



UC San Diego

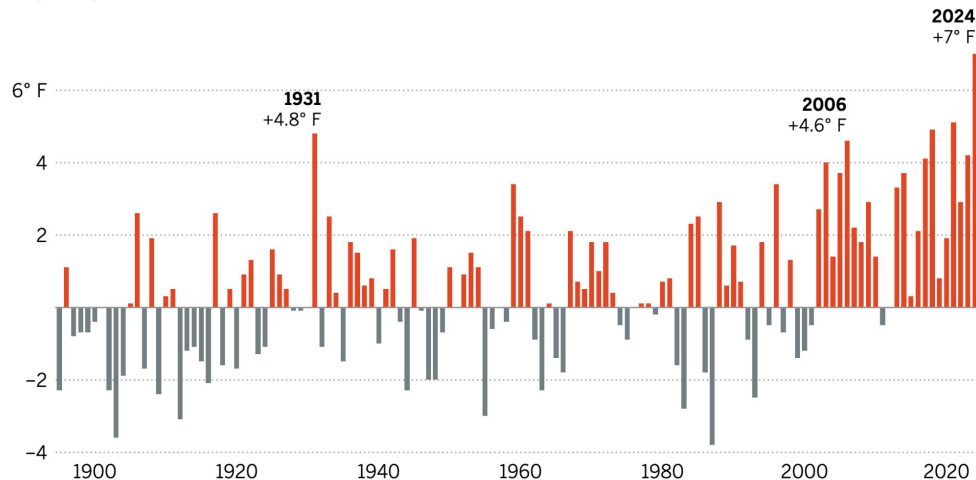
SoCal Extreme Heat Research Hub

Maren Hale, project manager

May 15, 2025

In 2024, July temperatures soared 7° F above average in California

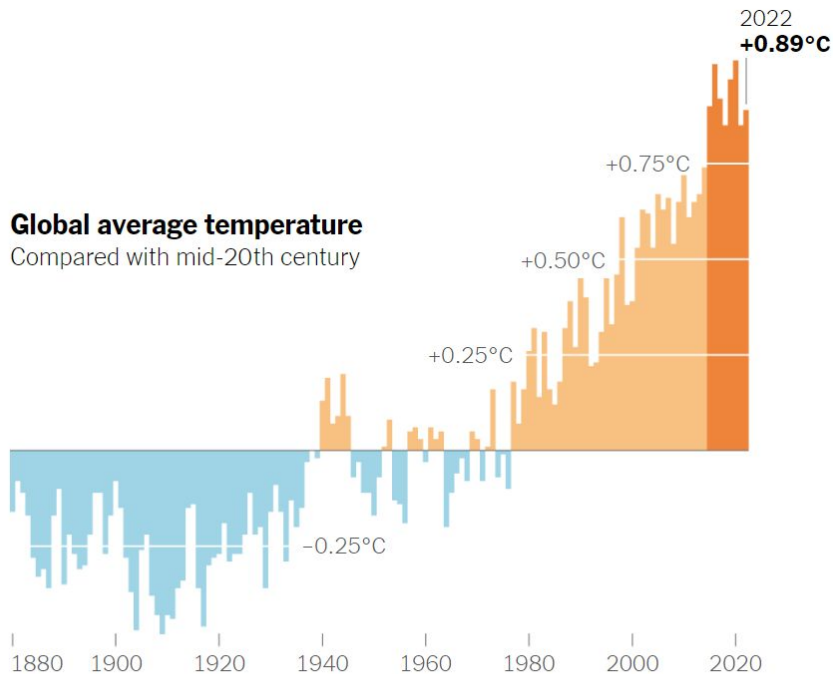
July temperature anomalies



Temperature anomalies are the difference between the monthly average and the 1901-2000 average of 74.7° F.

