# Cal-Adapt: Local Climate Change Snapshot Tool

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www.scag.ca.gov

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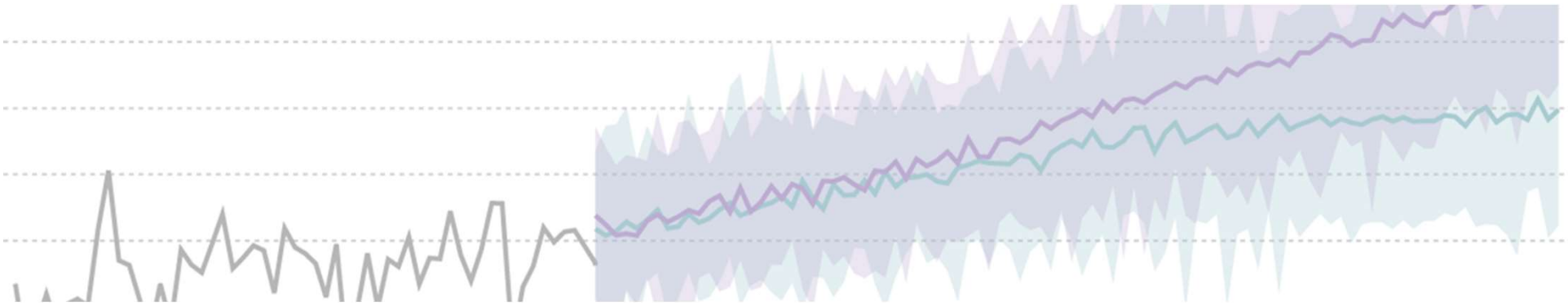
INNOVATING FOR A BETTER TOMORROW

**How do you use climate data in your work right now?**

*and/or*

**How do you imagine using climate data in your work in the future?**



# Cal-Adapt


visualize climate data

download climate projections

learn about climate change science

# Let’s take a look!

https://cal-adapt.org

# Local Climate Change Snapshot Tool

- Designed to be straightforward, introductory, and accessible
- Intended to support municipal adaptation planning (e.g LHMP compilation), education, and advocacy
- Simplifies settings for parameters like GCMs and time intervals to quickly provide information

# Steps to use the tool

1. Select an aggregation boundary and location.
2. View projections for a collection of physical climate variables.
3. Connect with additional resources.

# Local Climate Change Snapshot

Climate change related effects vary significantly throughout California, mirroring our state's diverse climate, topography, and ecology. This tool is a starting place if you are looking to get a quick sense of climate impacts in your region. The Snapshot tool provides climate projections for temperature, precipitation, and wildfire. Additional variables e.g. sea level rise will be added when they become available.

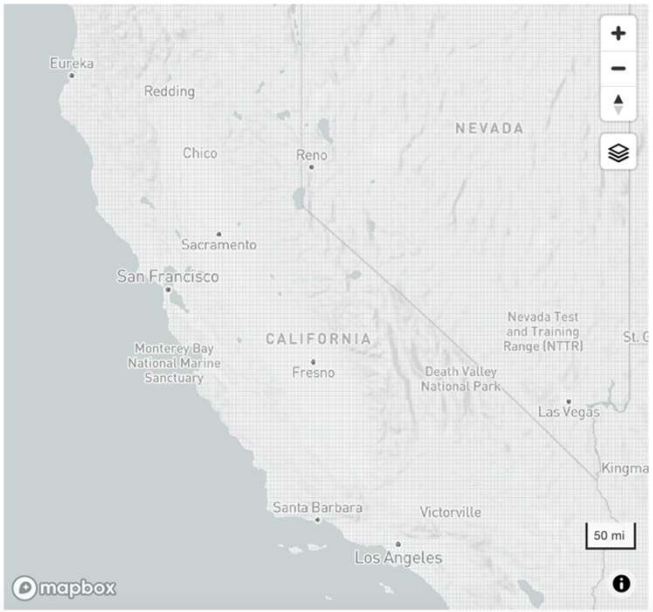
The Local Climate Change Snapshot Tool tool is designed to be straightforward and accessible for most users. Watch a short video on how to use the tool. If you want to explore the data in more depth, other tools on Cal-Adapt provide more configurable options.

