Locating and Selecting Scenarios On-line (LASSO)

Presentation to the STAC Climate Change Scenarios Workshop
March 7-8, 2016

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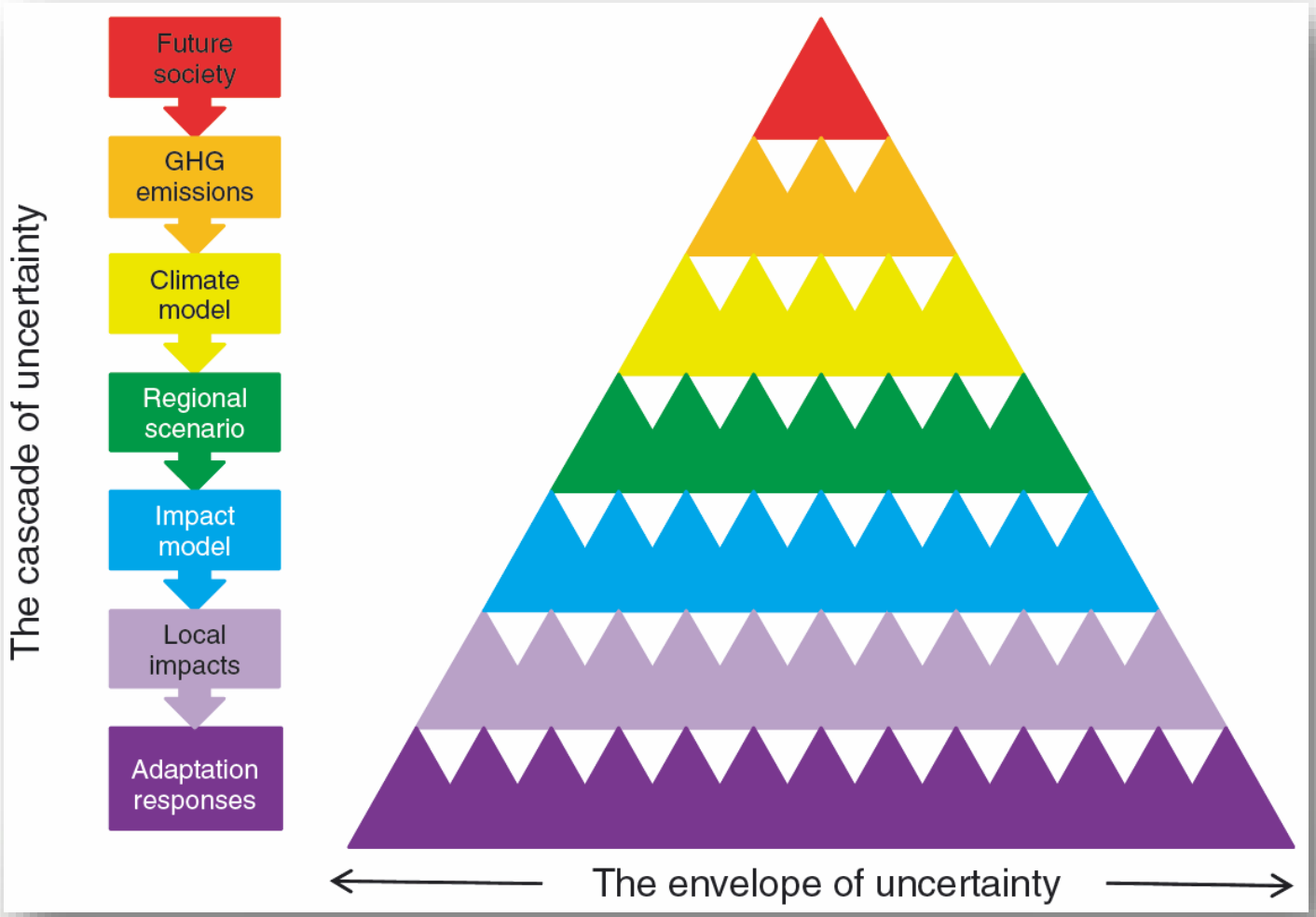
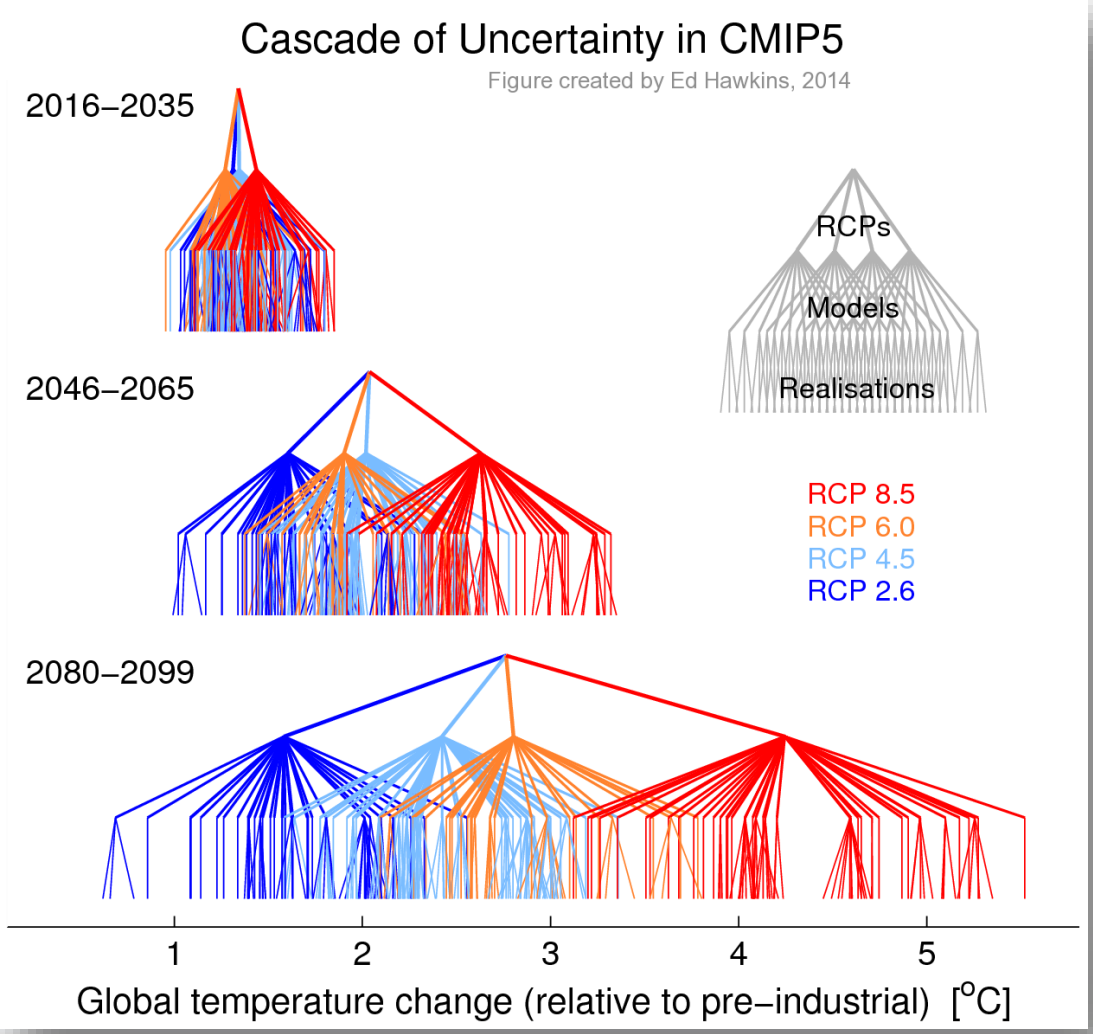
Some context for "uncertainty"



