# Climate Change Analysis

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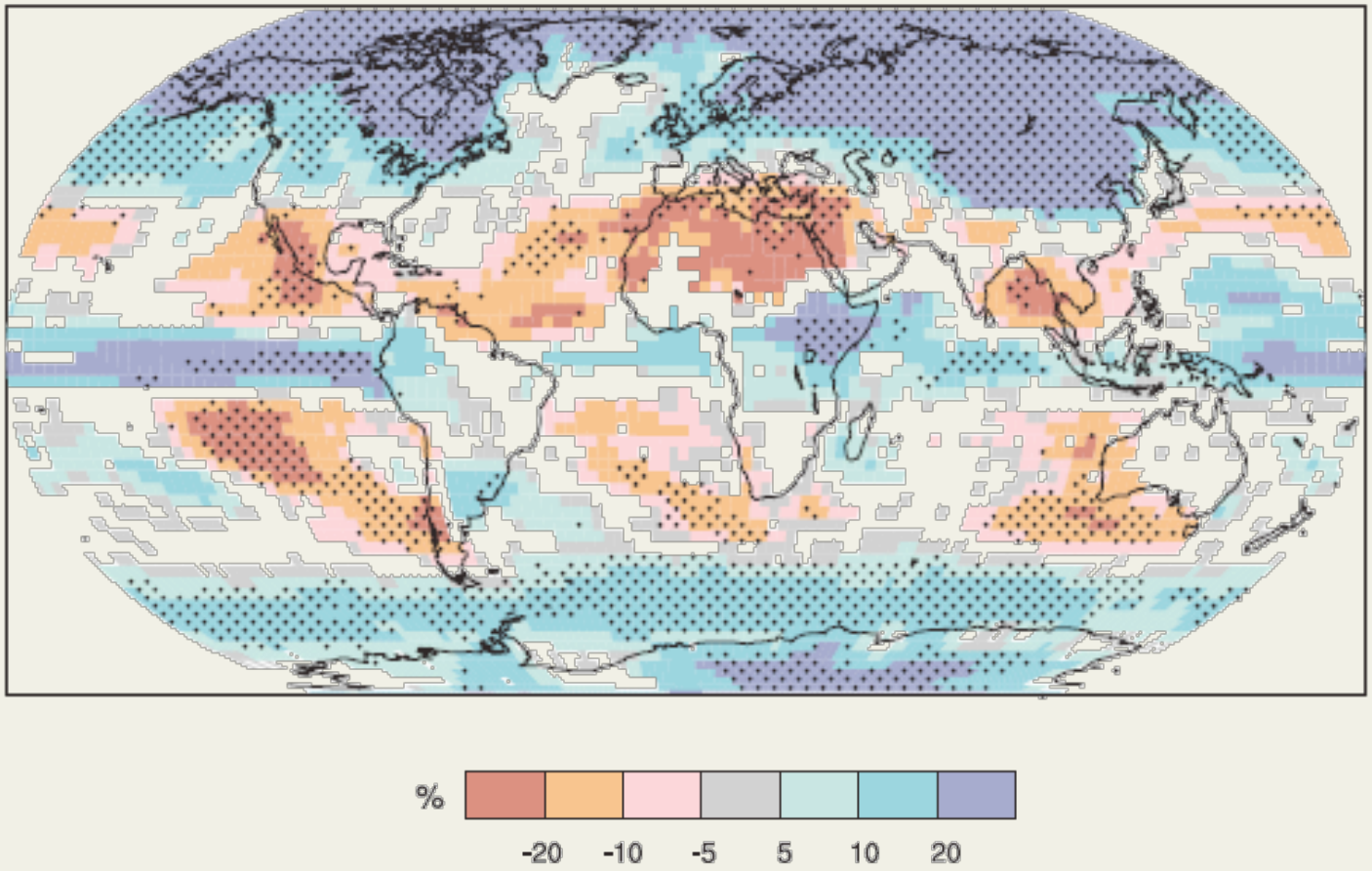
# Starting Point: the IPCC

- The IPCC reports provide an overview of observed and projected climate change
- In support of IPCC reports, archives of dozens of Global Climate Model simulations have been compiled; results of these simulations are publicly available
- GCMs are limited in many ways, but they provide a starting point for regional analysis