**Start by selecting a location. Search for address/zipcode or click on the map. To select an area, click on the County, City, Census Tract or Watershed options. Search by name/census tract number or click on the map.**

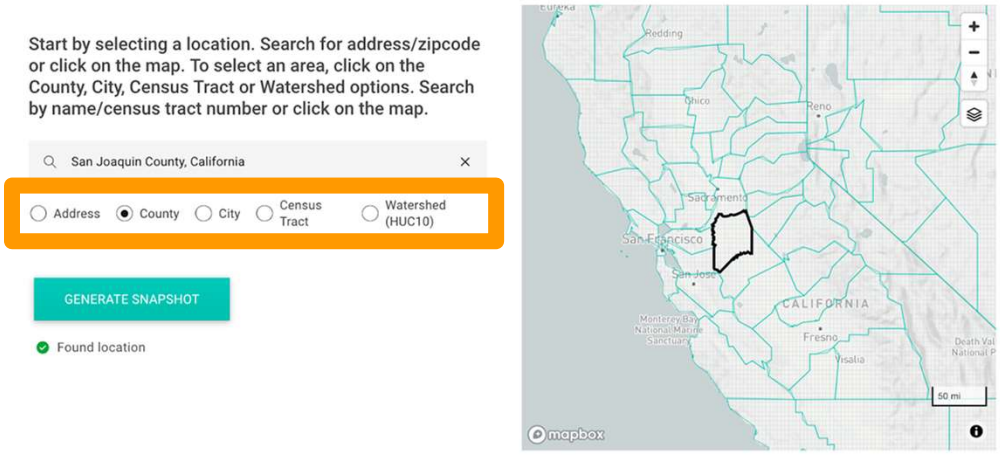
Enter address or zipcode

Address | County | City | Census Tract | Watershed (HUC10)

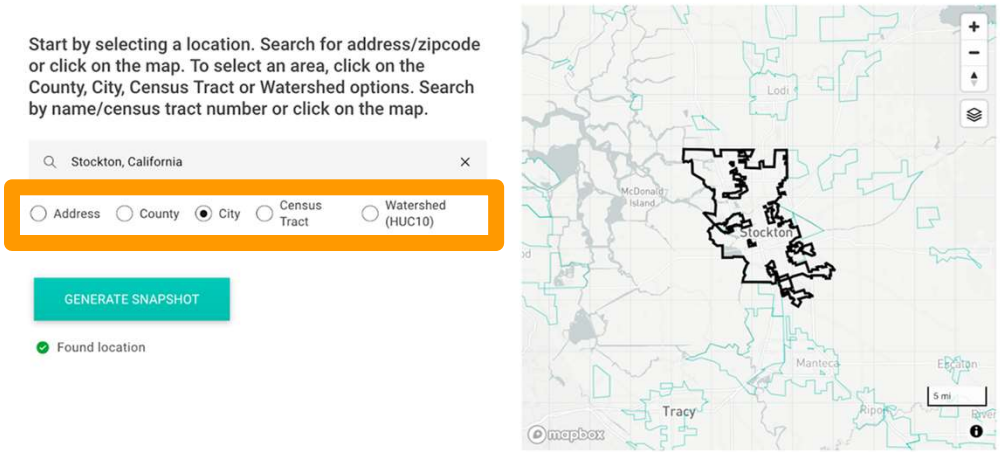
GENERATE SNAPSHOT



## Selecting a county




## Selecting a city




- Annual average maximum temperature
- Annual average minimum temperature
- Extreme heat days
- Warm nights

- Maximum 1-day precipitation
- Maximum length of dry spell
- Annual precipitation

- Annual average area burned

# What is a climate model?

Mathematical representations of physical processes

Run for each grid cell

*Smaller grid = more resolution, more computation*

*Larger grid = less resolution, less computation*

Can be run for future (projection) or past (hindcast)