More context



Making the case for heuristics

- A heuristic technique is any approach to problem solving, learning, or discovery that employs a practical method not guaranteed to be optimal or perfect, **but sufficient for the immediate goals**.
- Where finding an optimal solution is impossible or impractical, heuristic methods can be used to speed up the process of finding a satisfactory solution.
- Heuristics can be mental shortcuts that ease the cognitive load of making a decision. Examples of this method include using a rule of thumb, an educated guess, an intuitive judgment, or common sense.

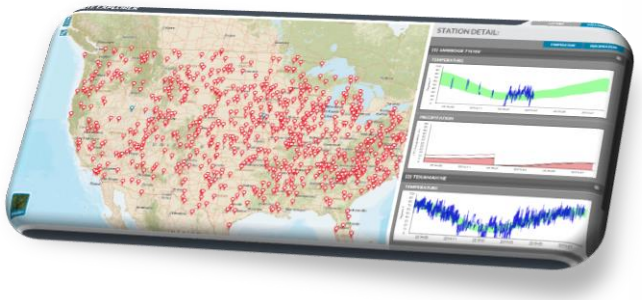
-Wikipedia

Existing Climate Tools

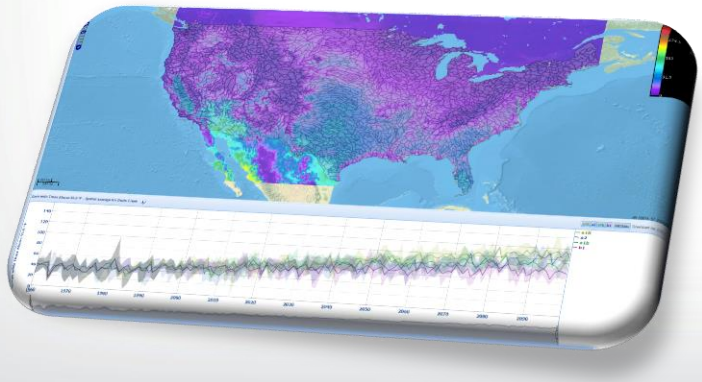
These are great tools, but….

