



Community Climate Chronicles

A catalyst for meaningful change and collective resilience

&

A research framework to explore local environmental change using GLOBE and remote sensing data

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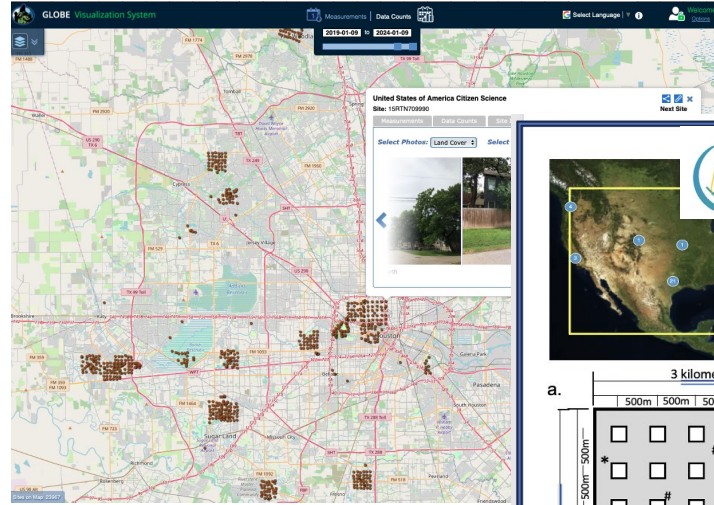
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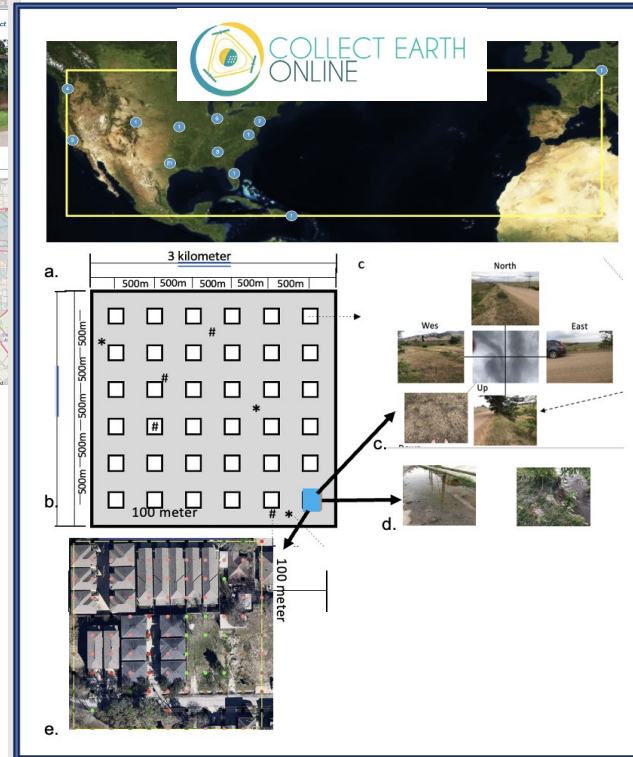
Connecting local to global data



A. Hyperlocal data collection using GLOBE Observer mobile app. Each intern creates a local 3 km area of interest for land cover observations.



B. Raw data goes in the open access GLOBE database



C. GLOBE API used to pull intern data into an ArcGIS dashboard (not shown), then brought into **Collect Earth Online**. Data is matched with satellite images. Interns can begin analyzing, labelling.



D. Actionable data for community use. A co-created, data-rich, community-developed climate story ensures diverse perspectives, local relevance, and collective action in addressing climate change.

Community Climate Chronicles:

What's our community history?

What changes have taken place in the environment over time?

Why are these important?

What data can help us to understand change and plan for the future?

What are local favorite outdoor leisure activities?

Are there any environmental issues that are impacting your community?

Have there been extreme Earth events that affect your region?

Interviews 5 people older than you: what changes they seen over time.