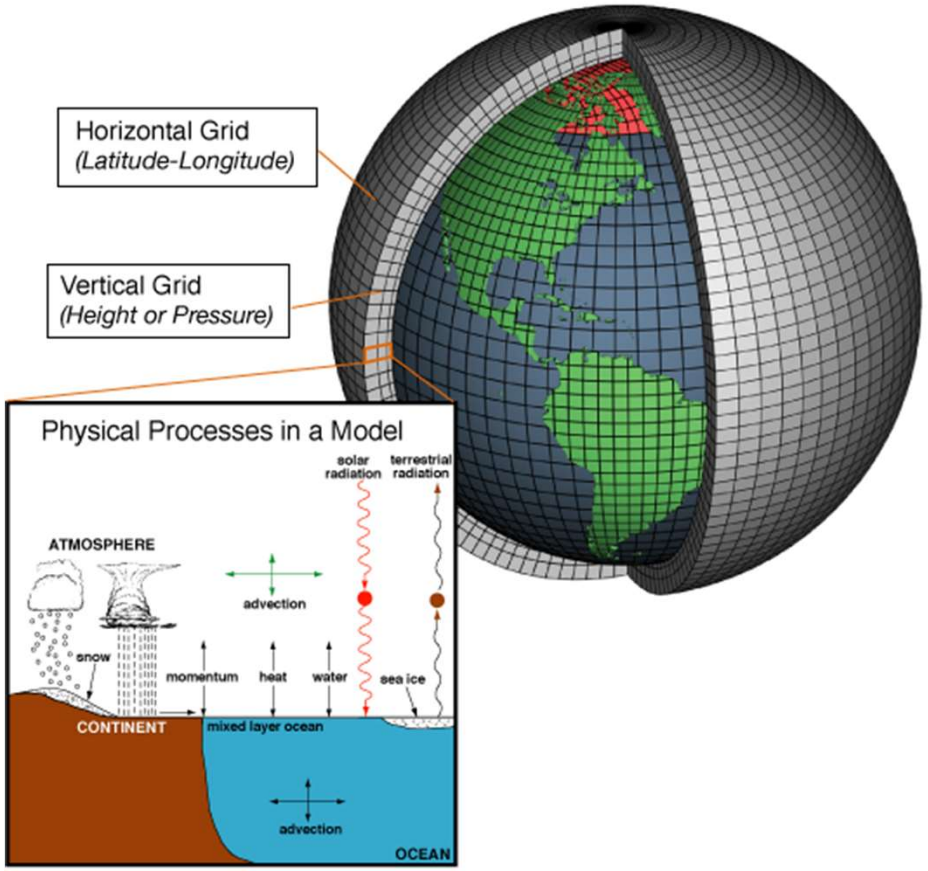
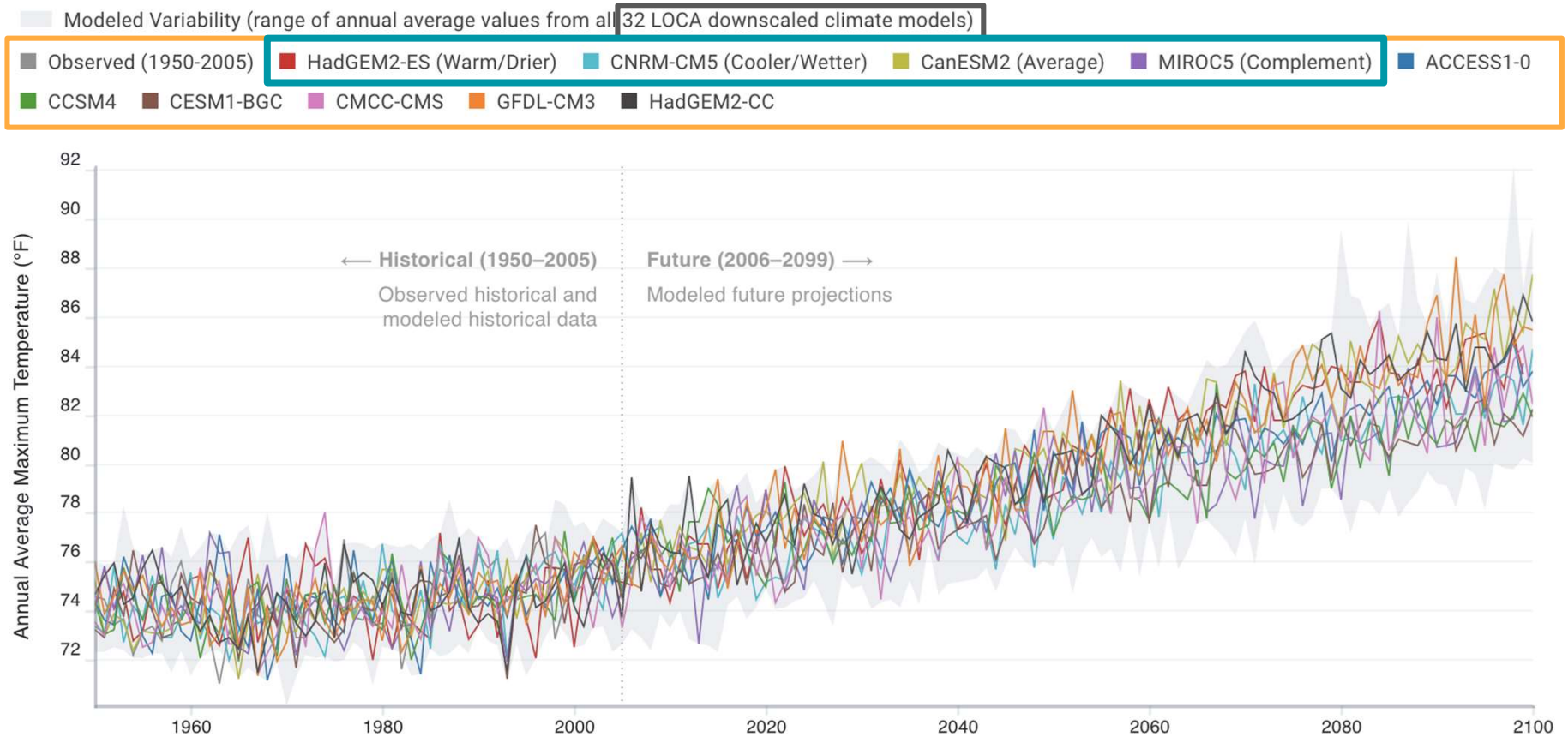



