

# EPA Tools and Resources Training Webinar

## Global Change Explorer: Identifying and Downloading Climate Change Information using LASSO

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# Presentation Outline

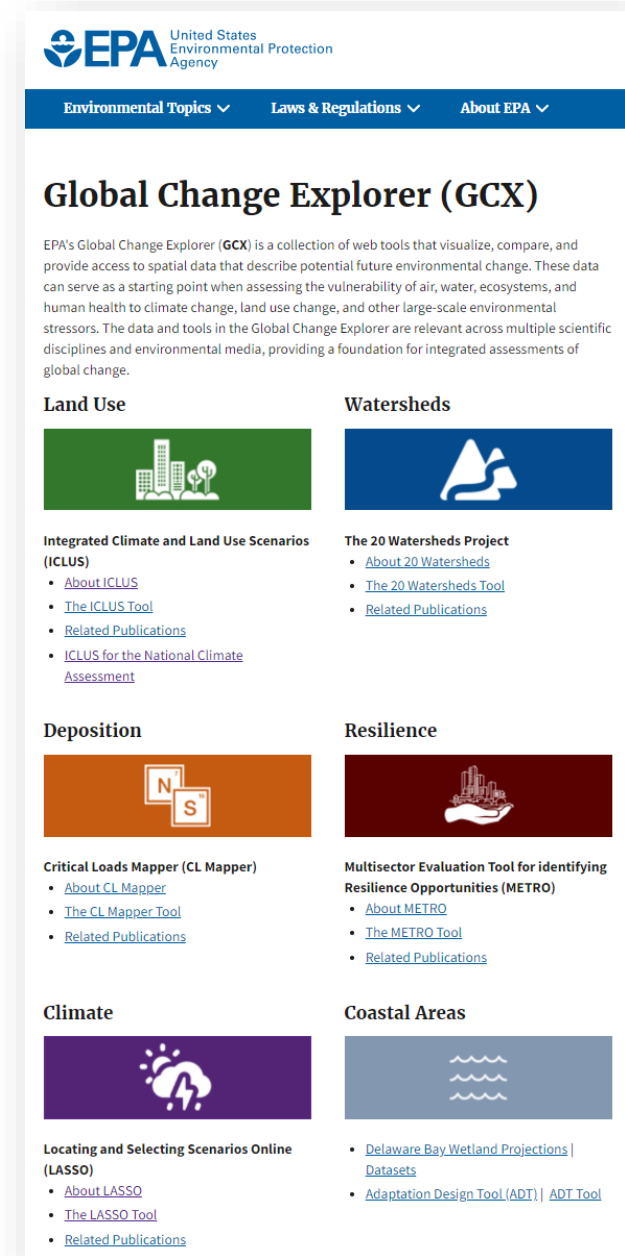
1. The Global Change Explorer
2. The Problem: *Which climate projections should I use?*
3. The Solution: An introduction to the LASSO tool
4. Demonstration
5. Concluding remarks

# Global Change Explorer

EPA's Global Change Explorer (GCX) is a collection of web-based tools that:

- Describe and visualize scenarios of future environmental change
- Provide access to underlying spatial data
- Facilitate adaptation and resilience planning

<https://www.epa.gov/gcx>



# Global Change Explorer (cont'd): *Impacts & Hazards*

Name	Topics	Mapping tool	Download data	Data coverage
<a href="#"><u>Integrated Climate and Land-Use Scenarios (ICLUS)</u></a>	<ul style="list-style-type: none"> <li>Population</li> <li>Land use</li> <li>Impervious surface</li> <li>Climate change</li> </ul>	Yes	Yes	Contiguous US
<a href="#"><u>20 Watersheds</u></a>	<ul style="list-style-type: none"> <li>Water quality</li> <li>Climate change</li> </ul>	Yes	Yes	Contiguous US (partial)
<a href="#"><u>Critical Loads Mapper (CL Mapper)</u></a>	<ul style="list-style-type: none"> <li>Atmospheric deposition</li> <li>Critical loads</li> <li>Ecosystem impacts</li> <li>Climate change</li> </ul>	Yes	Yes	Contiguous US
<a href="#"><u>Locate and Select Scenarios Online (LASSO)</u></a>	<ul style="list-style-type: none"> <li>Climate change</li> </ul>	No	Yes	Contiguous US