1. Spatially and temporally constrained summaries
2. No ability to download GIS-ready data
3. No guidance on what data to use

USGCRP Climate Explorer



USGS Derived Downscaled Climate Projection Portal



USGS National Climate Change Viewer

Motivating Questions

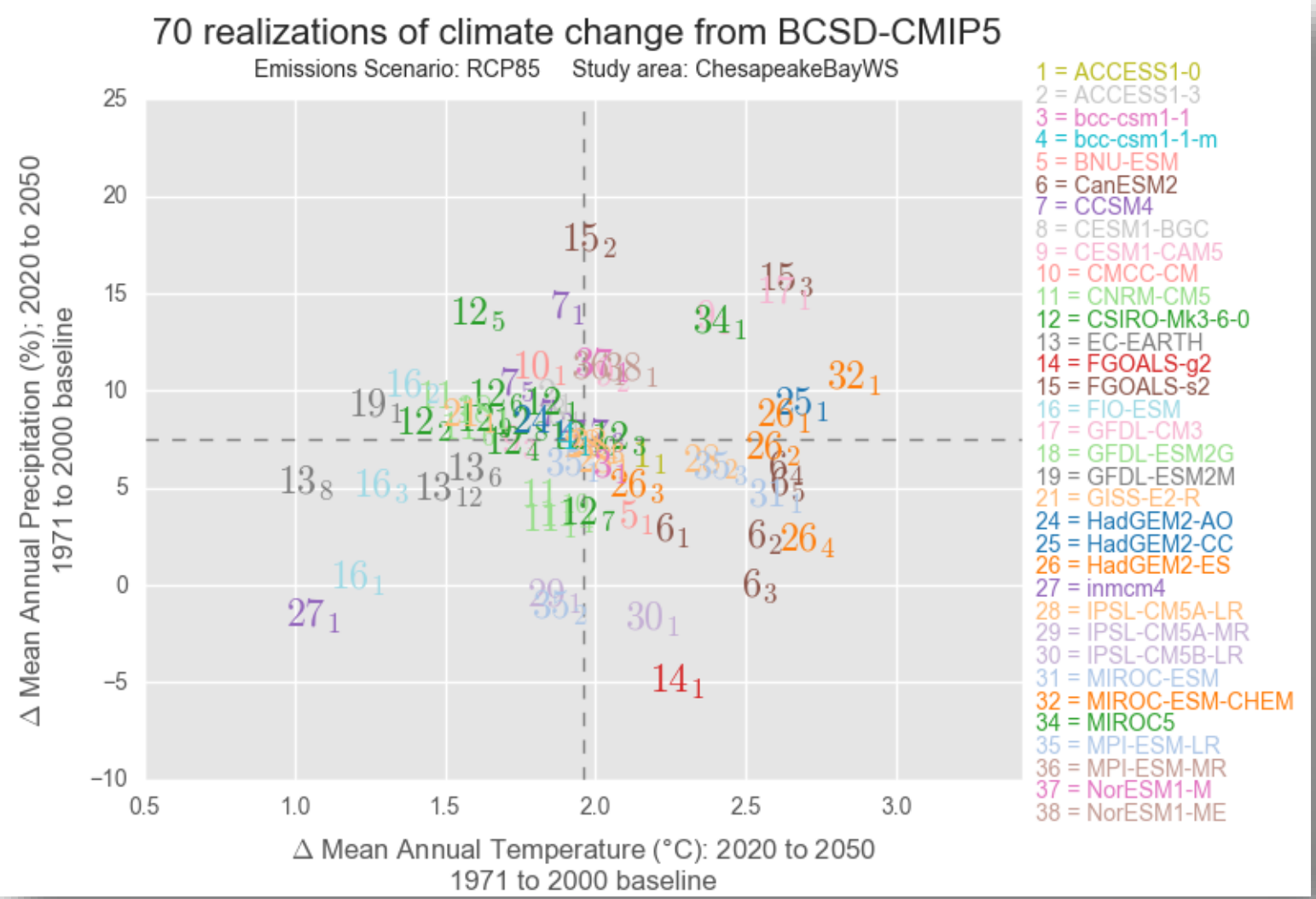
- **Which climate projections should I use?**
  - "It depends…"
    - Do you need to examine the full range of uncertainty?
    - Are you looking for a central estimate of change?
    - Do you care about precipitation, temperature, or both?
    - What is your study area?
    - What time period are you interested?
    - What interval are you interested in?