Image source: NOAA

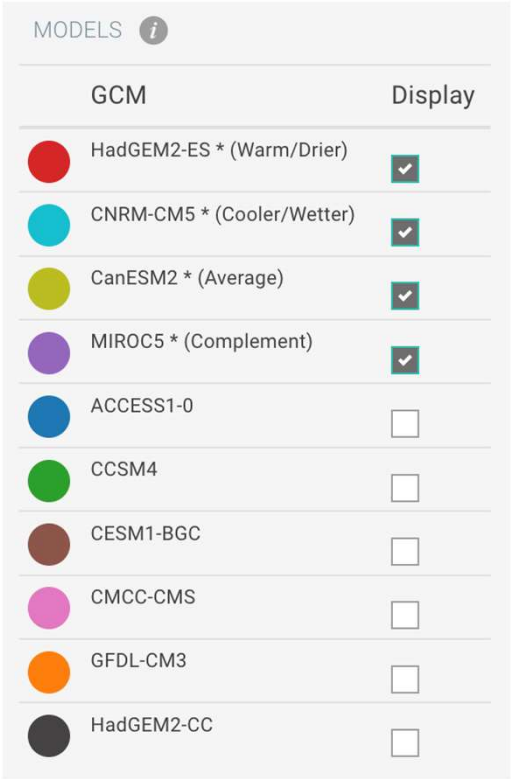



Model ensembles: **4 priority models**, 10 working models, 32 total models

# Principle #1: use individual models *and* model ensembles

Consider model ensembles, including the full range of projections in the ensemble:

- Ensemble minimum
- Ensemble average
- Ensemble maximum



[demo: how does this show up in the LCCS?]

