

# Cal-Adapt: Local Climate Change Snapshot Tool

07/27/21



sustainability  
PROGRAM

## Toolbox Tuesdays

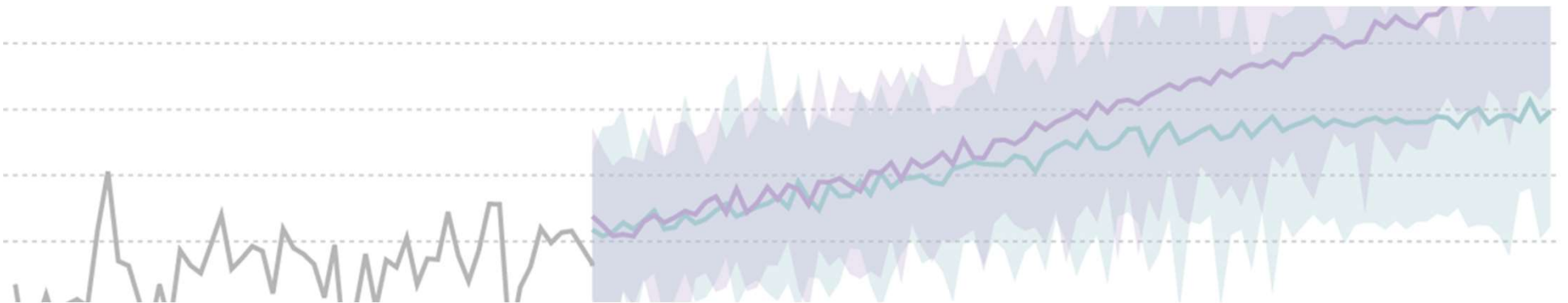
[www.scag.ca.gov](http://www.scag.ca.gov)



**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



CALIFORNIA STRATEGIC  
GROWTH COUNCIL



## Cal-Adapt provides data and tools for exploring climate change in California

We process climate data from California's scientific & research community. We make this data available through downloads, visualizations and the Cal-Adapt API for your research, outreach and adaptation planning needs.

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

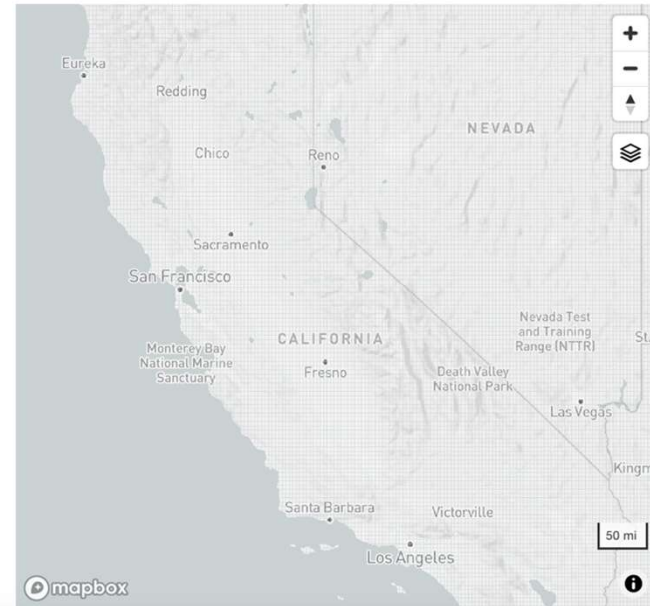
Climate change related effects vary significantly throughout California, mirroring our state's diverse climate, topography, and ecology. This tool is a starting place if you are looking to get a quick sense of climate impacts in your region. The Snapshot tool provides climate projections for temperature, 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.**

  
 Address  County  City  Census Tract  Watershed (HUC10)

GENERATE SNAPSHOT



## Selecting a county

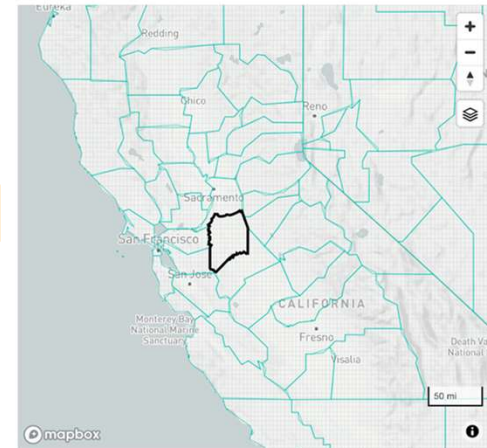
Start by selecting a location. Search for address/zipcode or click on the map. To select an area, click on the County, City, Census Tract or Watershed options. Search by name/census tract number or click on the map.