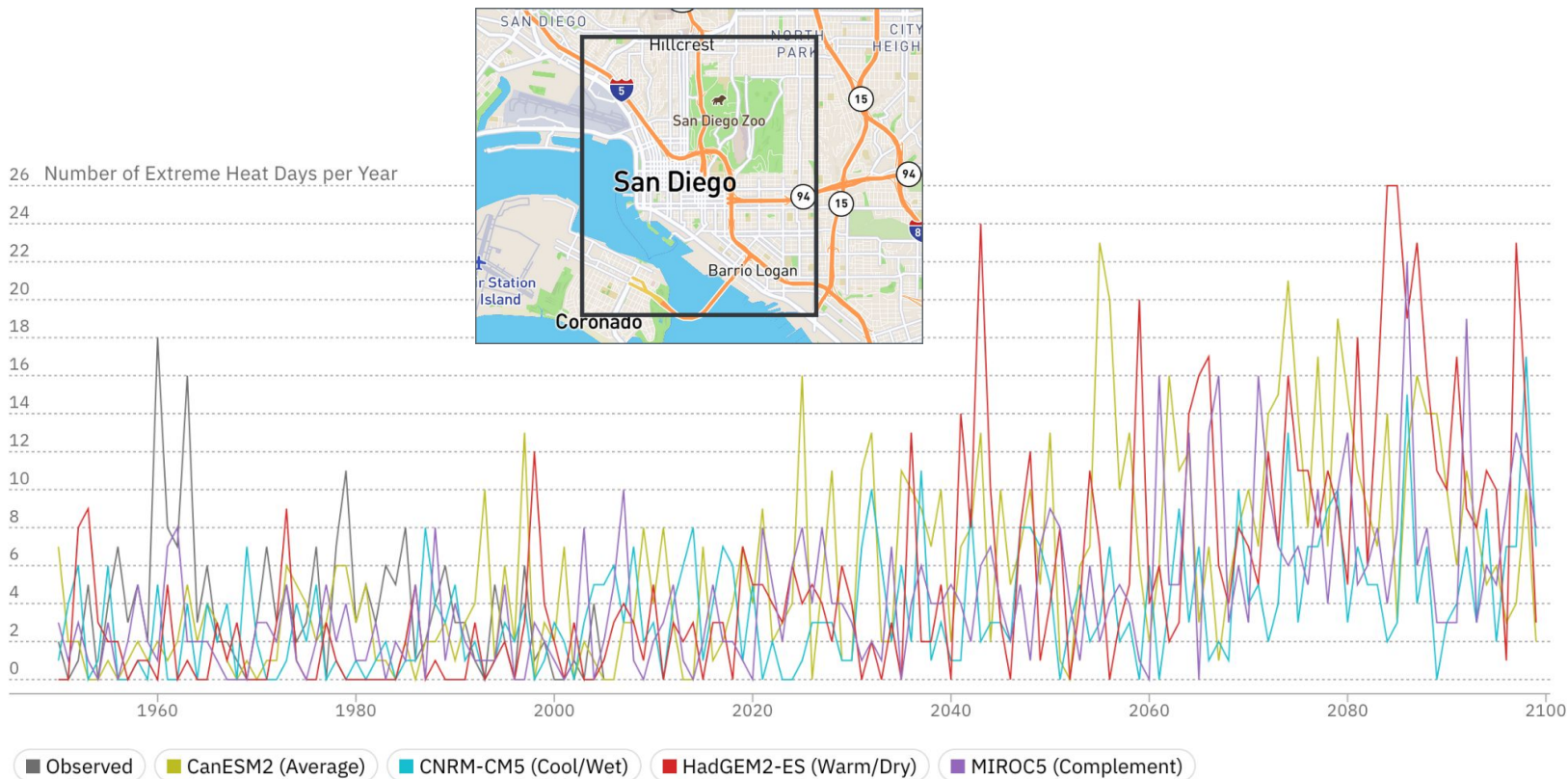
[NOAA National Centers for Environmental Information](#)