- *Gridded data implicit in location selection*
- *32 model ensemble*
  - *Average line*
  - *Envelope of variability*

# What are emissions scenarios?

Emissions scenarios mathematically capture possible futures greenhouse gas conditions, *contingent on human action*

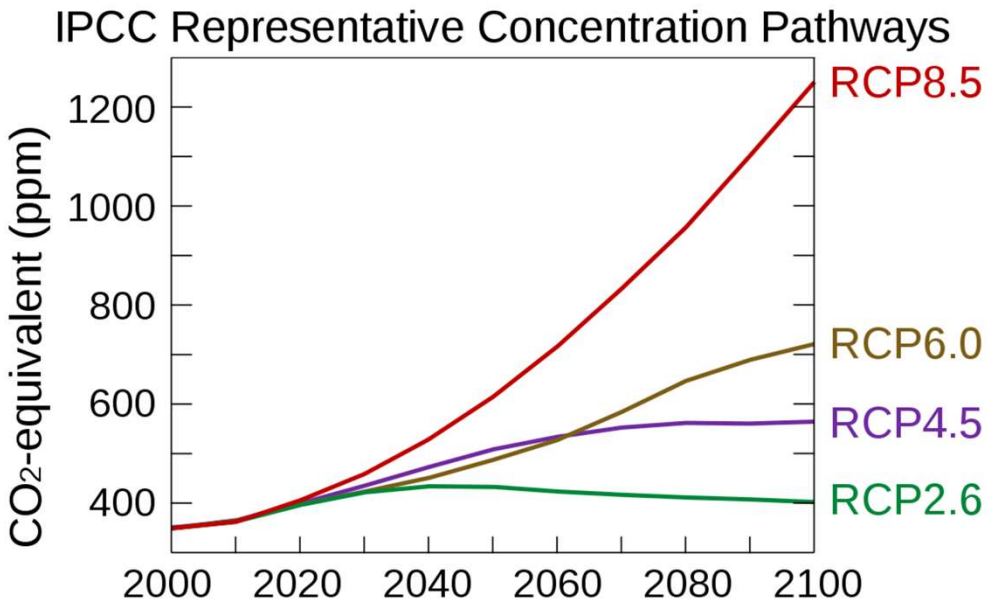


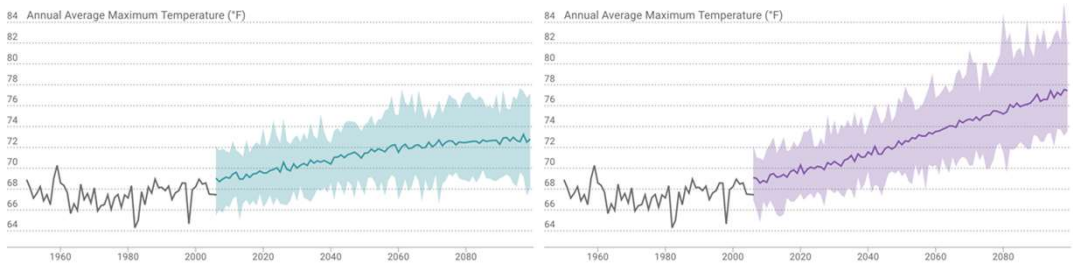

Image source: Wikipedia

# What are emissions scenarios?

RCP: **r**epresentative **c**oncentration **p**athway

- RCP 4.5, *medium emissions scenario*: global $CO_2$ emissions peak by 2040 and then decline.
- RCP 8.5, *high emissions scenario*: global $CO_2$ emissions continue to rise throughout the 21st century.

*Values (e.g. 4.5) refer to radiative forcing magnitudes (a way of measuring solar radiation)*



## Principle #2: consider how RCP scenarios relate to your risk tolerance - separately!

If your decision context is sensitive to “extreme events” or “worse” climate change, you’ll want to center RCP 8.5 in addition to RCP 4.5.

The State of California recommends that you consider RCP 8.5 through at least 2050.

*RCP 4.5 and RCP 8.5 are generally comparable through 2050.*

**When in doubt, use both RCP scenarios - but don’t average them!** Consider each as a separate, plausible future.

[demo: how does this show up in the LCCS?]

