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GLOBAL LEARNING AND EVIDENCE EXCHANGE

CLIMATE-SMART AGRICULTURE

DECEMBER 5–9, 2016 // SIEM REAP, CAMBODIA

Development, Agriculture and Climate Change

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CLIMATE CHANGE: KEY TO WORK IN THE CAUSES (MITIGATION)

Inertia of Current and Past Emissions →
Effects in Climate for Decades

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Need to Adapt

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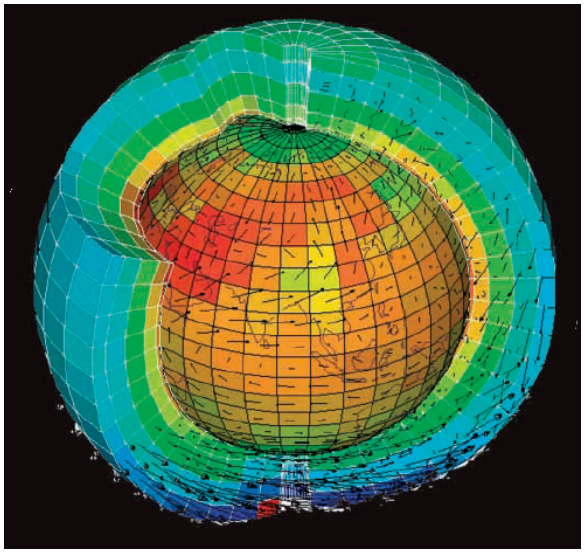
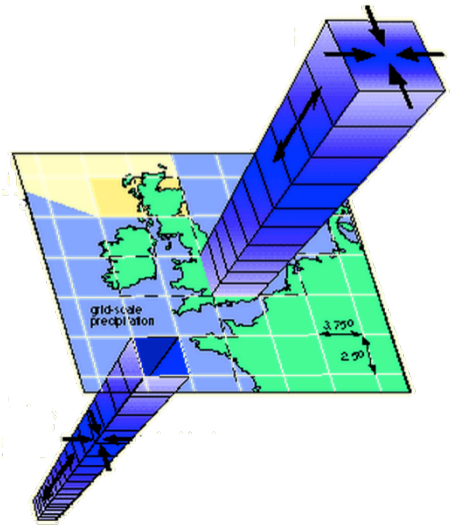
IMPROVING ADAPTATION TO CC: ADAPT TO WHAT? FUTURE CLIMATE?

Climate Change Scenarios: Climate Models (GCMs)





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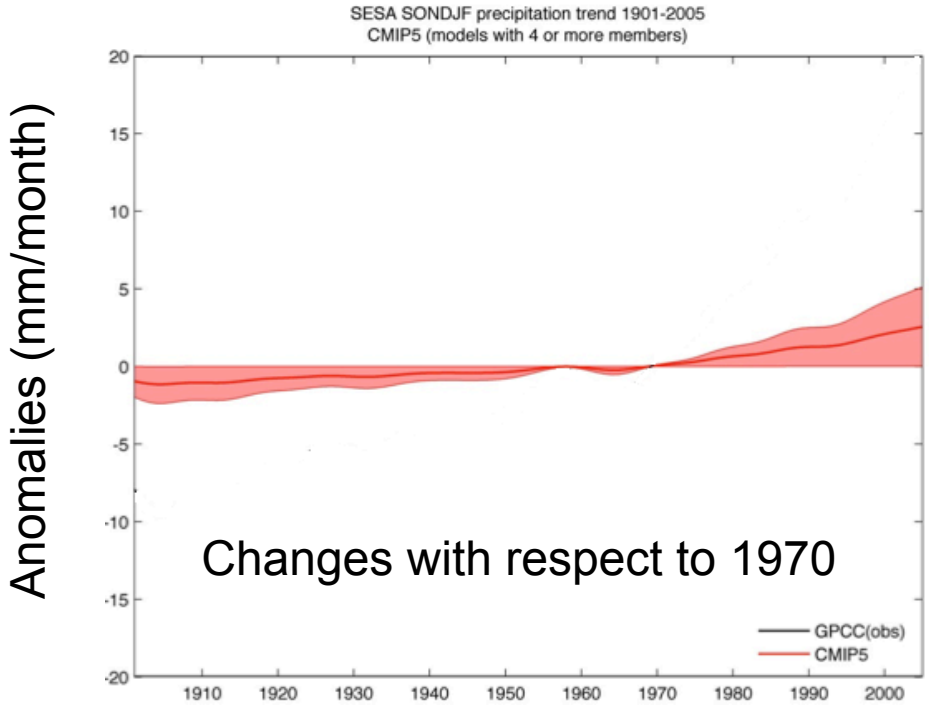
CLIMATE MODELS: SIMULATING PAST OBSERVED CLIMATE

