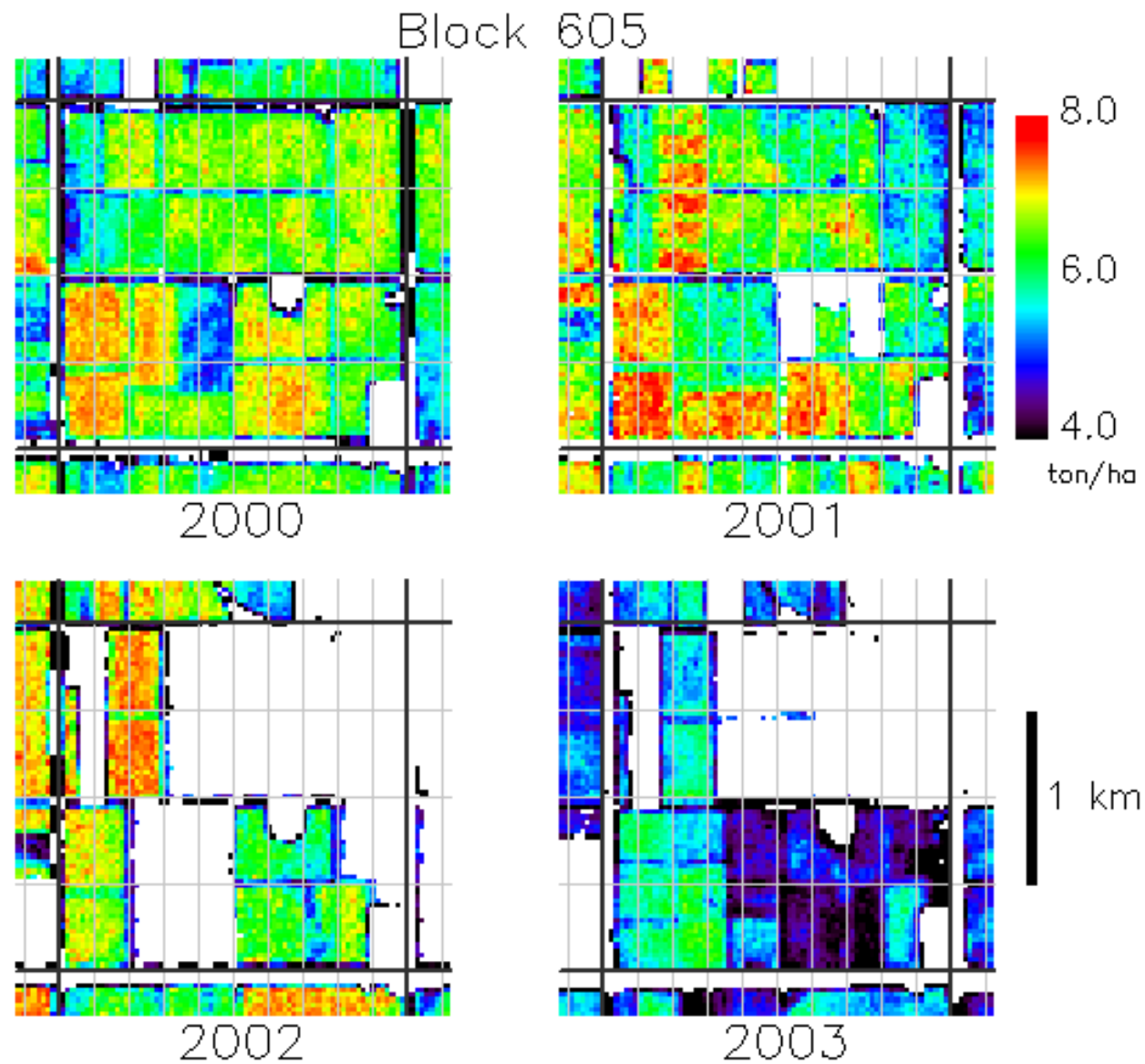
# New goals, same tools: Understanding yield variability



**\*Height difference between successive bars shows the estimated average yield loss due to sub-optimal conditions for each factor**