- **"Okay, now where can I download them?"**

Specific Project Goals

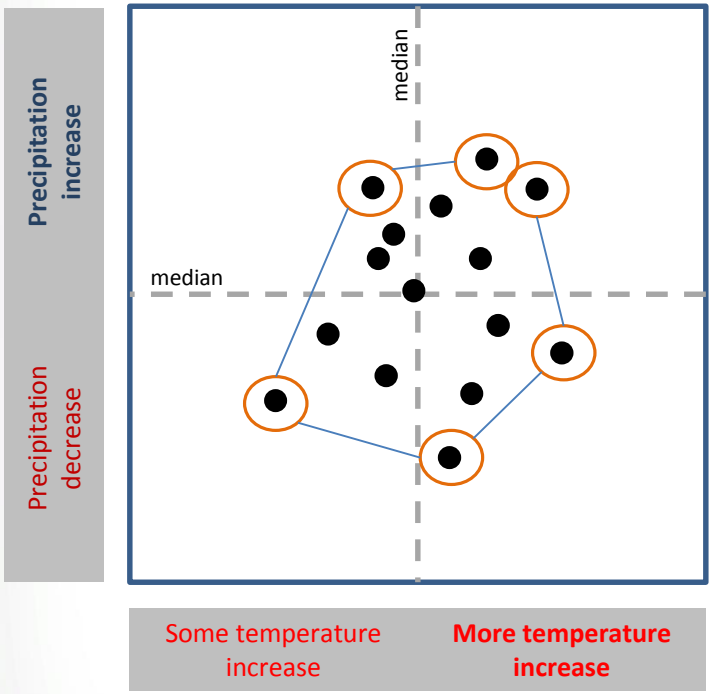
1. Enable the target audience
   - GIS people
   - Modelers
2. Make it embarrassingly simple
3. Make it flexible
4. Leverage existing climate change projection information
5. Make it extensible
6. Inform "Paradigm Two" approaches

Introducing Bi-plots



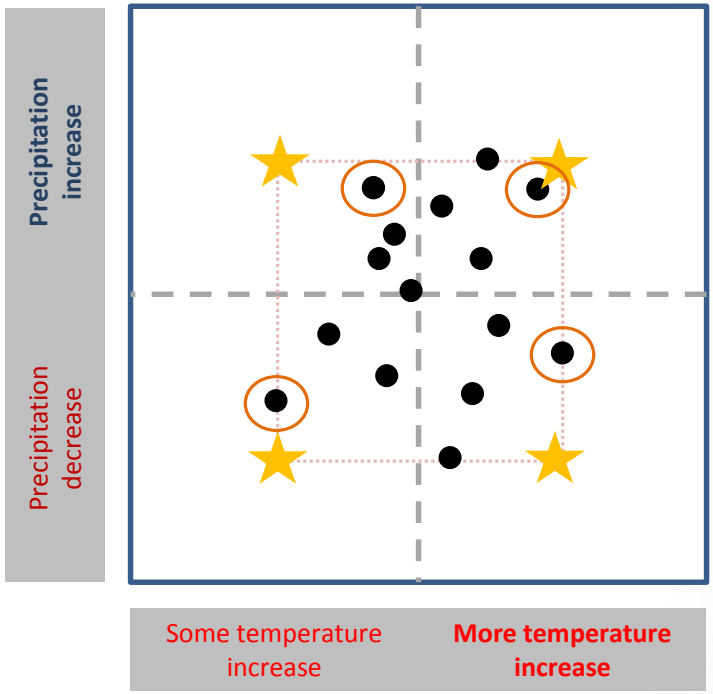
Selection Strategies

Selection Strategy #1: *The Lasso*



Pros	Cons
Full "envelope" of change	More time, resources

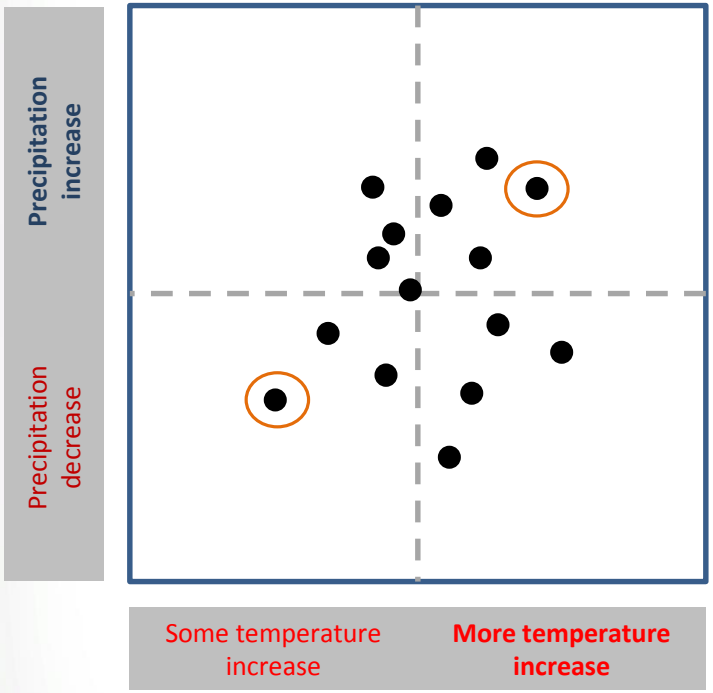
Selection Strategy #2: *Four Corners*



Pros	Cons
Fewer scenarios means less time/resources	Could miss min/max of either axis