Example: SE South America SONDJF



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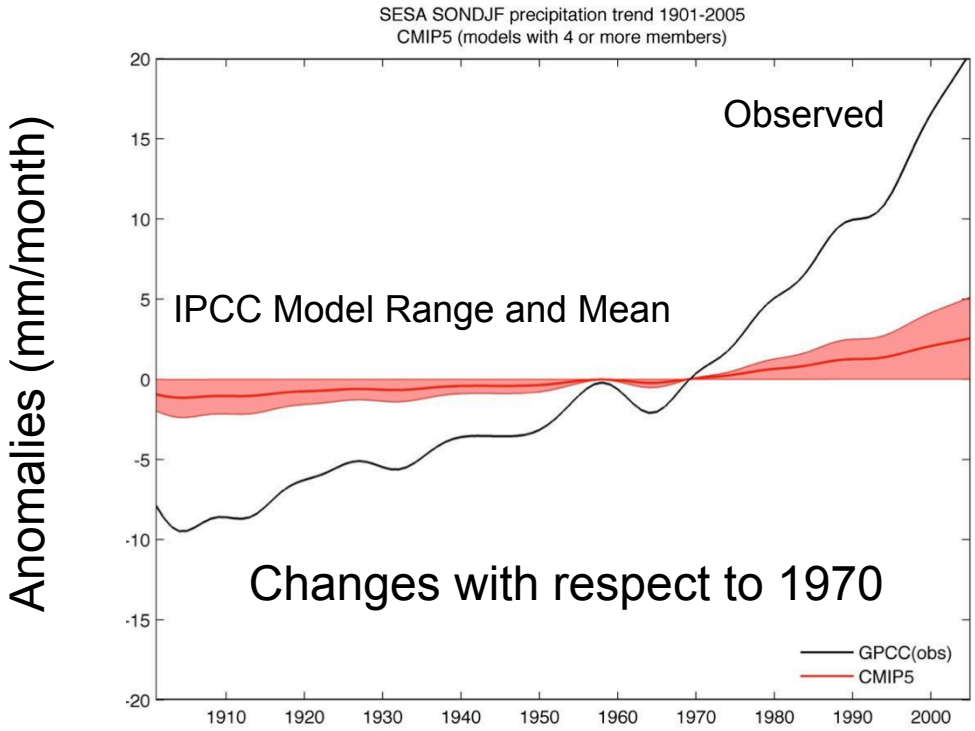
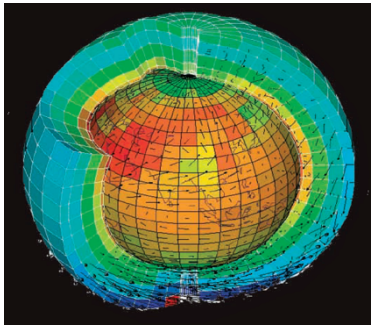


CLIMATE CHANGE SCENARIOS: CLIMATE MODELS (GCMS)