## New goals, same tools: Tech transfer to farmers

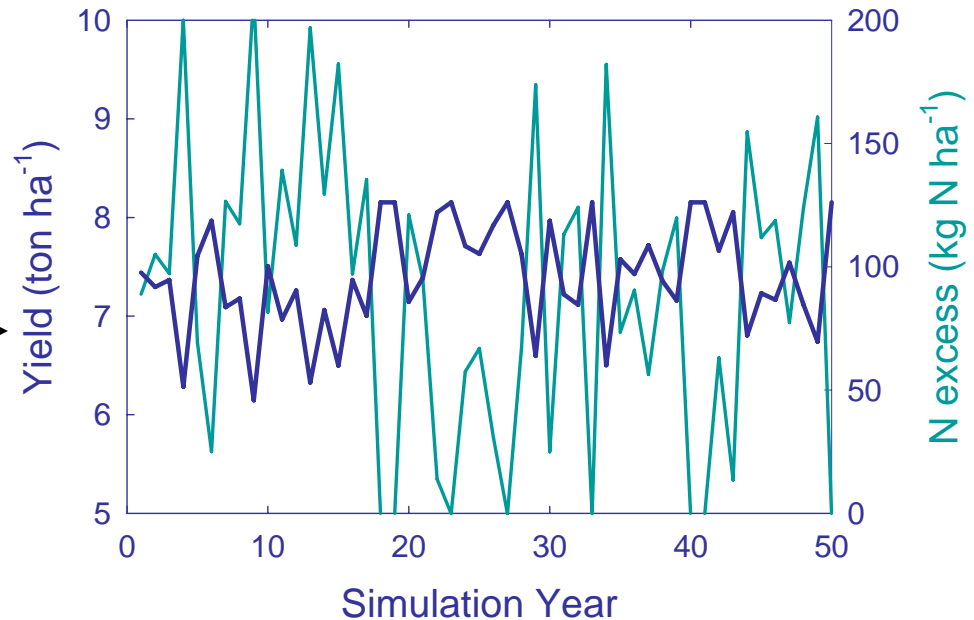




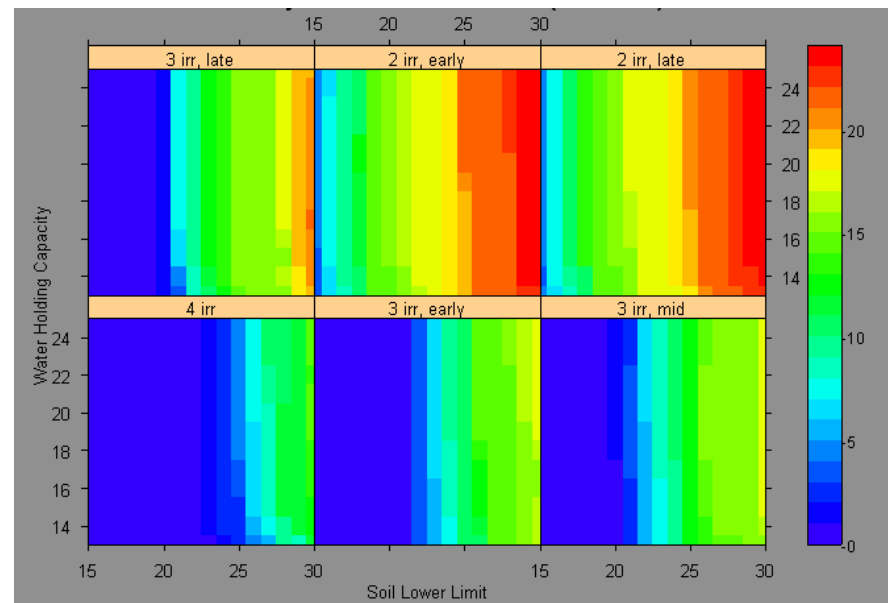
# New goals, same tools:

Other side projects:

Understanding N rates  
using a model of  
farmer decision making  
under uncertainty and  
soil, climate datasets



Exploring irrigation  
options using crop  
growth model and soil,  
climate datasets



Vulnerability analysis  
(Amy)

## Some lessons (sample size = 1)

- Big differences between *ex post* and *ex ante* analyses (uncertainty is important factor in farmer's or institution's behavior)
- For yield or N rate improvements, there were few "easy" recommendations to make, except maybe better weed control. But we now know the tremendous value of reducing uncertainty and have some of the tools to do it (e.g., N diagnostics, remote sensing)
- Some farmers are clearly more progressive and experiment with new ideas and technologies. If and when they work, others likely follow quickly.



## Some lessons (sample size = 1)

- Interdisciplinary discussions (incl. farmers) almost always lead to a change in thinking and new ideas
- Everyone thinks at different spatial and temporal scales. This was one of the biggest challenges but also biggest benefits of interdisciplinary research.
- Many years (incl. time in Valley) needed to find real solutions to problems (both for perspective and for data)
- Goals can change quickly, but basic data and model needs are often similar
- Good collaborators are essential

# Some challenges (sample size = 1)

For Me:

- Academic incentives are still mainly for doing “cutting edge” disciplinary work, not for relevant or useful work. How to allocate time??

• For Group:

- Long term, “matrix” funding for interdisciplinary work is hard to come by, especially(?) for agriculture

- Balancing the needs to fill missing expertise, allow students to do own thing, and maintain a manageable group size (serendipity vs. design)

- How to measure impact?



An aerial photograph of a vast agricultural landscape, characterized by a dense grid of rectangular fields. The fields exhibit a variety of colors, including shades of brown, tan, and green, suggesting different crops or stages of land use. The fields are separated by thin, dark lines, likely roads or irrigation canals. In the lower right quadrant, there is a distinct area with a more complex, irregular pattern, possibly indicating a different type of land use or a small settlement. The overall impression is one of a highly organized and productive agricultural region.

Thank You