- *Two different RCP scenarios*
  - *RCP 4.5*
  - *RCP 8.5*

# What is uncertainty? What is variability?

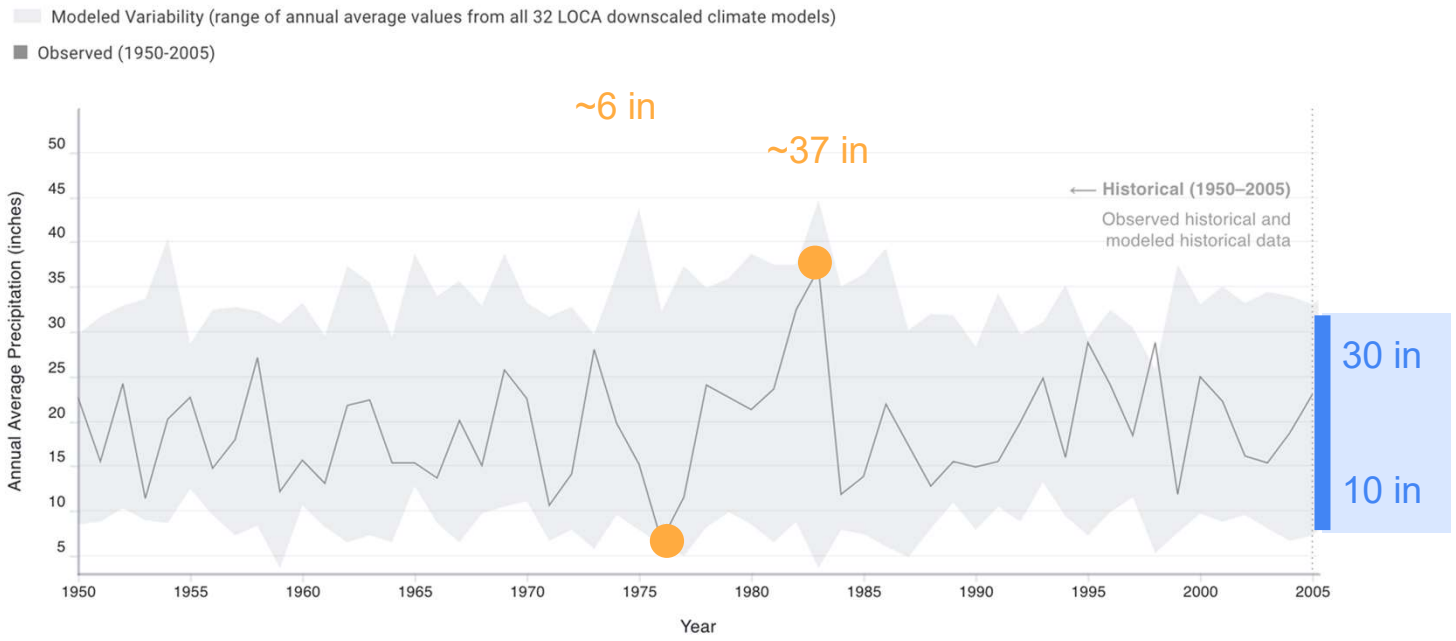
Climate is not the same as weather - **climate is the long-term average of weather.**

The weather on any given day - both in the past *and* in the future - may typify the climate of a place, or it may not.