Health and Environmental Justice: mosquito danger days, air quality

Community Climate Chronicles is a structured place-based exploration of environmental conditions in a locality to identify environmental justice issues, health challenges, and current and future climate change concerns .

Data Sources:

- Citizen science data GLOBE Observer Land Cover data
- Satellite data: Landsat timeseries data, 1984-2024
- Extreme event data, Worldview
- NOAA climate data

Layers Events Data

REFERENCE

- Place Labels © OpenStreetMap contributors, Natural Earth
- Coastlines / Borders / Roads

Extreme Earth Events: What is happening right now in my region?

Search

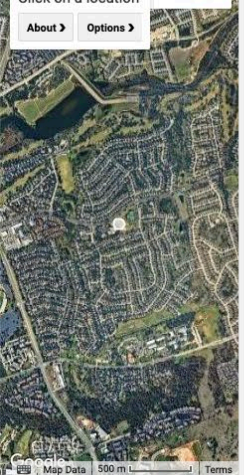
<p>Dams</p> <ul style="list-style-type: none"> Drought Hazard Human Built-up And Settlement Extent Land Surface Reflectance Land Surface Temperature 	<p>Aerosol Optical Depth</p> <ul style="list-style-type: none"> Aerosol Type Dust Corrected Reflectance Human Built-up And Settlement Extent 	<p>Aerosol Optical Depth</p> <ul style="list-style-type: none"> Aerosol Type Fires and Thermal Anomalies Carbon Monoxide Corrected Reflectance
<p>Floods</p> <ul style="list-style-type: none"> Flood Flood Hazard Corrected Reflectance Land Surface Reflectance Precipitation Estimate Precipitation Rate 	<p>Severe Storms</p> <ul style="list-style-type: none"> Corrected Reflectance Cloud Fraction Cloud Multi Layer Flag Cloud Phase Cloud Pressure Cloud Effective Radius 	<p>Shipping</p> <ul style="list-style-type: none"> Corrected Reflectance Brightness Temperature Land Surface Reflectance Radiance Sea Ice Sea Ice Brightness Temperature
<p>Smoke Plumes</p> <ul style="list-style-type: none"> Aerosol Index Aerosol Optical Depth Aerosol Type Carbon Monoxide Corrected Reflectance Fires and Thermal Anomalies 	<p>Vegetation</p> <ul style="list-style-type: none"> Aboveground Biomass Corrected Reflectance Canopy Characteristics Forests, Mangrove Freeze/Thaw Fraction of Photosynthetically Active Radiati... 	<p>Other</p> <ul style="list-style-type: none"> Areas of No Data (mask) Blue Marble Brightness Temperature Cirrus Reflectance Chlorophyll a Dams