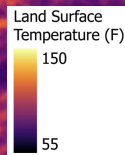
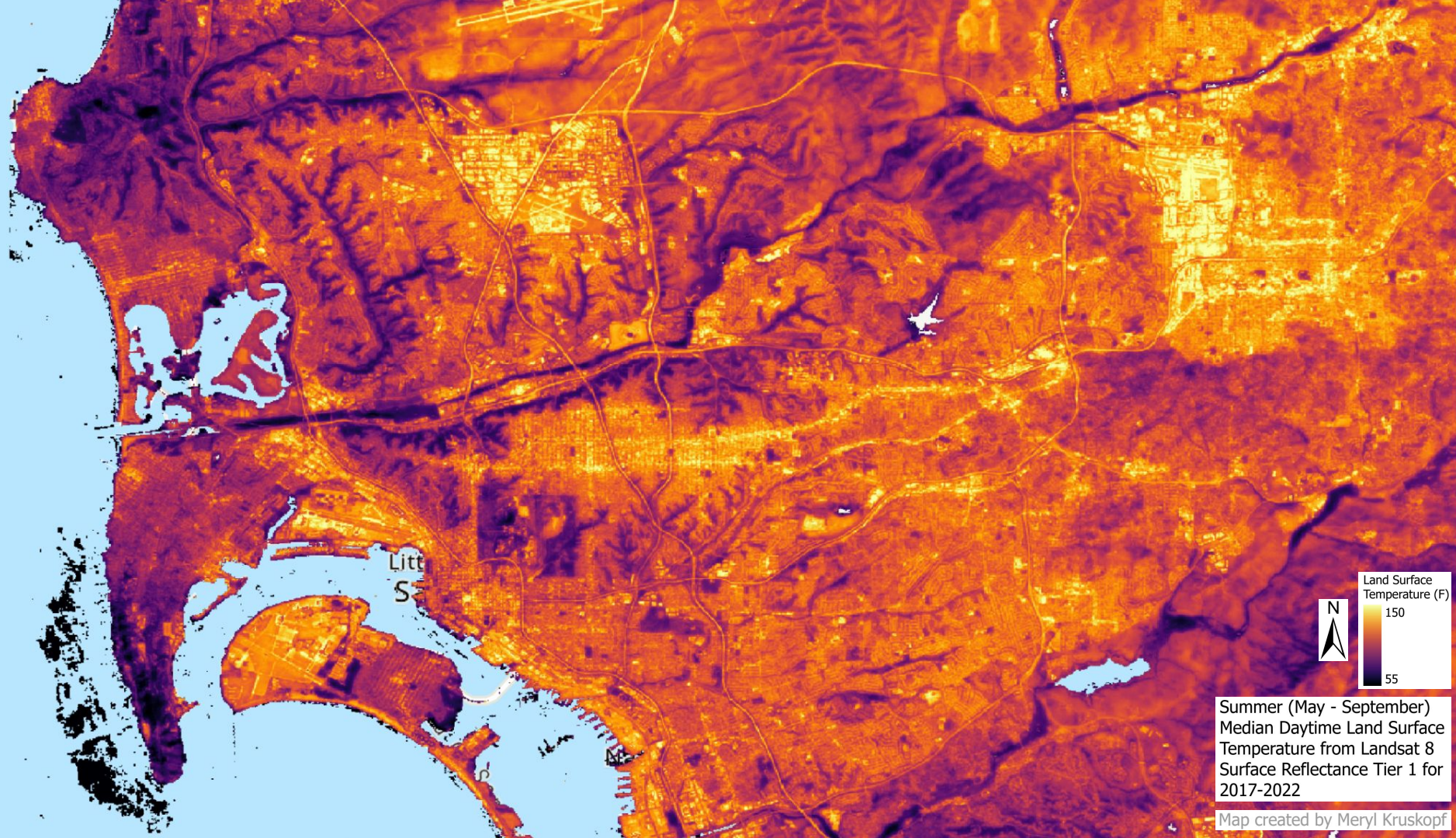
California has warmed along with the western US and the world as a result of anthropogenic climate change



Source: NASA Goddard Institute for Space Studies

California Heat Waves and Climate Change





Summer (May - September)
Median Daytime Land Surface
Temperature from Landsat 8
Surface Reflectance Tier 1 for
2017-2022

Map created by Meryl Kruskopf



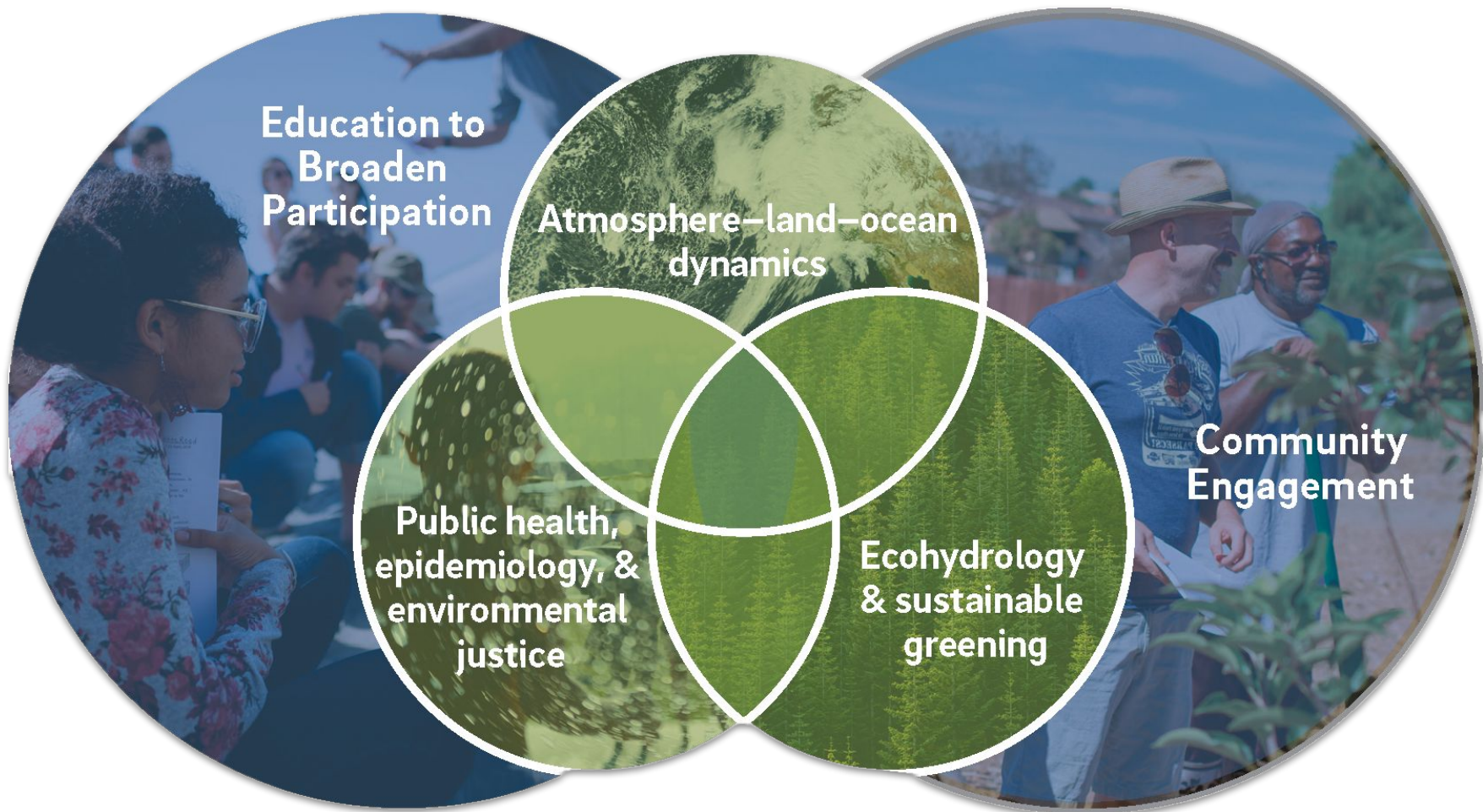
What is the SoCal Heat Hub?