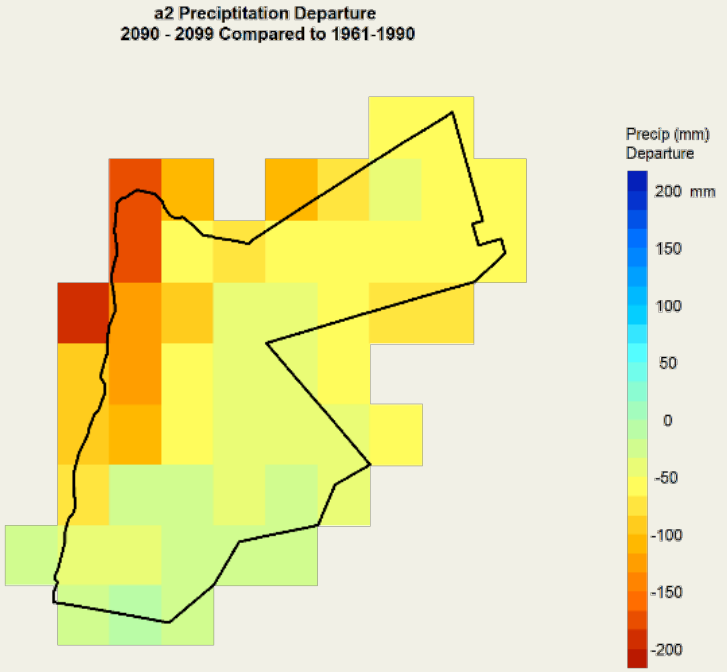
# The Projection: hotter and drier

IPCC AR4: 21st C precipitation change, Scenario A1B




IPCC AR4

# Jordan

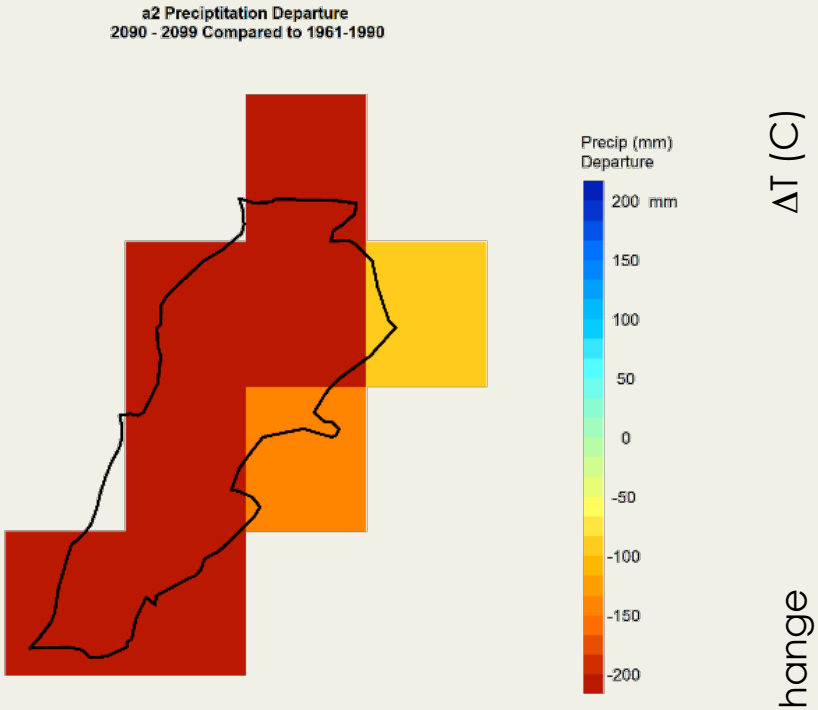



ΔT (C)