San Joaquin County, California

Address  County  City  Census Tract  Watershed (HUC10)

GENERATE SNAPSHOT

Found location



## Selecting a city

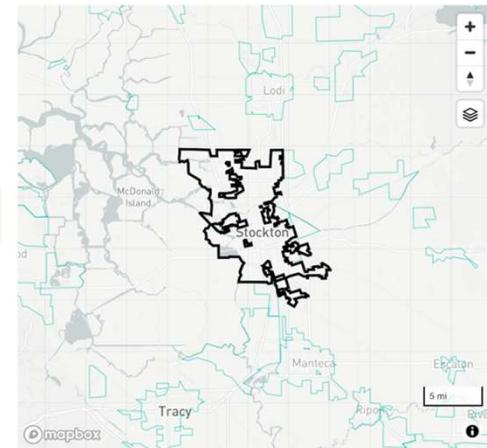
Start by selecting a location. Search for address/zipcode or click on the map. To select an area, click on the County, City, Census Tract or Watershed options. Search by name/census tract number or click on the map.

Stockton, California

Address  County  City  Census Tract  Watershed (HUC10)

GENERATE SNAPSHOT

Found location







## TEMPERATURE

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



## PRECIPITATION

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



## WILDFIRE

- 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)

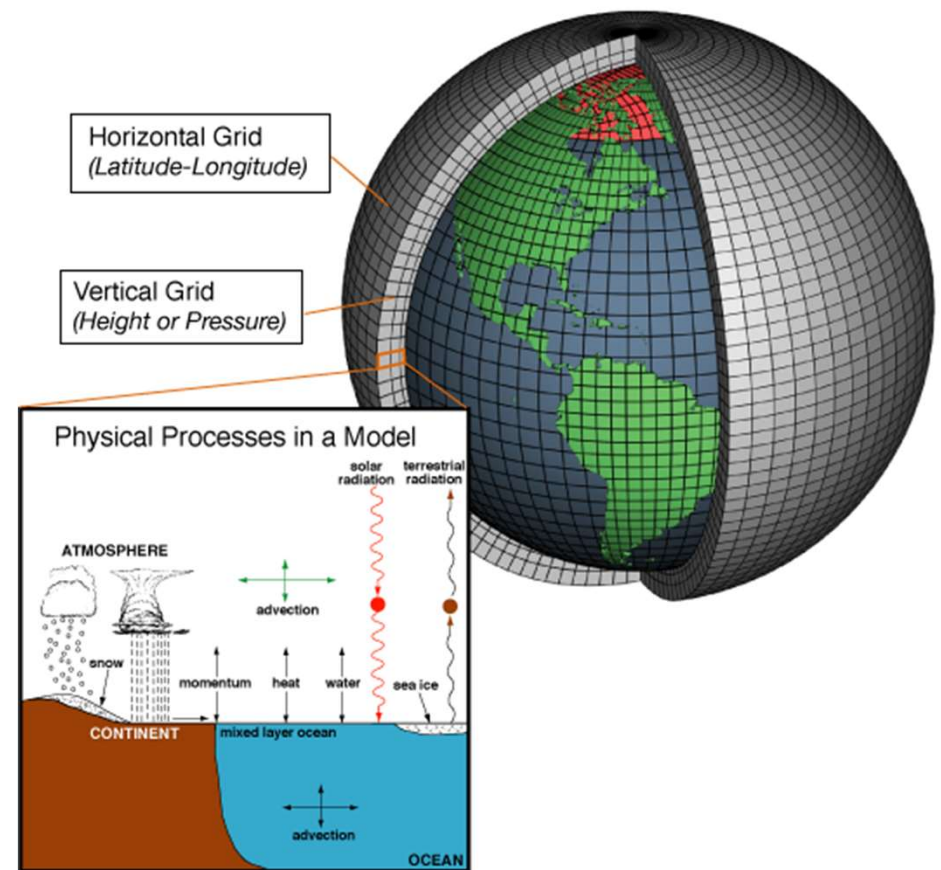
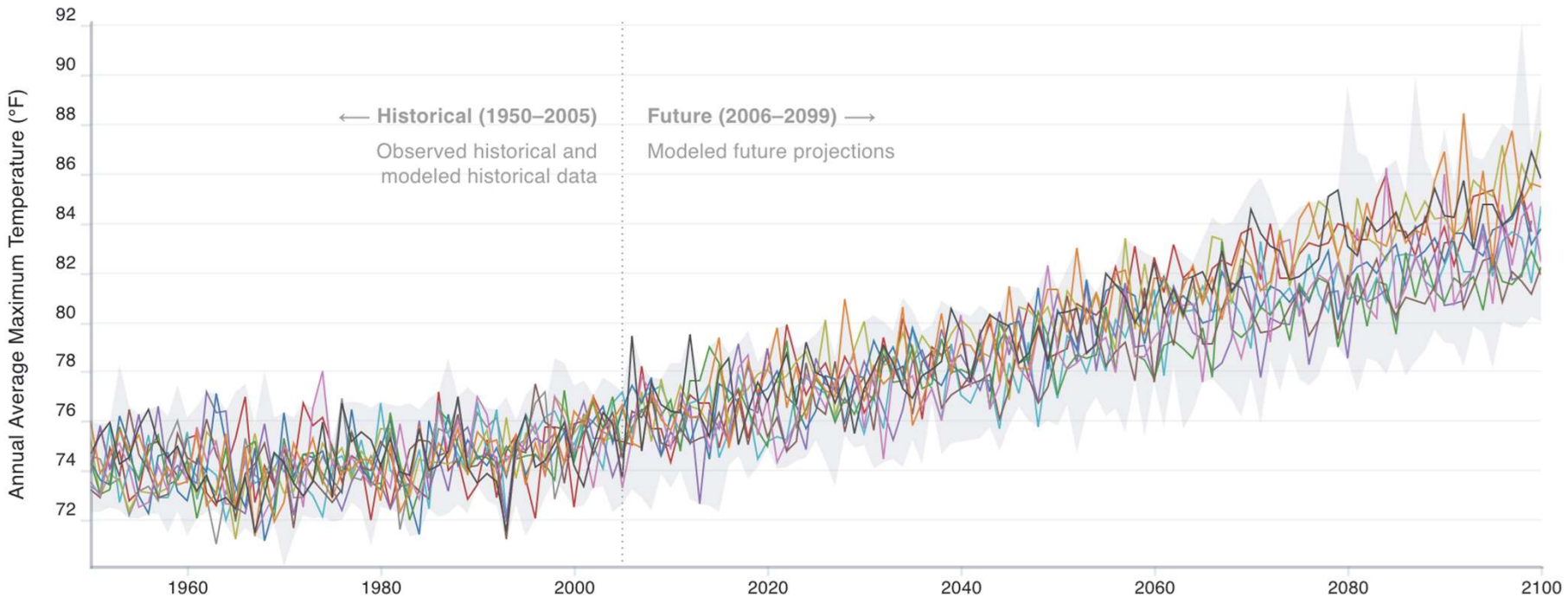


Image source: [NOAA](#)

Modeled Variability (range of annual average values from all 32 LOCA downscaled climate models)

- Observed (1950-2005)
- HadGEM2-ES (Warm/Drier)
- CNRM-CM5 (Cooler/Wetter)
- CanESM2 (Average)
- MIROC5 (Complement)
- ACCESS1-0
- CCSM4
- CESM1-BGC
- CMCC-CMS
- GFDL-CM3
- HadGEM2-CC













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

MODELS <span>i</span>	
GCM	Display
 HadGEM2-ES * (Warm/Drier)	<input checked="" type="checkbox"/>
 CNRM-CM5 * (Cooler/Wetter)	<input checked="" type="checkbox"/>
 CanESM2 * (Average)	<input checked="" type="checkbox"/>
 MIROC5 * (Complement)	<input checked="" type="checkbox"/>
 ACCESS1-0	<input type="checkbox"/>
 CCSM4	<input type="checkbox"/>
 CESM1-BGC	<input type="checkbox"/>
 CMCC-CMS	<input type="checkbox"/>
 GFDL-CM3	<input type="checkbox"/>
 HadGEM2-CC	<input type="checkbox"/>