- Research team focused on the topic of extreme heat in coastal SoCal
- Headquartered at Scripps Institution of Oceanography (UCSD)
- Transdisciplinary & convergent
- Co-production of knowledge



COASTLINES AND PEOPLE

- Funded by NSF's Coastlines and People program
 - "Supports ... research hubs that study the interactions between natural, human-built and social systems in coastal populated environments."
- 5-year lifespan, ending in 2027



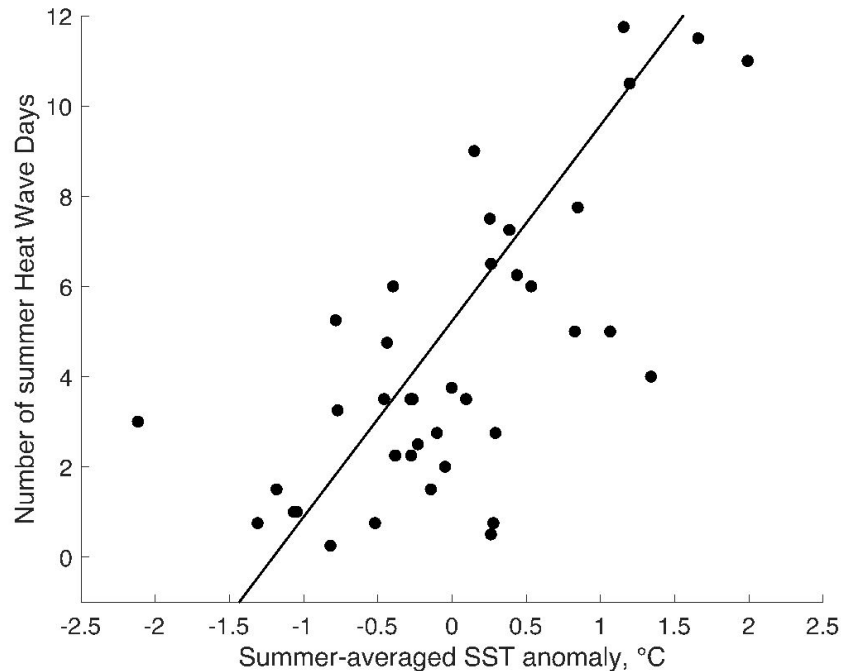
Theme 1: Atmosphere–Land–Ocean Dynamics



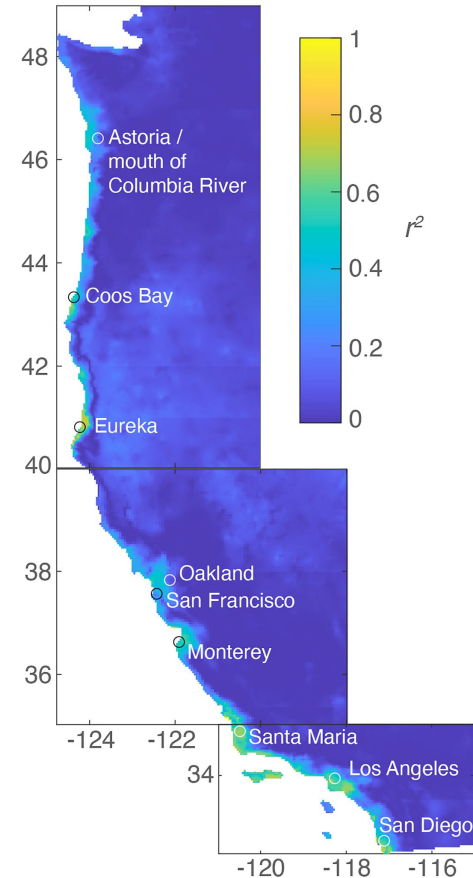
How do ocean, atmosphere, and land processes drive and/or modulate extreme heat across varied coastal zone climates, and what changes are expected with climate change?