% Precip Change

www.climatewizard.org

# Lebanon

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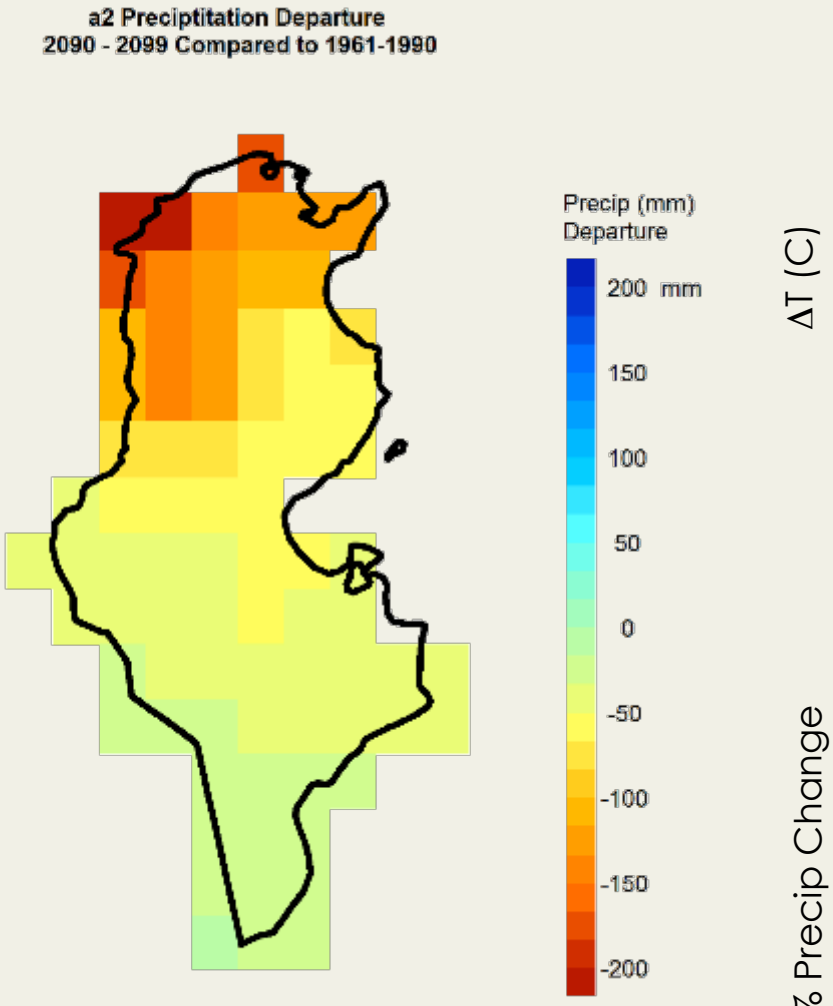
# Tunisia

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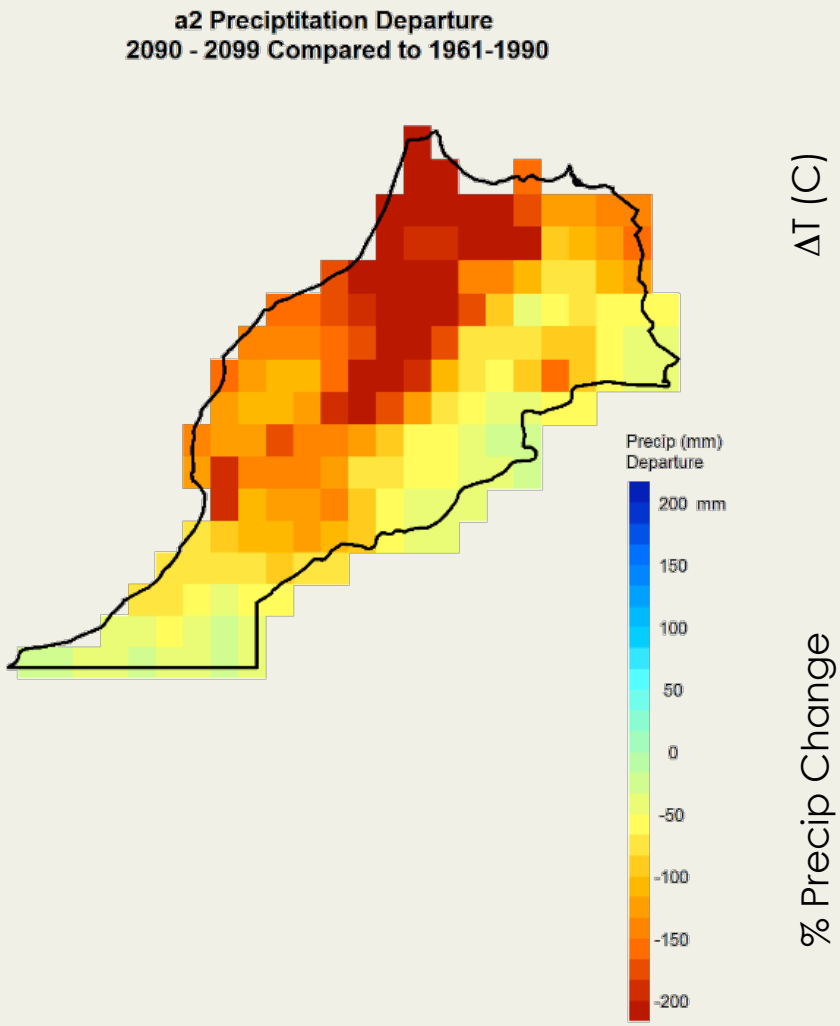
# Morocco