[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*

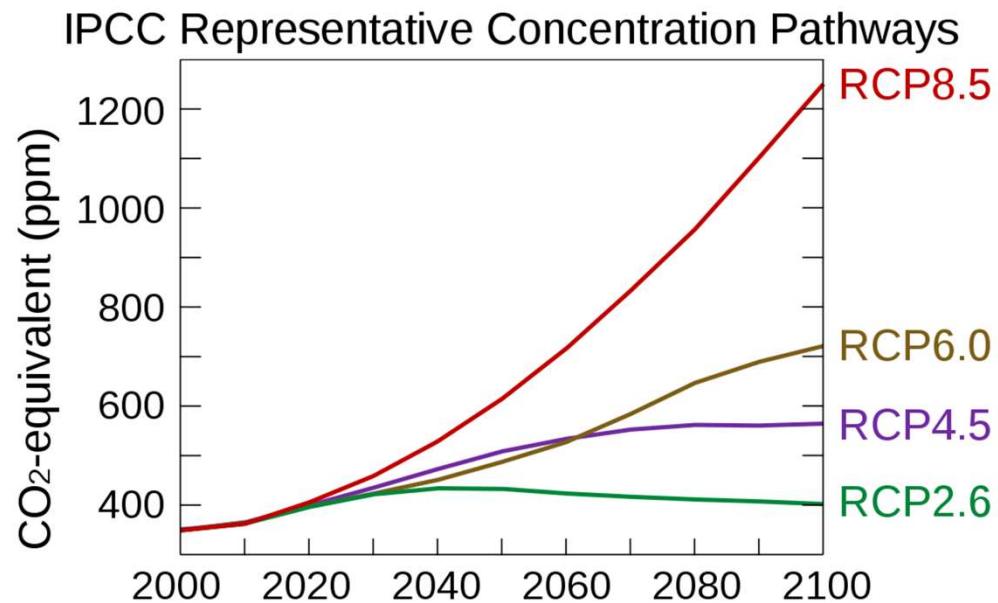


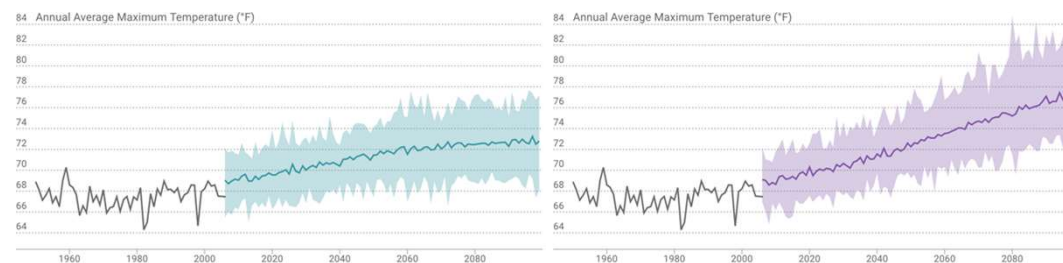
Image source: [Wikipedia](#)

# What are emissions scenarios?

RCP: representative concentration pathway

- **RCP 4.5**, *medium emissions scenario*: global CO<sub>2</sub> emissions peak by 2040 and then decline.
- **RCP 8.5**, *high emissions scenario*: global CO<sub>2</sub> 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?