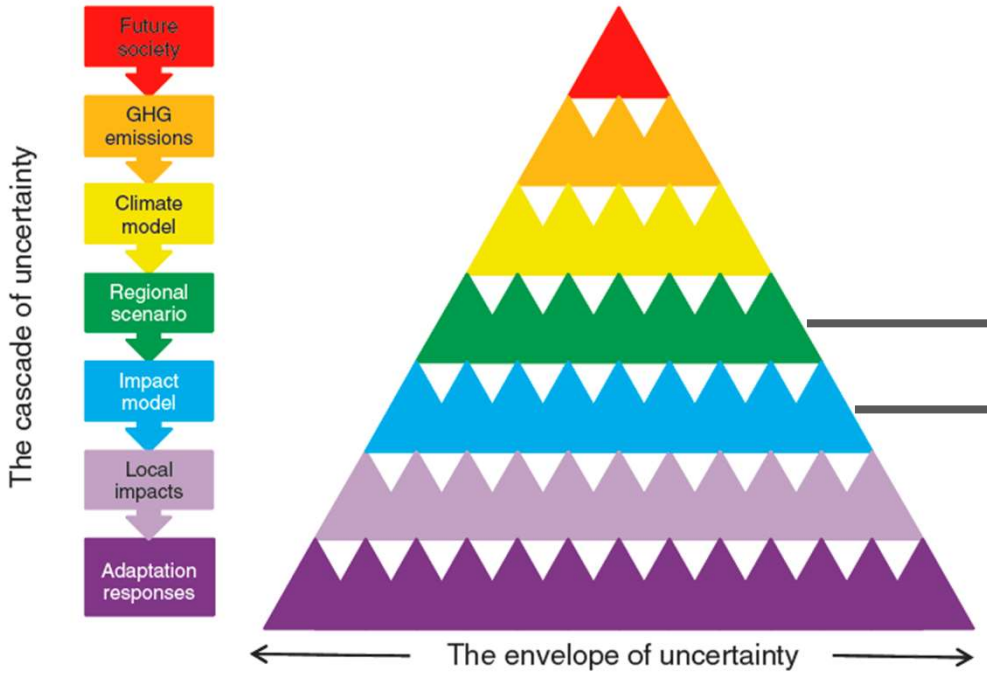
California's climate is **highly variable right now; that variability will persist** into the future under climate change.

# What is uncertainty? What is variability?

Annual average precipitation, Sacramento, modeled and observed - variability



# What is uncertainty? What is variability?




Cal-Adapt downscaled climate model outputs

Impact models (e.g. wildfire)

Source: Wilbert & Desai (2010) via *The Climate Lab Book* by Ed Hawkins

# Principle #3: aggregate in time and space

We want to avoid accidentally selecting an anomalous year or location.

Generally, don't look at single years or point locations.

Consider instead aggregating in space (e.g. cities, counties) and time (30-year) periods.

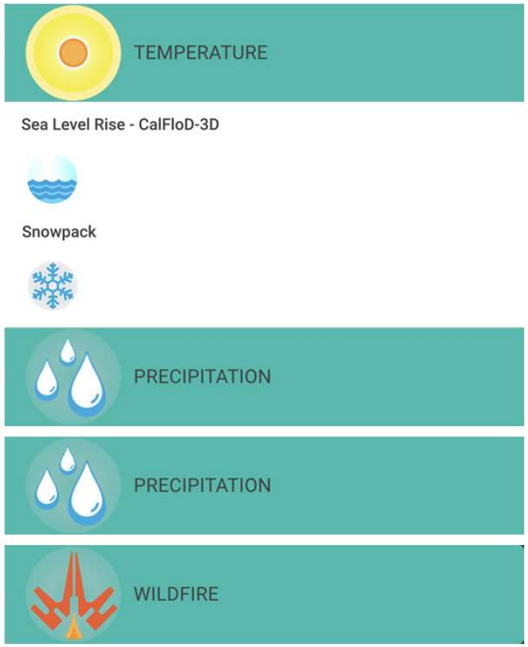
*"Climate normals" are computed in 30-year intervals.*

[demo: how does this show up in the LCCS?]

- *Location selection options*
- *Statistics table - walk through this*
- *Model ensemble*

# How will the climate change where I work?

| | CLIMATE IMPACT | DIRECTION | SCIENTIFIC CONFIDENCE FOR FUTURE CHANGE |
|---|---|---|---|
| | TEMPERATURE | WARMING ↗ | Very High |
| | SEA LEVELS | RISING ↗ | Very High |
| | SNOWPACK | DECLINING ↘ | Very High |
| | HEAVY PRECIPITATION EVENTS | INCREASING ↗ | Medium-High |
| | DROUGHT | INCREASING ↗ | Medium-High |
| | AREA BURNED BY WILDFIRE | INCREASING ↗ | Medium High |