ΔT (C)

% Precip Change

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# Characteristics of GCM Climate Projections

- Large uncertainty—much of it irreducible
- Coarse spatial resolution
- Change, not impacts
- Limited representation of extremes
- Minimal model evaluation in MENA

# Climate projections → Climate Resilient Development

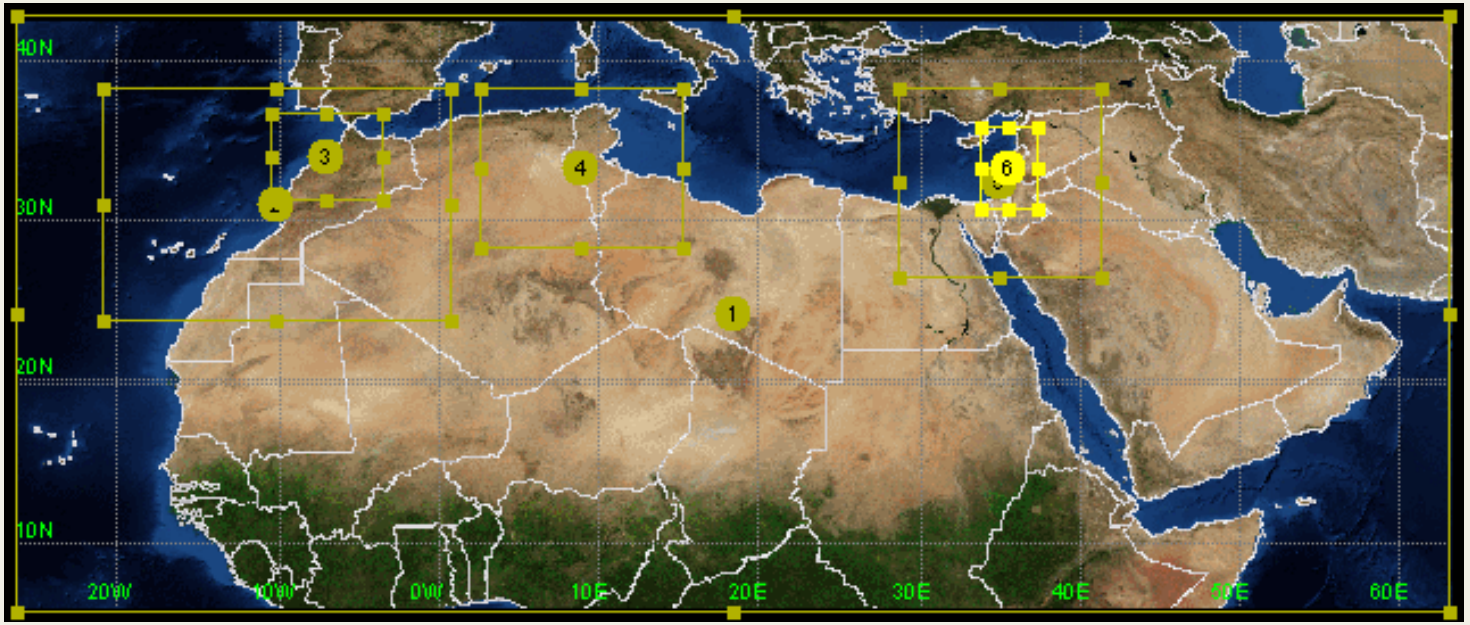
This is a complex problem that involves many disciplines and many sectors.