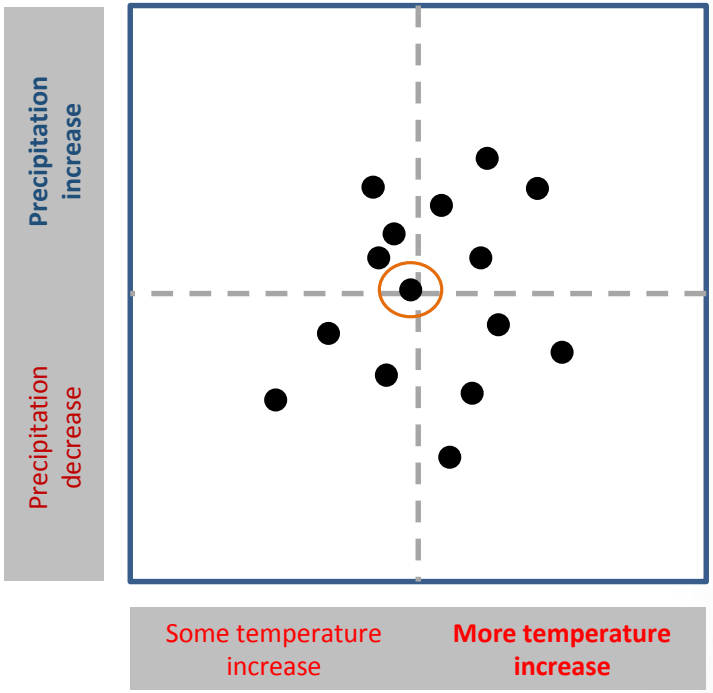
Selection Strategies

Selection Strategy #3: *Two Corners*



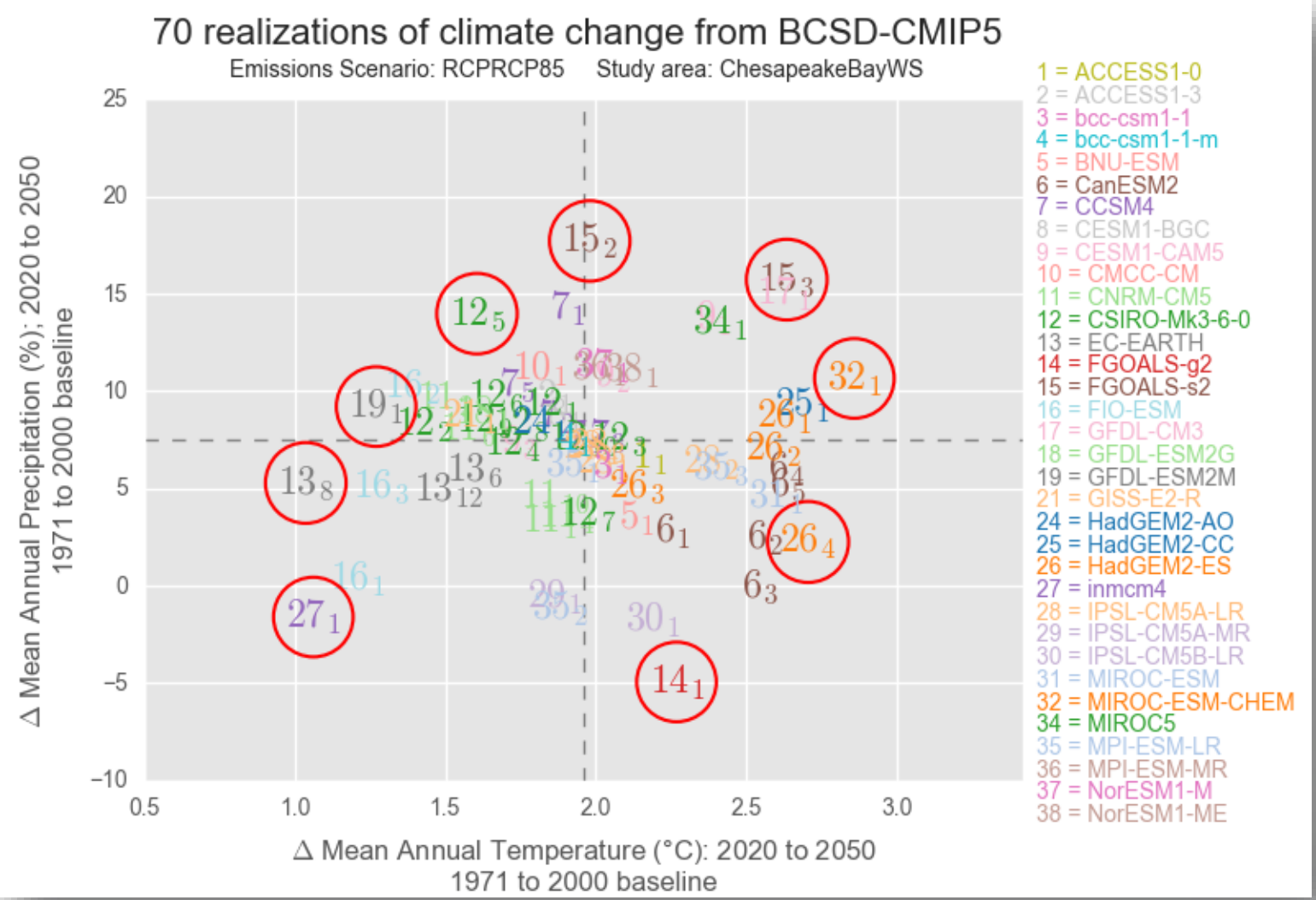
Pros	Cons
Fewer scenarios means less time/resources	Limited range of projections is captured