1. Great advances in science, but still lots to understand:

   Limitations of the Models

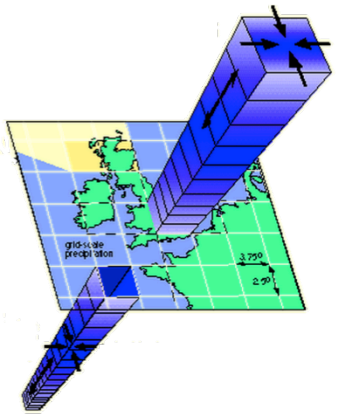


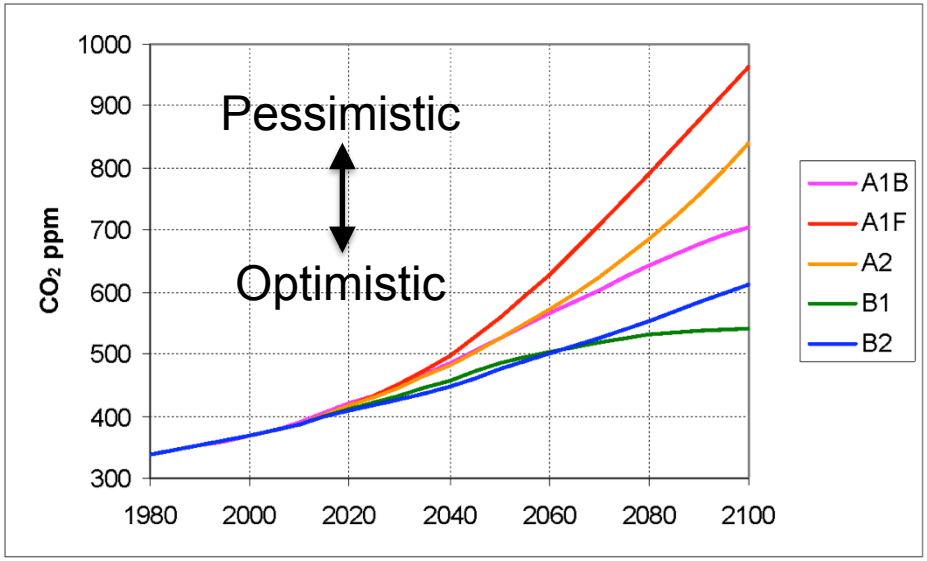
2. Key Input: GHG Emissions

   Assumptions: (e.g., in 2080-2100)

   Technologies?
   Energy Sources?
   Deforestation rates?
   Population?

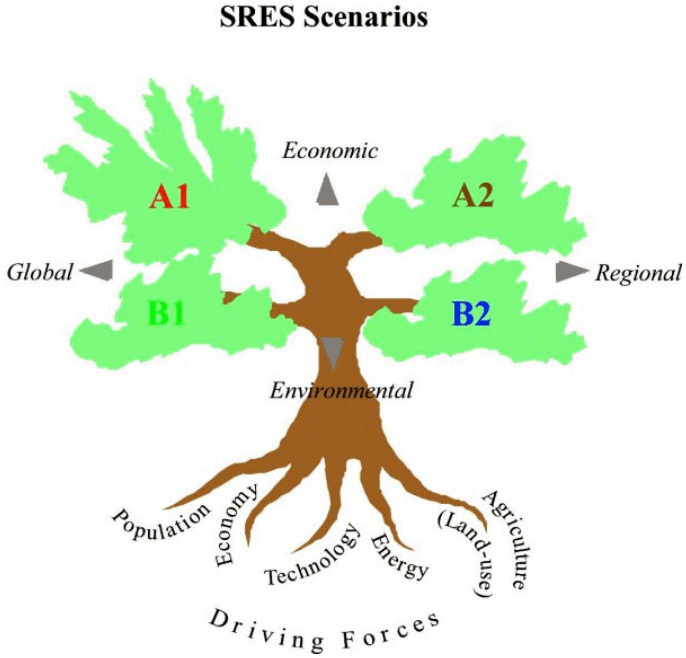
   Uncertainties





CO_2 atmospheric concentration for different development options

Future Socioeconomic Scenarios



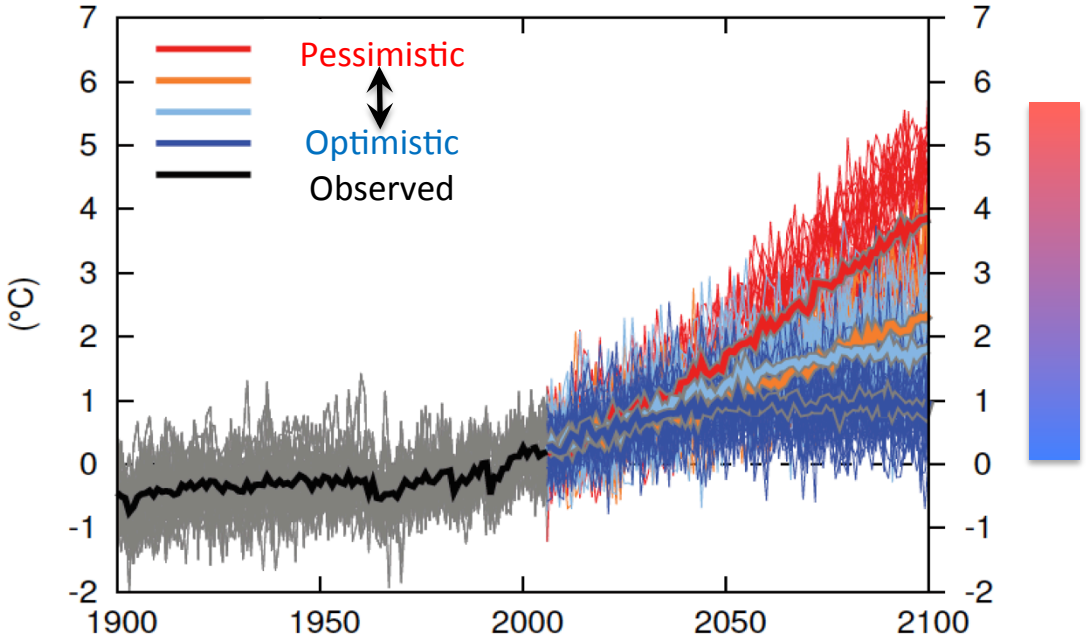
In AR5: Radiative Forcing Values (similar assumptions)