# Questions?

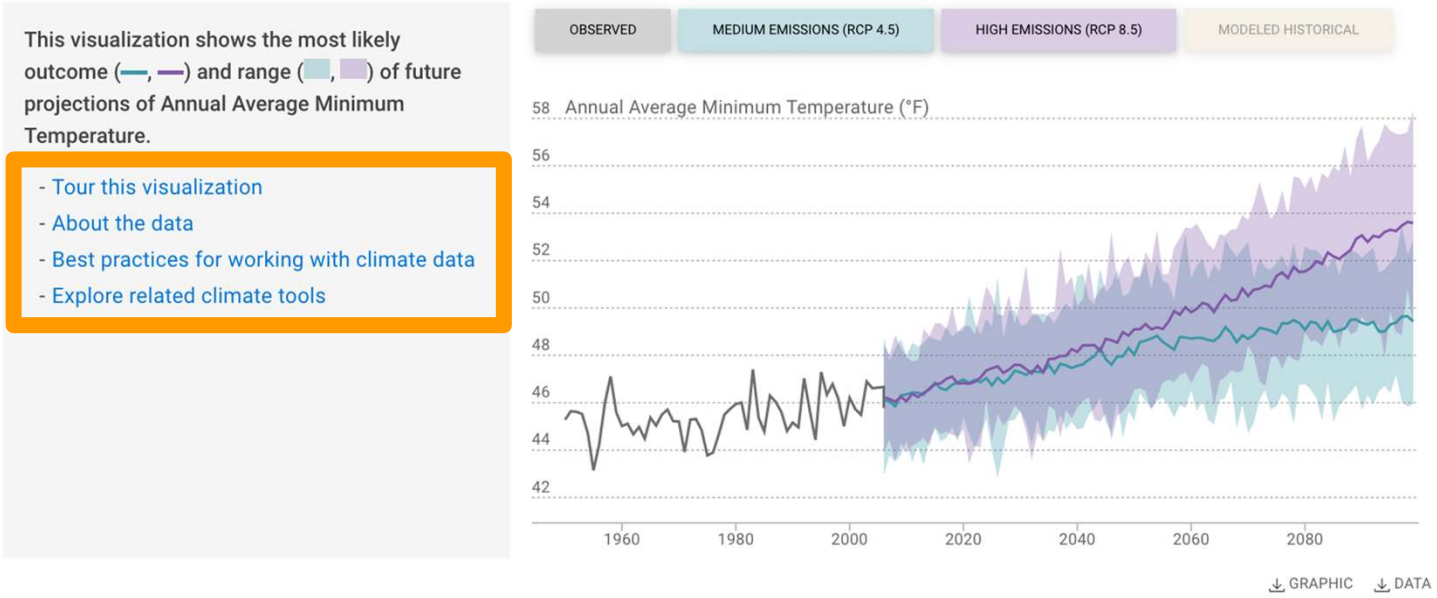
# Thank you!

Sign up for the Cal-Adapt newsletter:

https://cal-adapt.org/signup.html

Email us at support@cal-adapt.org.

# Appendices




- Two emissions scenarios (RCPs) - RCP 4.5 and RCP 8.5
- 32 LOCA downscaled projections (models)
  - Average of all 32 models - dark lines
  - Range of all 32 models - shaded region

**Observed (1961-1990)** 30yr Average: 74.2 °F

| | Change from baseline ⓘ | 30yr Average | 30yr Range |
|---|---|---|---|
| **Baseline (1961-1990)** | | | |
| MODELED HISTORICAL | - | 74.3 °F | 74.1 - 74.5 °F |
| **Mid-Century (2035-2064)** | | | |
| MEDIUM EMISSIONS (RCP 4.5) | +3.8 °F | 78.1 °F | 76.6 - 79.3 °F |
| HIGH EMISSIONS (RCP 8.5) | +4.7 °F | 79.0 °F | 77.0 - 80.9 °F |
| **End-Century (2070-2099)** | | | |
| MEDIUM EMISSIONS (RCP 4.5) | +4.9 °F | 79.2 °F | 77.2 - 81.4 °F |
| HIGH EMISSIONS (RCP 8.5) | +8.1 °F | 82.4 °F | 79.6 - 86.4 °F |

GRAPHIC DATA

## Related Cal-Adapt Tools

### Annual Averages

Explore projected annual averages of maximum temperature, minimum temperature and precipitation for your location.

### Extreme Heat

Explore projected frequency and duration of extreme heat days and warm nights for your location.

### Maps of Projected Change

Explore maps of projected long-term (30 years) changes in annual average temperature and precipitation.

## Additional Resources