# Global Change Explorer (cont'd): *Adaptation & Resilience*

Name	Purpose/Topic area	Mapping tool/ Download data	Format
<b><u>Multisector Evaluation Tool for identifying Resilience Opportunities (METRO)</u></b>	<ul style="list-style-type: none"> <li>Assess resilience</li> <li>Metro/urban areas</li> </ul>	No	Online tool (password protected)
<b>Adaptation Design Tool (ADT)</b>	<ul style="list-style-type: none"> <li>Adaptation planning</li> <li>Natural resources</li> </ul>	No	Downloadable worksheets

# The Problem

- Addressing climate change requires the best available scientific knowledge
- Some of that knowledge is not easily accessible
- Climate change projections offer many options, very little guidance

# The Problem (cont'd)

Choose a data source

Choose a climate variable

Choose projections

*Which climate projection(s)  
should I choose?*

**Step 2.4: Select Projection Set (Green text indicates projection set form completed)**

☐ BCSD-CMIP3-Climate-monthly  
☐ BCCA2-CMIP3-Climate-daily  
☐ BCSD-CMIP3-Hydrology-monthly  
☐ BCSD-CMIP5-Climate-monthly  
☐ BCCA2-CMIP5-Climate-daily  
☐ BCSD-CMIP5-Hydrology-monthly  
☐ LOCA-CMIP5-Climate-daily  
☐ LOCA-CMIP5-Hydrology-daily

☐ BCSD-CMIP3-Climate-monthly  
☐ BCCA2-CMIP3-Climate-daily  
☐ BCSD-CMIP3-Hydrology-monthly  
☒ BCSD-CMIP5-Climate-monthly  
☐ BCCA2-CMIP5-Climate-daily  
☐ BCSD-CMIP5-Hydrology-monthly  
☐ LOCA-CMIP5-Climate-daily  
☐ LOCA-CMIP5-Hydrology-daily

**Step 2.5: Products & Variables -- monthly projections**

**Products**  
☒ 1/8 degree BCSD projections  
☐ 1/8 degree Observed data (1950-1999)  
☐ 1 degree RegridDED GCM projections  
☐ 1 degree Bias-corrected GCM projections  
☐ 1 degree Observed data (1950-1999)

**Variables**  
☐ Precipitation Rate (mm/day)  
☐ Ave Surface Air Temperature (deg C)  
☐ Min Surface Air Temperature (deg C)  
☐ Max Surface Air Temperature (deg C)

**Step 2.6: Emissions Scenarios, Climate Models and Runs**

The original GCM output files for the BNU-ESM model were discovered to have problems, left in the table below as a place-holder

De-select all runs	None	None	None	None
Select all runs	All	All	All	All
Climate Models:	Emissions Path: RCP2.6	Emissions Path: RCP4.5	Emissions Path: RCP6.0	Emissions Path: RCP8.5
access1-0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
access1-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bcc-csm1-1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
bcc-csm1-1-m	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
bnu-esm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
canesm2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ccsm4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
cesm1-bgc	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
cesm1-cam5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
cmcc-cm	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
cnrm-cm5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
csiro-mk3-6-0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ec-earth	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
fgoals-g2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
fgoals-s2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
fto-esm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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gfdl-esm2m	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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giss-e2-r-cc	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
hadgem2-ao	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
hadgem2-cc	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
hadgem2-es	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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ipsl-cm5a-lr	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ipsl-cm5a-mr	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ipsl-cm5b-lr	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
miroc-esm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
miroc-esm-chem	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
miroc5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
mpi-esm-lr	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
mpi-esm-mr	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
mri-cgcm3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
noresm1-m	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
noresm1-me	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

# The Problem (cont'd)

“Which climate projection(s) should I use?”

- What is your study area?
- Do you care about precipitation, temperature, or both?
- What time period are you interested?
- Are you interested in seasonal changes?
- Do you need to be consistent with other analyses?
- How are you going to deal with uncertainty?