IPCC

CLIMATE CHANGE SCENARIOS (IPCC)

Socioeconomic Scenarios + Climate Models

Example: Temperature in SE Asia

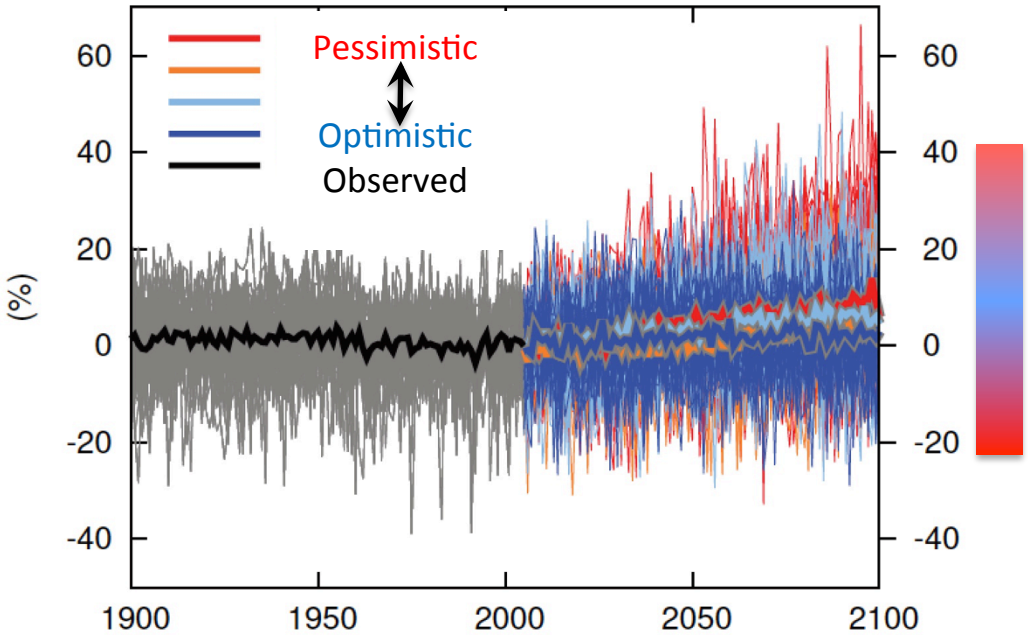


This is for the Whole Region

- Much more uncertain for local scale

RAINFALL: MUCH HIGHER UNCERTAINTIES

Example: Rainfall in SE Asia (Apr-Sep)