Selection Strategy #4: *Middle of the Pack*

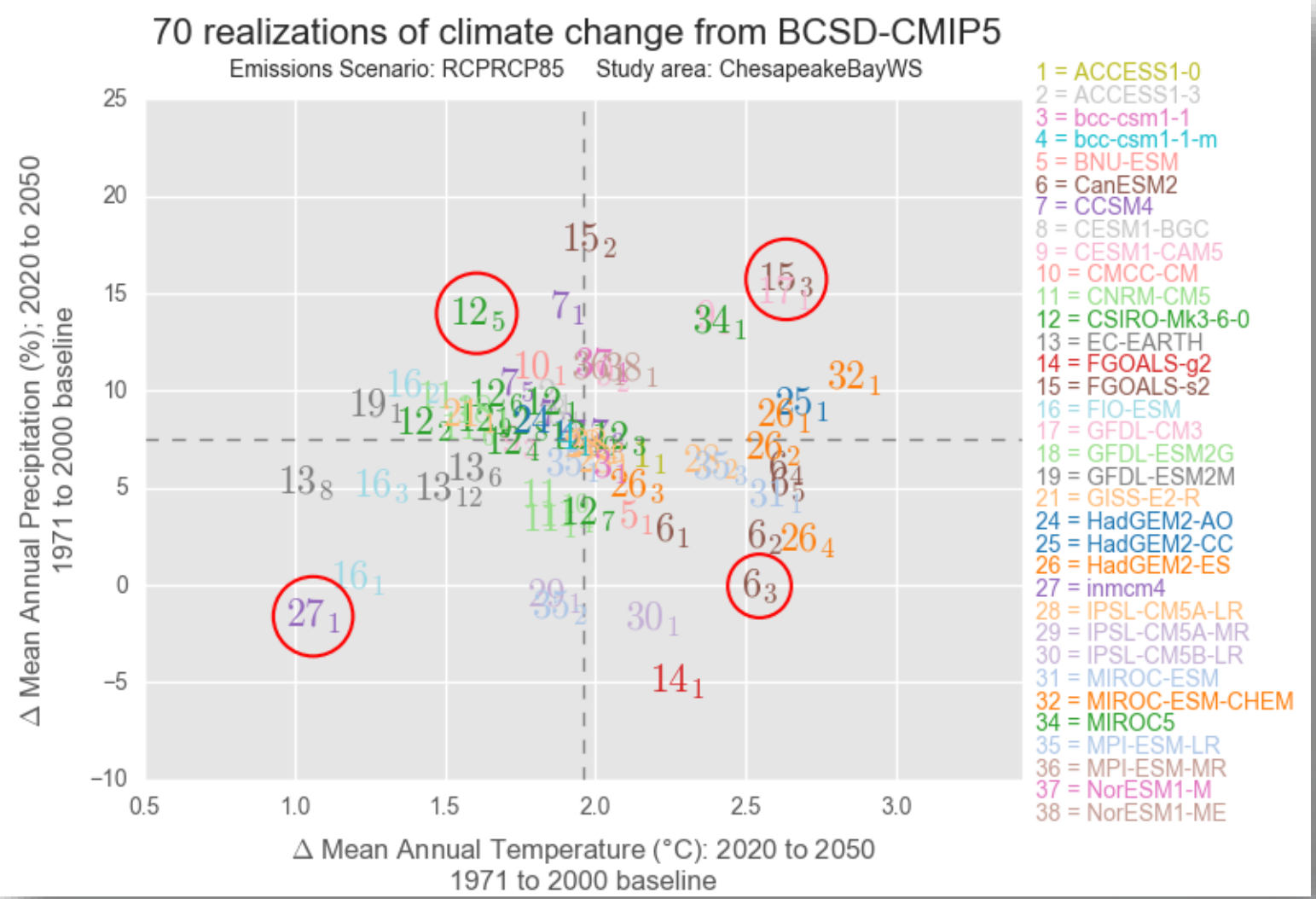


Pros	Cons
Sometimes a central projection is needed	Could be confused with "most likely"