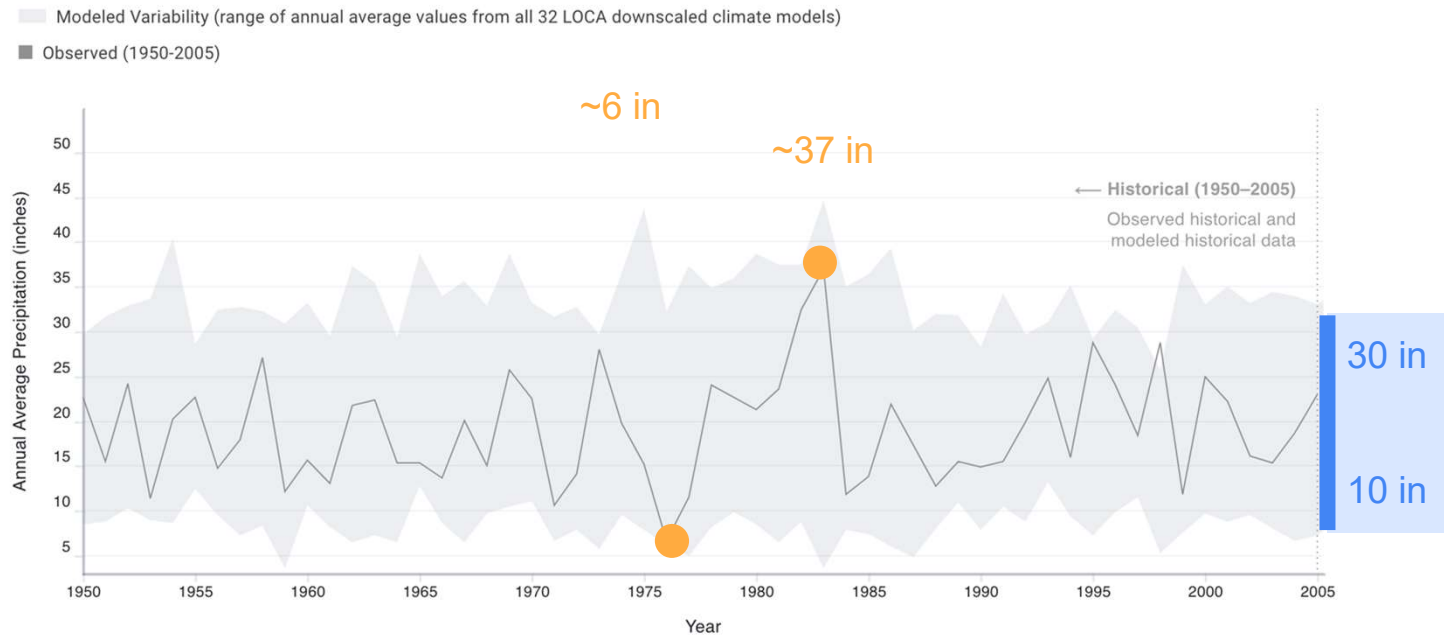
Climate is not the same as weather - **climate is the long-term average of weather.**

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.

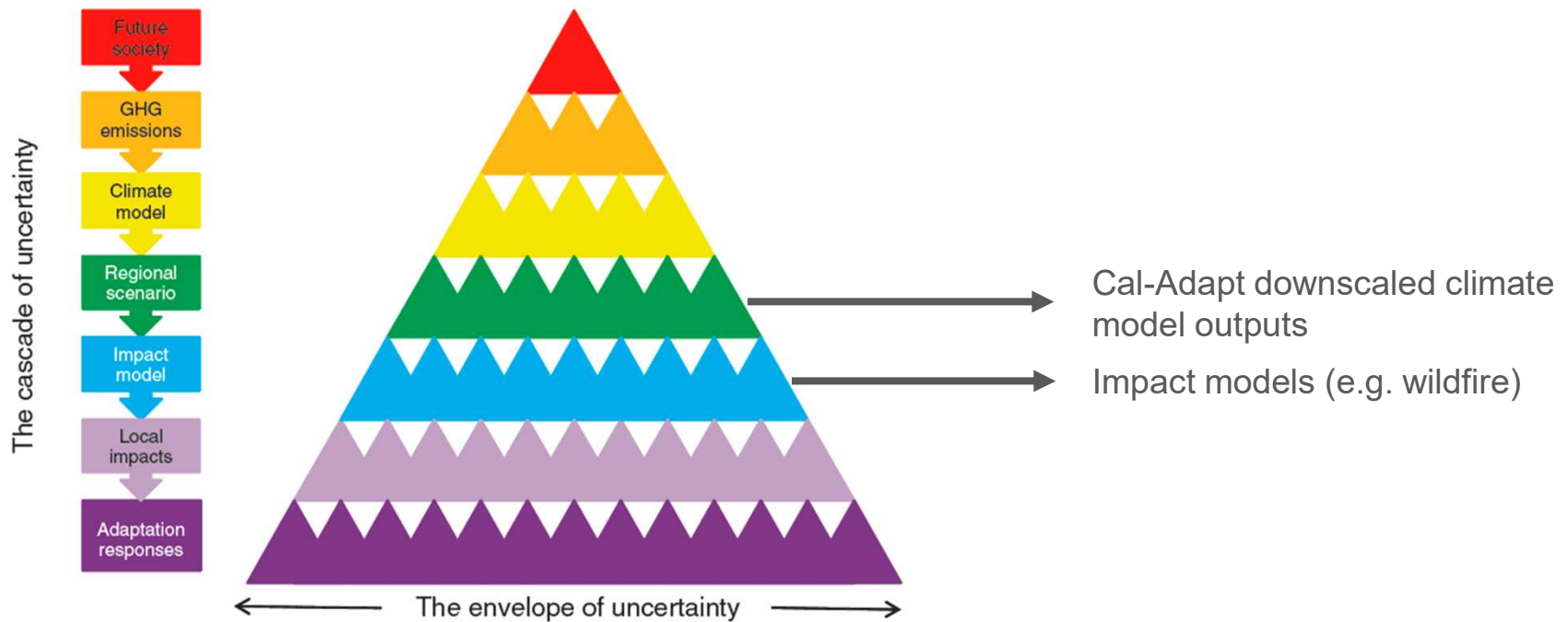
California's climate is **highly variable right now; that variability will persist** into the future under climate change.