This is for the Whole Region

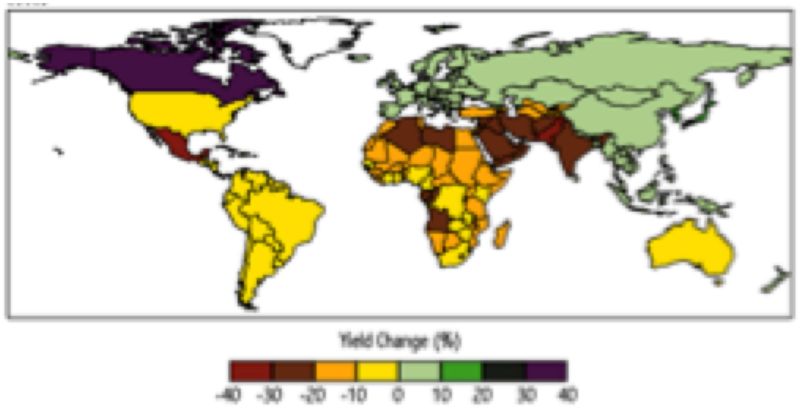
- Much more uncertain for local scale

CONCLUSION: CLIMATE CHANGE SCENARIOS ARE UNCERTAIN

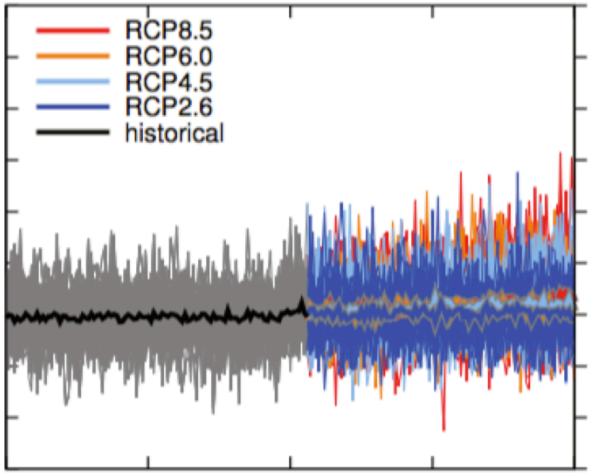
IPCC's objective was not to create scenarios for impact assessment

However: Published articles

Percent change in crop yields by 2080



Additional problem:
This is easily understood
Can be "erroneously" believed
and lead to maladaptation



Uncertainty?

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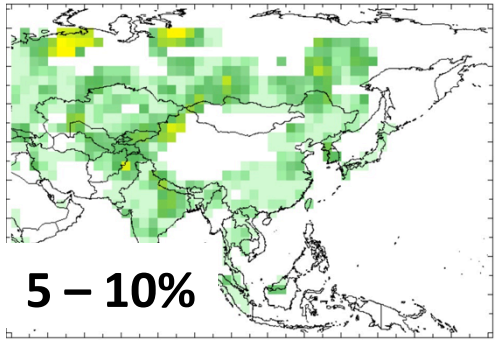
Need a Different Approach

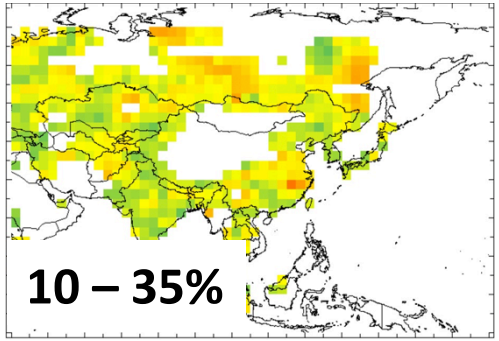
CLIMATE VARIES AT DIFFERENT TEMPORAL SCALES

How Important is Each Scale? Which one Explains More of the Past?

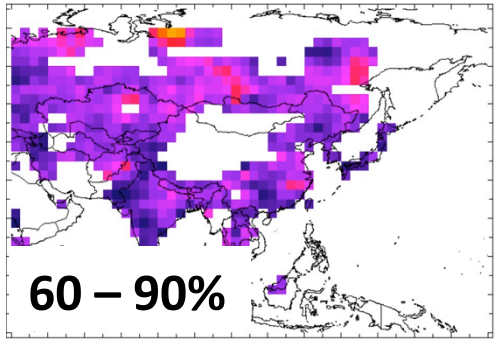
Example: Observed Annual Rainfall in SE Asia in the Last 100 Years



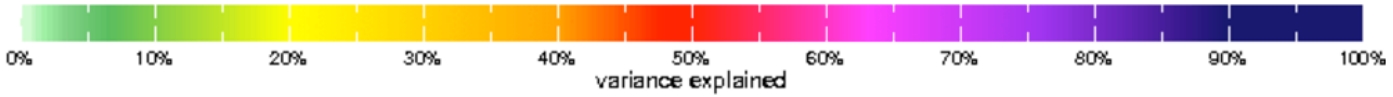
Trend (Climate Change)



Decadal



Interannual (year to year)



Temperature in S India, Japan: trend explains 40-50%

http://iridl.ldeo.columbia.edu/maproom/Global/Time_Scales/

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THE CLIMATE PARADOX OF EAST AFRICA