Connections Between Terrestrial and Ocean Heating

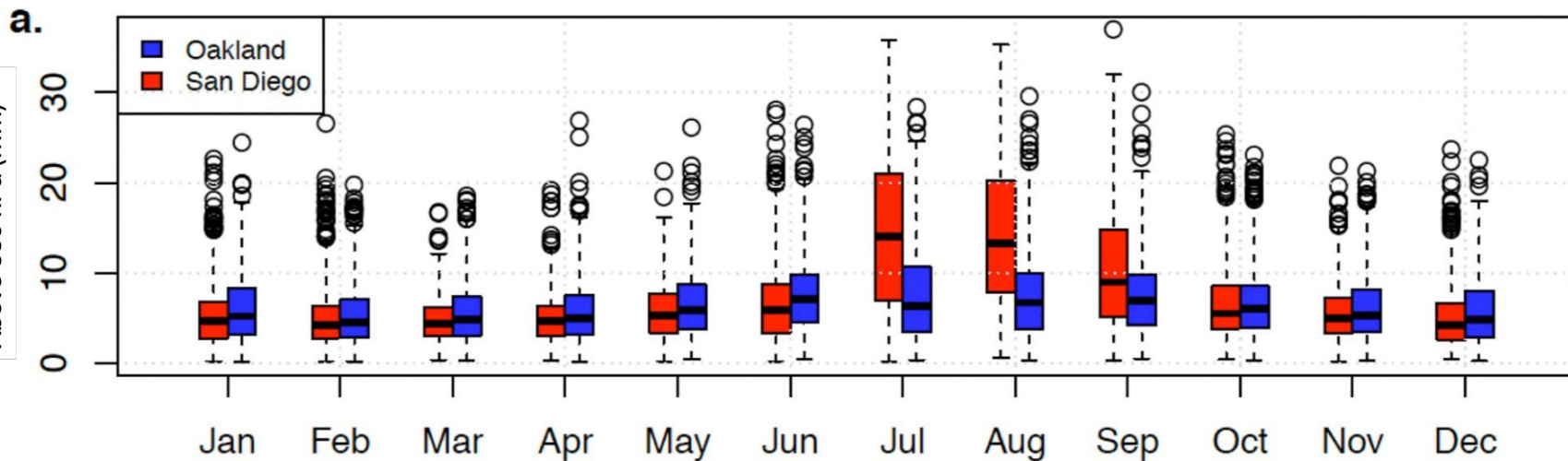
The number of summer heat wave days in the coastal zone of SoCal tracks with sea surface temperature



The relationship between sea surface temperature and terrestrial summer temperatures extends along the whole US west coast