# The LASSO Tool

Where....? → **L**ocate

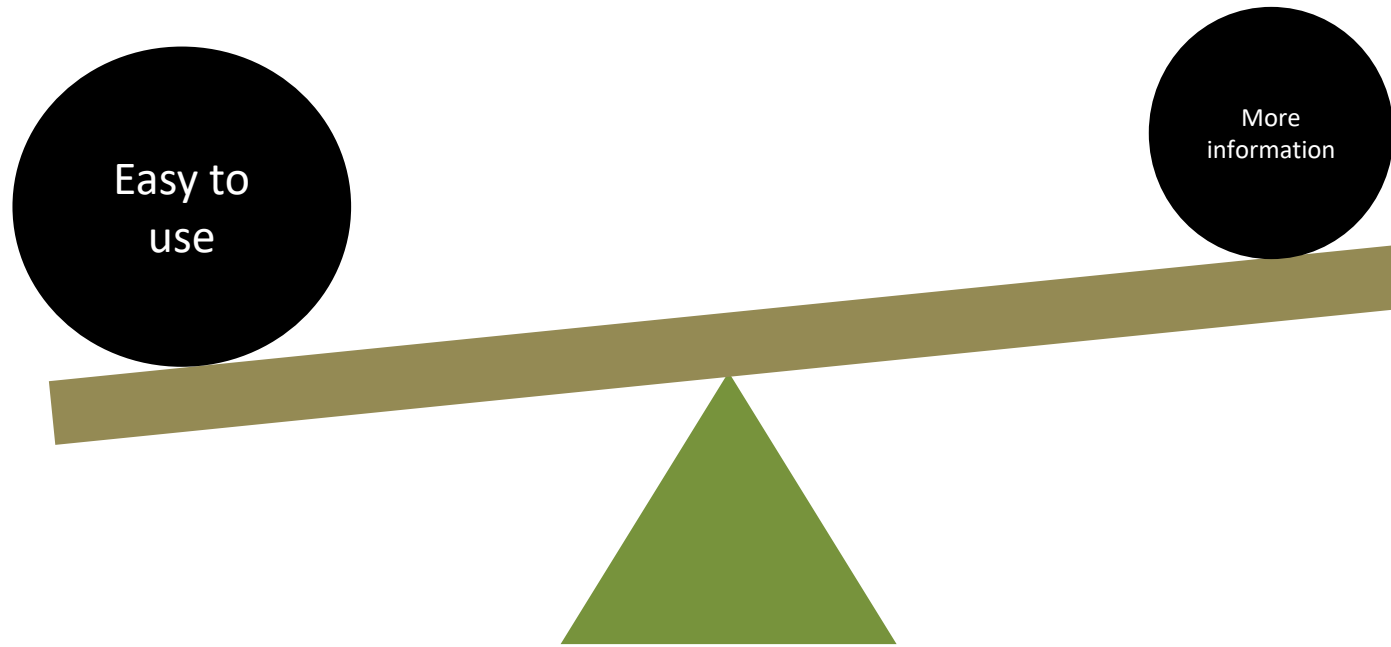
**A**nd

Which ones....? → **S**elect  
**S**cenarios

**O**nline

# The LASSO Tool (cont'd)

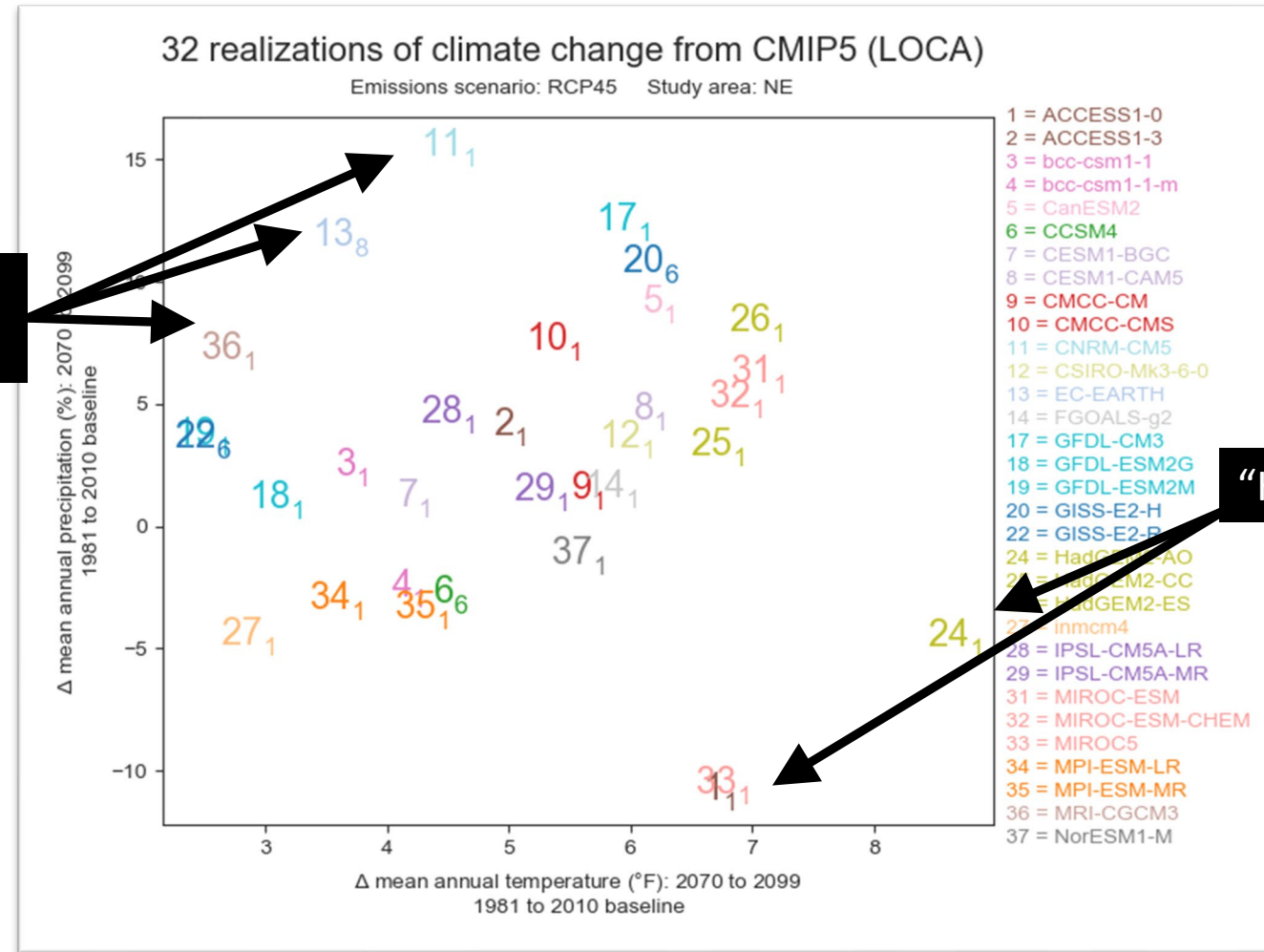
- GIS analysts & scientists
- Regional planners
- Watershed managers
- Sustainability officers
- *Anyone interested in quantifying climate change*



# The LASSO Tool: Scatterplots

“Warm and wet”

- Simple
- Useful for interpreting uncertainty
- Already used in climate studies



“Hot & dry”

# Demonstration

<https://lasso.epa.gov>

# Example Use Cases

- Watershed modeling (EPA ORD)
  - Cypress Creek (TX)
  - Upper Soldier Creek (KS)
  - Taunton (MD)
- Chesapeake Bay Climate Change Assessment Framework\*
- [Climate Change Impacts and Risk Analysis](#) (CIRA; EPA Office of Atmospheric Programs)

# Take Home Messages

- There are many good climate change tools and viewers
  - [Climate Explorer](#)
  - [National Climate Change Viewer](#)
- In most cases, projections need to be *translated* or *characterized* in order to be useful
- LASSO is one of the few that provides subsetting guidance and functionality
- LASSO methods are based on peer-reviewed approaches
- Embrace the uncertainty

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*The views expressed in this presentation are those of the author and do not necessarily reflect the views or policies of the US EPA.*

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