Expertise assembled under the current project can make important, focused contributions on technical aspects of climate impact projections

# Potential Collaborative Activities

- Downscaling: statistical and dynamical
- Impacts analysis: water resources, agriculture, health

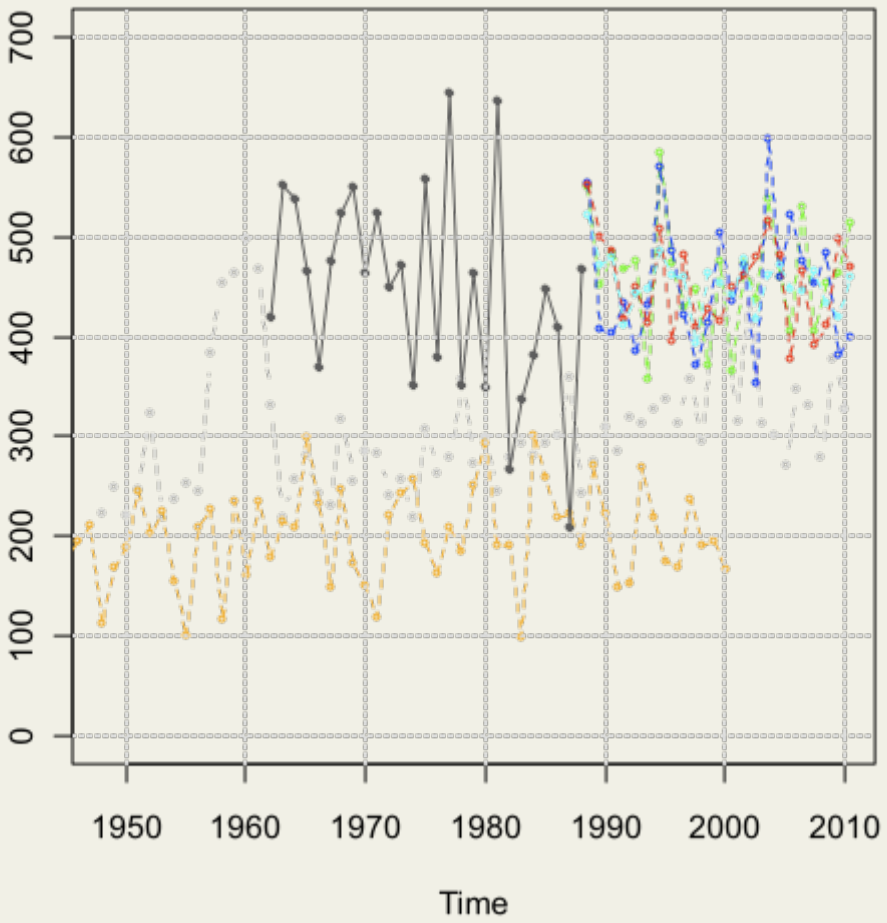
# Dynamical Downscaling



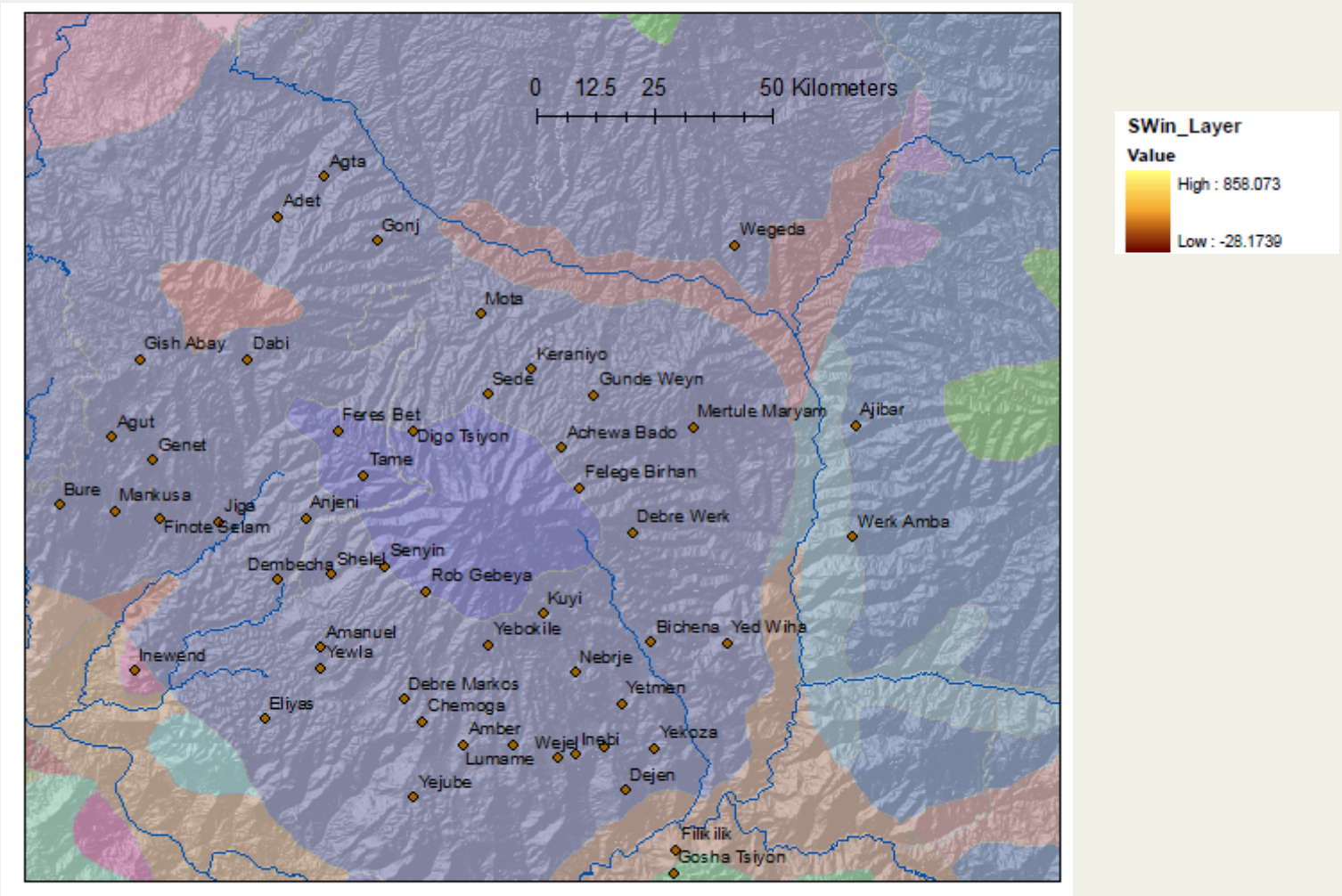

- Physically-based predictions at high resolution
- Respond to GCM boundary conditions
- Models must be evaluated under current conditions
- High powered computers required

# Statistical Downscaling

- Data-based
- Low computational demand
- Free software available.
- Requires 30+ year meteorological station records
- Assumes stationarity