Impacts on SoCal's Coastal Low Clouds



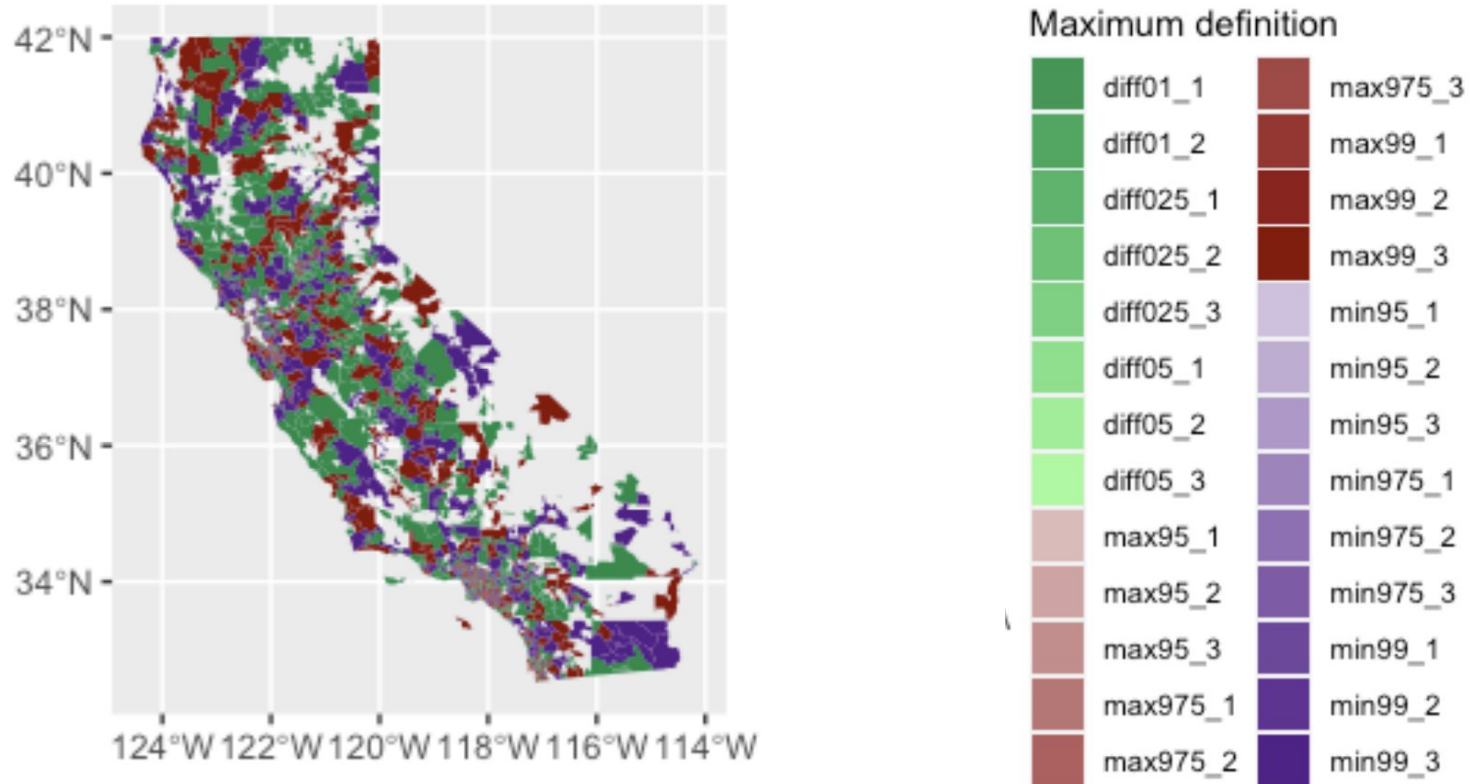
Increased moisture in the atmosphere due to the North American Monsoon helps break up the “May Gray/June Gloom” pattern in SoCal – in contrast to NorCal



Theme 2: Public Health, Epidemiology, and Environmental Justice

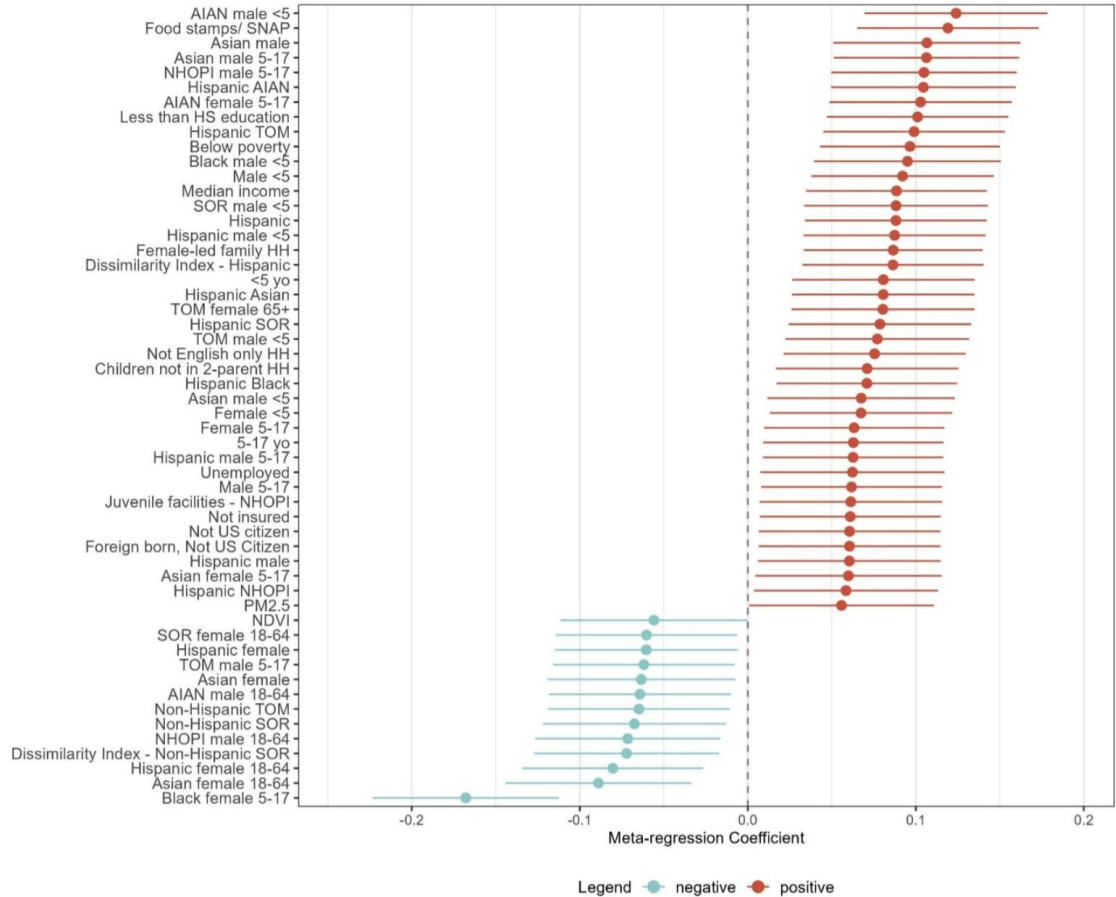
What are the locally-specific health impacts of extreme heat, and how do they vary according to land use and socioeconomic factors?