Cedar Park, Texas
30.5049°, -97.8199°

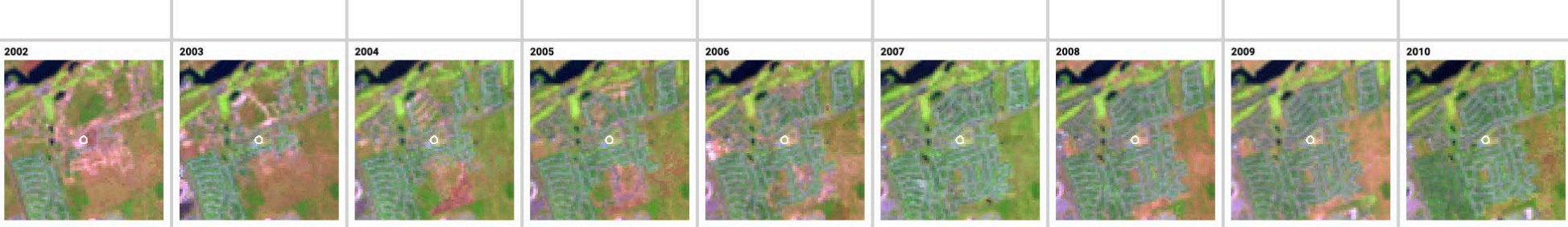
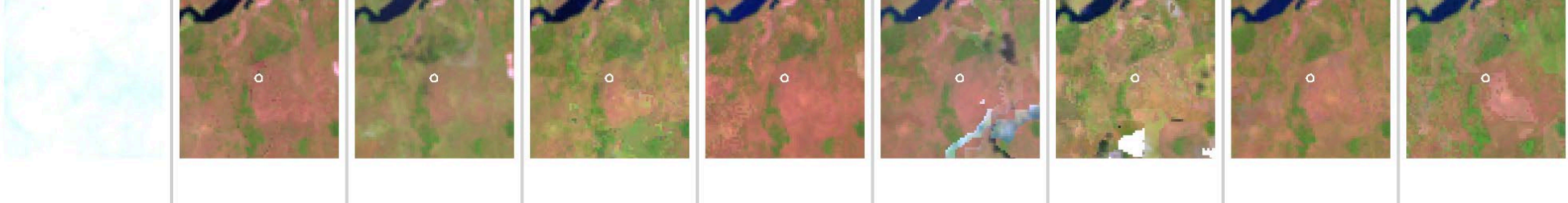
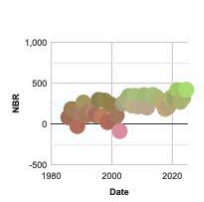


Click on a location

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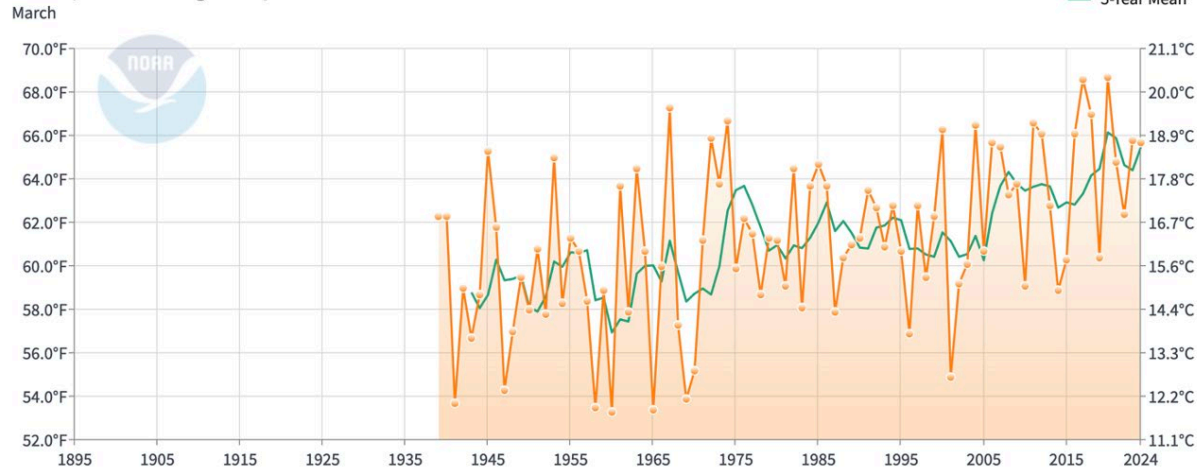