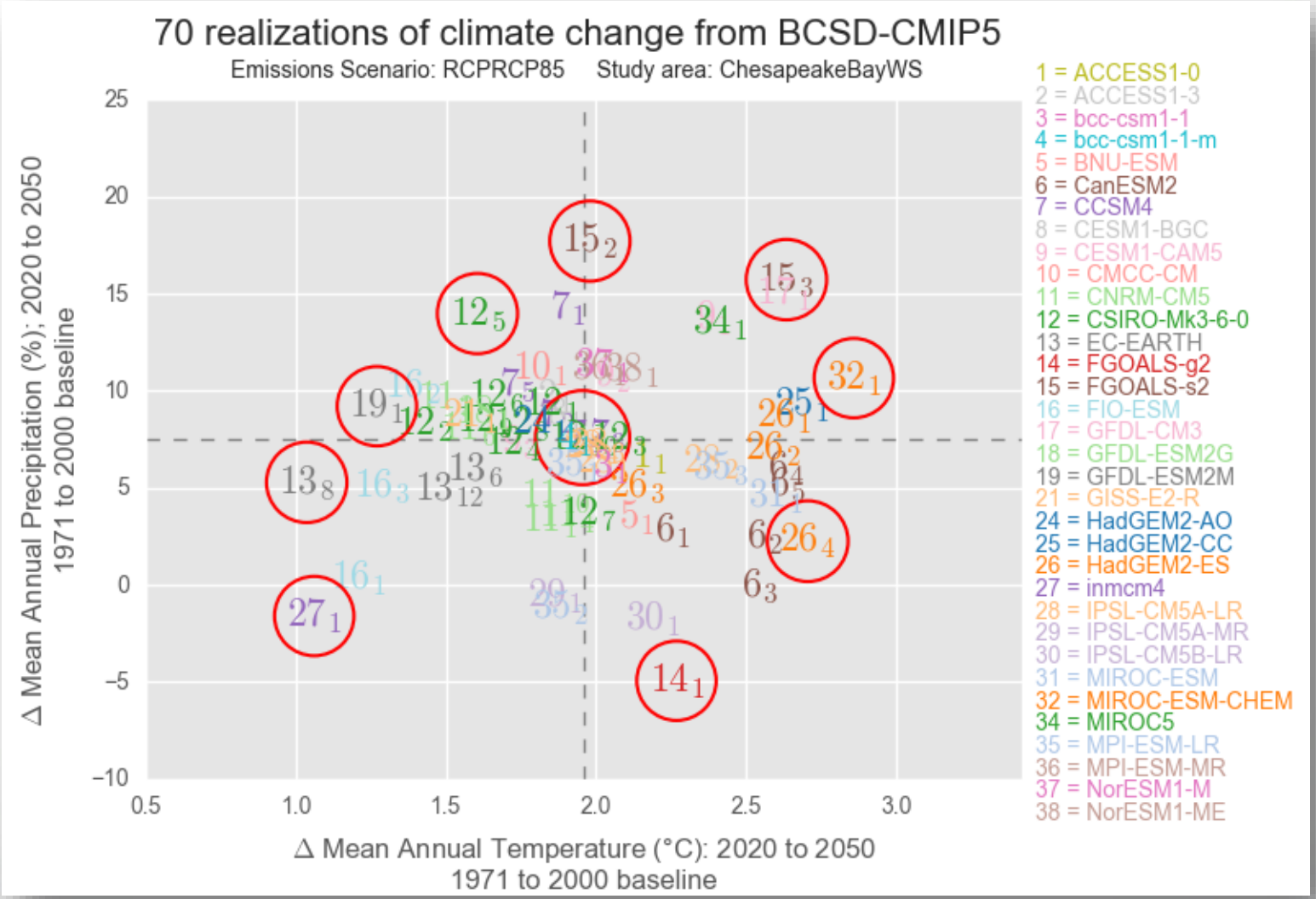
Example #1: *The Lasso*



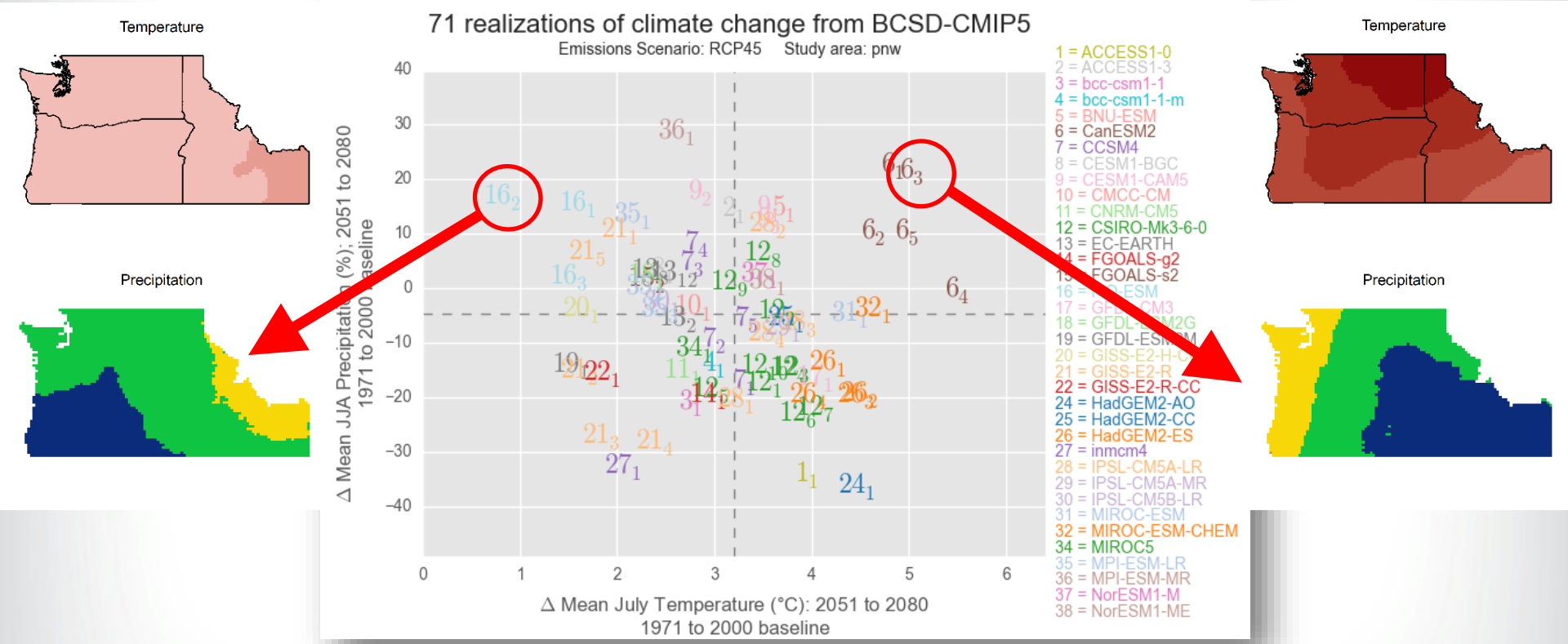
Example: *Four Corners*



Example: *The Lasso + Middle of the Pack*



Caution: More Uncertainty Ahead



Additional comments

- Be flexible; incorporate learning (Chris Weaver)
- Bi-plot parameters should be chosen thoughtfully
  - *What variables matter over what time period?*
- No promise of optimality
- Limited set of statistics/variables at this time
- No control of underlying data
- No analysis
- Requires THREDDS/OPeNDAP servers
- Limited mapping and visualization capability

What data can LASSO target?

- **Currently**
  - **BCSD-CMIP3**
  - **BCSD-CMIP5**
    - **Monthly**
    - **1/8th degree**
    - **Precipitation and temperature**
- **Up Next**
  - **BCCA-CMIP5**
    - **Daily**
    - **1/8th degree**
    - **Precipitation and temperature**

After that?

- MACA
  - Daily
  - 4 km or ~ 6 km
  - Precipitation, temperature, relative/specific humidity, solar radiation, wind speed/direction

Not available for LASSO yet

- BCSD-CMIP5 Hydrologic Projections –
  - Includes output from the VIC model forced with observed and projected climate
  - 1/8th degree
  - Daily
    - Precipitation, temperature, wind speed, baseflow, surface runoff, total runoff
  - Monthly
    - Precipitation, temperature, wind speed, baseflow, surface runoff, total runoff, ET, PET (x6), relative humidity, soil moisture content, snow water equivalent, net radiation

Timeline

- ***Q2 2016* – working beta version**
- ***Q2/Q3 2016* – webinars and formal beta testing**
- ***December 2016* – Final web application**
  - *Global Change Explorer*: ***http://globalchange.epa.gov***