Identifying the Types of Heat Waves that Drive Heat Health Impacts



Environmental Justice Variables

Community characteristics that explain the spatial heterogeneity of these heat-related health impacts and contribute most to community susceptibility



Theme 3: Ecohydrology & Sustainable Greening

What is the locally-specific relationship between temperature and vegetation? Where/how can vegetation be used for heat adaptation, and what are the associated climate/water resource constraints?

Interactive map tool

[“Ecohydrology and Heat Explorer” Tool:
Learn how to use the tool](#)

A tool to support research
“co-production” and
community engagement.

Ecohydrology and Heat Explorer

This interactive map allows exploration of interactions between heat, plants, and water. You can display a map and also look at patterns over time in key data layers representing heat (Land Surface Temperature or LST), plant greenness (Normalized Difference Vegetation Index or NDVI), plant cover (Tree Canopy Cover or TCC), and the combination of plant transpiration and soil evaporation (Evapotranspiration or ET).

Toggle Base Map

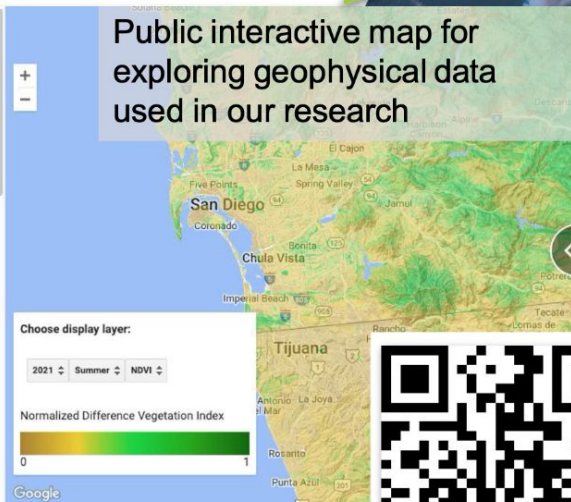
Instructions

Select data layers to display on one or both sides of the slider using the drop-down menu options. Zoom in or out using the +/- buttons. Drag the slider from side to side to compare different time periods and/or layers. To generate charts of LST, NDVI, and ET over time, click a point on the map or draw a polygon on one or both sides of the slider. Map layers and charts may take several minutes to display. For additional instructions: [click here](#)

About This Map

Data
The interactive map displays the following data:

Layers - Normalized Difference Vegetation



Education to
Broaden
Participation

Atmosphere–land–ocean
dynamics

Public health,
epidemiology, &
environmental
justice

Ecohydrology
& sustainable
greening

Community
Engagement

<https://tinyurl.com/ycynj8bf>

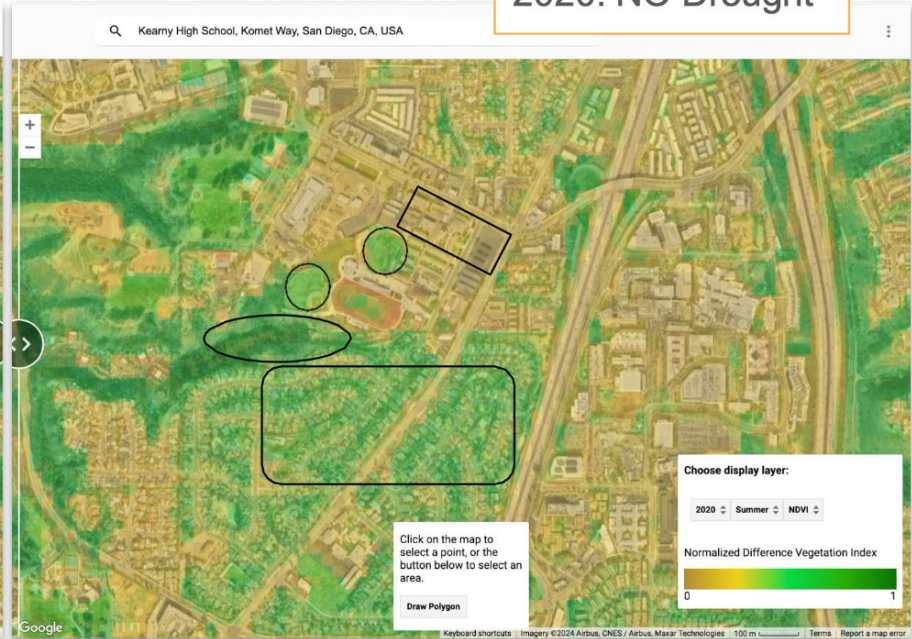
Interactive map tool

[“Ecohydrology and Heat Explorer” Tool:
Learn how to use the tool](#)