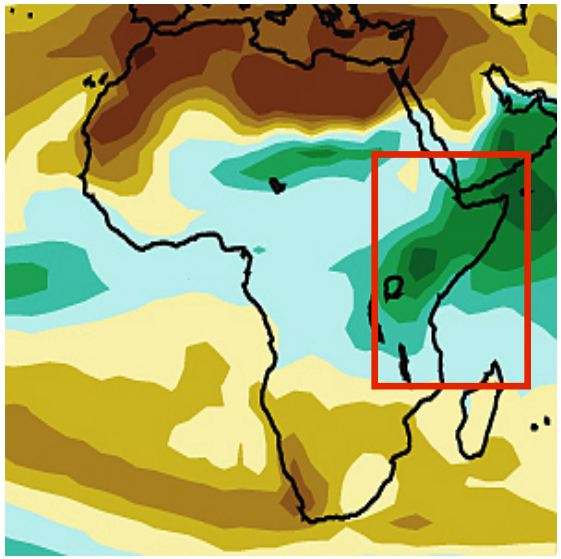
Eastern Africa by 2100: Increased Rainfall?

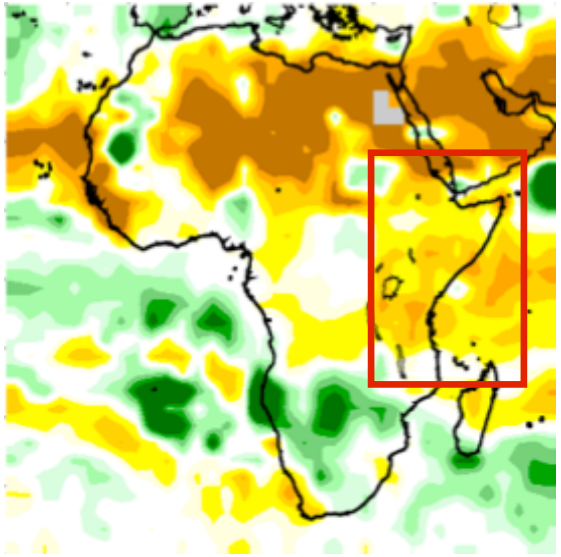
Climate Change Projections
(end of 21st Century)

Observations
(Last 15 years)

Green= more rainfall

Brown = less rainfall





Decadal Climate Variability is Key to Plan for the Next 10-30 years

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Brad Lyon, IRI / Un. Maine

SCENARIOS FOR ADAPTATION TO CLIMATE CHANGE

- Very far in the future: 2080-2100 *(agendas with urgent needs)*
- Very coarse in spatial scale *(and local needs)*, downscaling does not help…
- Very uncertain *(especially at local level, much worse for rainfall)*
- Models only consider "trend" *(explains a small portion of variance)*

Difficult to consider in actual decisions

NEED A DIFFERENT APPROACH

- Climate change is a problem of the PRESENT (happening already) as opposed to a problem of the FUTURE
- Some of the most damaging impacts of climate change: increased year to year climate variability (droughts, storms, heat waves)
- Improving adaptation to today's climate variability will lead to more resilient production systems in the future (with this approach, actions are needed at a time scale that is relevant for farmers, policy makers, development programs)
- Existing user demand for future climate (infrastructure, water reservoirs, development programs), Work in "near term" climate change (i.e., 10-30 years)

NEED A NEW PARADIGM

- Current paradigm: Noah's Ark
- Perfect Information about the Future: a climatic cataclism is coming
- Action: build infrastructure and save biodiversity
- We do not have (will not have) perfect information of the future climate

(R. Terra, 2014, in prep)

PARADIGM 2:
GINKGO BILOBA

Ginkgo at Shukkeien garden in 1945

Somehow 6 Ginkgos Survived
How? Why?

- 2 million years of Evolution
- Adapted (resilient) to a wide range of conditions
- Survived an unprecedent extreme event (bomb)

Paradigm: Adapt with "flexibility"

- **We will not have "perfect" information**
- **Adapt to a range of plausible conditions**
- **Start by Adapting to Today's Climate Variability**

(Rafael Terra, 2014, in prep)

FINAL COMMENTS

- Climate change: key is reducing net emissions of GHG, but need to adapt
- Limitations of traditional approach *(scenarios, uncertain, far in the future, explain little variance, can lead to mal-adaptation)*
- A smart way to improve adaptation to future climate is to start by improving adaptation to current climate (CSA), attractive to policy/ development plans
- Adapt with flexibility, seek resilience: Gingko Biloba vs Noah's Ark

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