# What is uncertainty? What is variability?

Annual average precipitation, Sacramento, modeled and observed - variability



# What is uncertainty? What is variability?



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	 TEMPERATURE Sea Level Rise - CalFloD-3D  Snowpack 
	SEA LEVELS	RISING ↗	Very High	
	SNOWPACK	DECLINING ↘	Very High	
	HEAVY PRECIPITATION EVENTS	INCREASING ↗	Medium-High	 PRECIPITATION
	DROUGHT	INCREASING ↗	Medium-High	 PRECIPITATION
	AREA BURNED BY WILDFIRE	INCREASING ↗	Medium High	 WILDFIRE

**Questions?**



# Thank you!

Sign up for the Cal-Adapt newsletter:

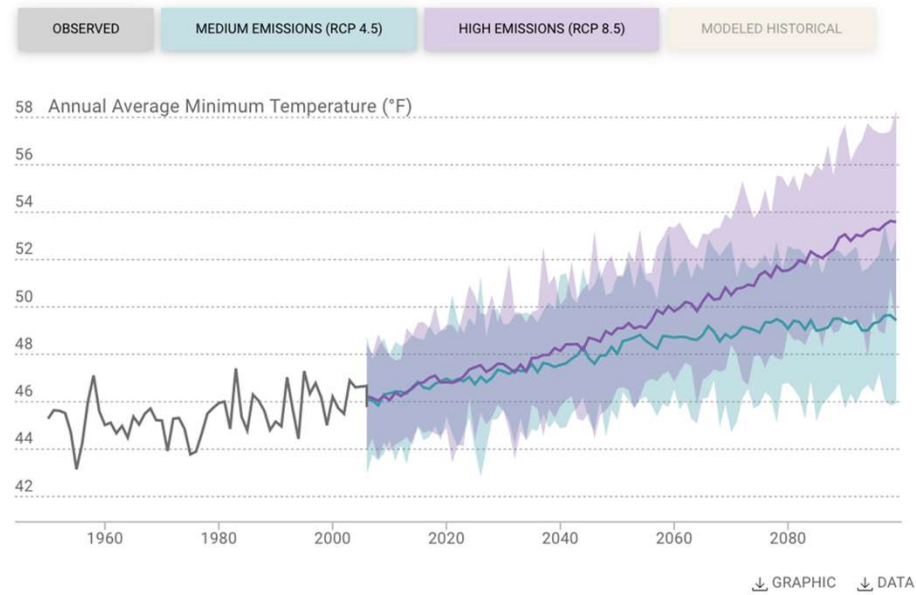
<https://cal-adapt.org/signup.html>

Email us at [support@cal-adapt.org](mailto:support@cal-adapt.org).

# Appendices

This visualization shows the most likely outcome (—, —) and range (■, ■) of future projections of Annual Average Minimum Temperature.

- [Tour this visualization](#)
- [About the data](#)
- [Best practices for working with climate data](#)
- [Explore related climate tools](#)



- 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



California Heat  
Assessment Tool

A cover image for the California Heat Assessment Tool, showing a wide, straight road stretching into the distance under a hazy, orange-tinted sky, suggesting a hot, dry environment.

California's Adaptation  
Clearinghouse:  
Temperature Impacts

A cover image for the California's Adaptation Clearinghouse: Temperature Impacts, featuring three construction workers in high-visibility yellow jackets and blue hard hats with the CCC logo, standing on a construction site.

Regional Reports:  
California's 4th Climate  
Change Assessment

A cover image for the Regional Reports: California's 4th Climate Change Assessment, showing a desert landscape with mountains in the background under a cloudy sky.