2016: Drought



2020: NO Drought



Example: Looking at NDVI in different years (2016, 2020) at a local high school

Theme 4: Community Engagement

Enable long-term, equitable engagement with regional government agencies and community partners with the goal of informing research and products produced by research theme areas 1–3.

“Accelerating Regional Heat Action Planning Across San Diego”

Funded by the Extreme Heat and Community Resilience Program

Led by San Diego Regional Climate Collaborative in partnership with the cities of San Diego, La Mesa, and Chula Vista

Evaluation of regional extreme heat resources that will enable coordinated planning and action, e.g., the development of Heat Action and Adaptation Strategies, Heat Action Planning, Cooling Solutions Toolbox, and Heat Vulnerability Indexes.

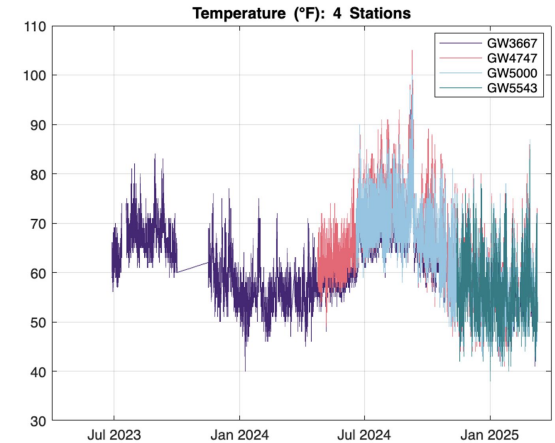
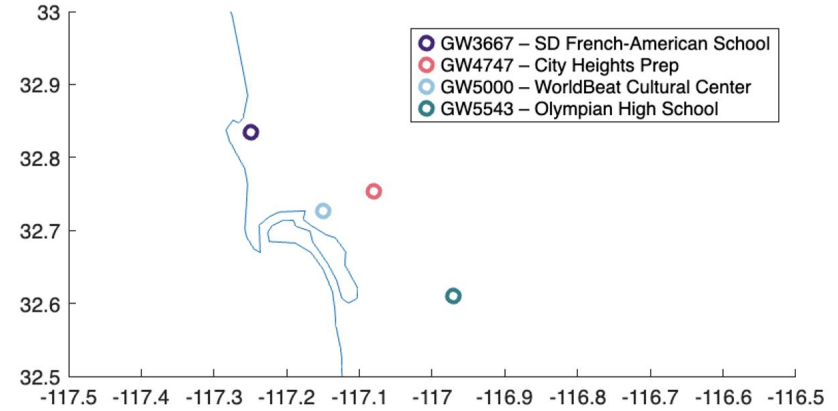


Theme 5: Education to Broaden Participation

Expand the Hub's impact through extensive education activities that will broaden participation of underrepresented students from K12 through college.

Develop curricula that use a local phenomenon (extreme heat in SoCal) to anchor the broader phenomenon of global change.

Community Weather Station Project

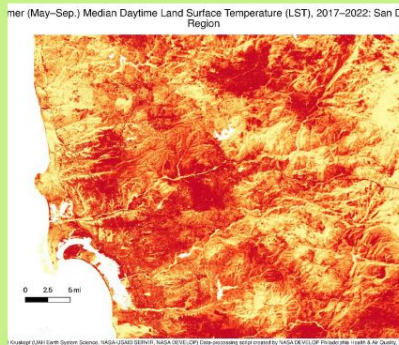




Cooler Communities Curriculum

GRADE 5 UNIT 2: COOLER COMMUNITIES

Cooler Communities was created with support from the [SoCal Heat Hub](#) at Scripps Institution of Oceanography, UC San Diego with funding from the National Science Foundation (NSF #2209058).



ESSENTIAL QUESTION: HOW CAN WE MAKE OUR COMMUNITIES COOLER?

ANCHOR PHENOMENON: THE LAND SURFACE TEMPERATURE DIFFERS ACROSS OUR CITY.

14 LESSONS | [SEE BELOW LESSONS FOR FULL PROJECT DESCRIPTION](#) ↕

[Before You Start](#)

[Calendar Overview](#)

[Phenomena Wall](#)

STAY UP TO DATE: SoCalHeatHub.ucsd.edu

CONTACT INFO: mlhale@ucsd.edu

Thank you!