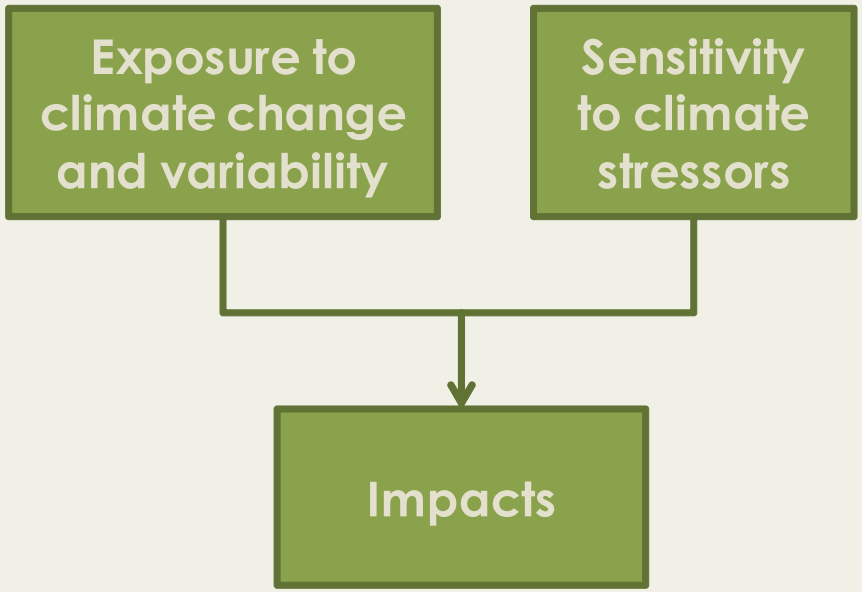
# Topographic Downscaling



# Summary: Downscaling

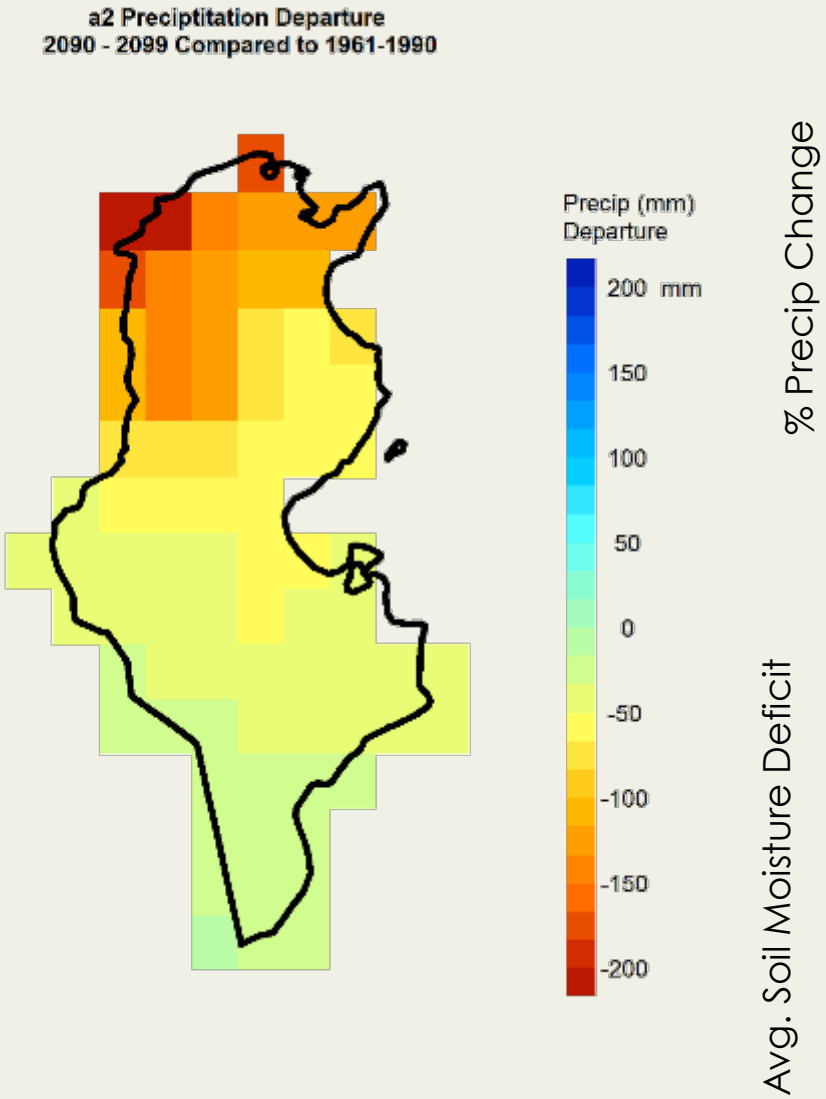
- Dynamical downscaling is valuable but resource intensive (computers, people)
- Much can be achieved with statistical and topographic methods
- Coordinated dynamical-statistical approaches might be optimal:
  - e.g., dynamical downscaling at ICBA with further topographic (or nested) downscaling at country level

# Impacts Analysis




- Relevant at the local to regional scale
- Draw on centralized climate and hydrological analyses
- Can help to constrain uncertainties
- Examples:
  - Regional MENA-LDAS hydrological predictions
  - National/Local application to agriculture and water resource studies

# Tunisia




% Precip Change

Avg. Soil Moisture Deficit

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# Summary: Impacts Analysis

- Requires informed application of climate data and information on sensitivities
- Off-the-shelf models exist, but local customization is essential
- Impacts analysis can actually *reduce* uncertainty relative to simple change metrics
- But complexities compound very quickly!

شكرا

# THANK YOU