Map Data 500 m Terms

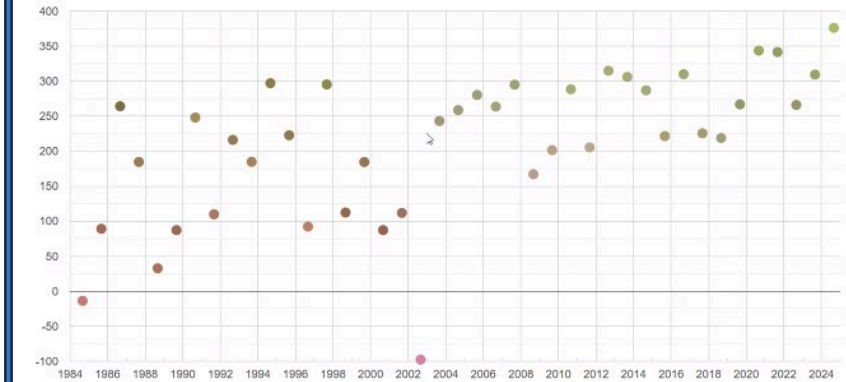
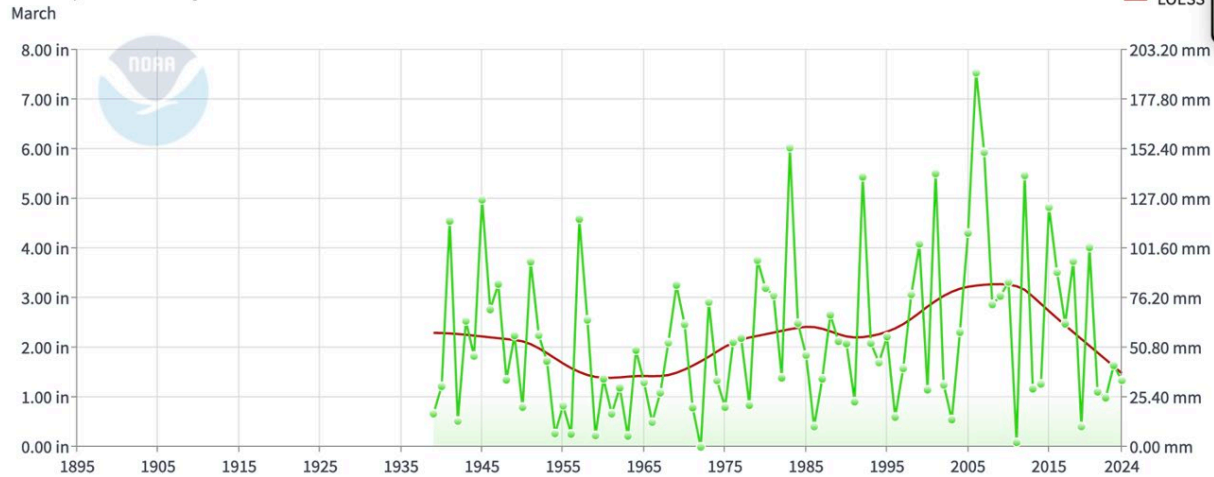


What has happened over time (time series data)?

Austin, Texas Average Temperature

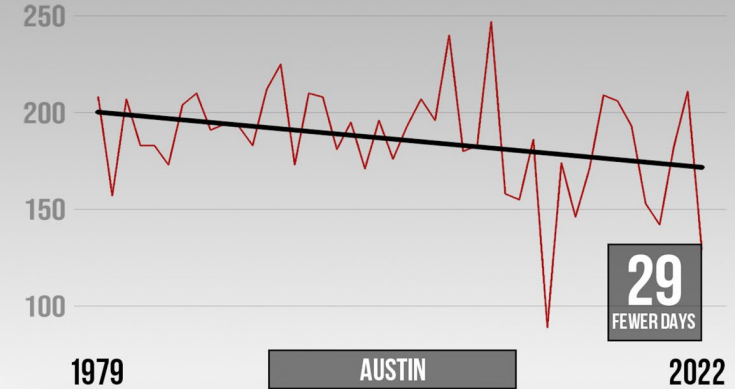


Austin, Texas Precipitation



MOSQUITO DAYS

Annual days suitable for mosquitoes



Mosquito days: 50-95°F, relative humidity >42%
Source: Yamana and Eltahir (2013); gridMET

CLIMATE CENTRAL

<https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/city/mapping>

<https://www.climatecentral.org/graphic/mosquito-days-2023?graphicSet=Local+Mosquito+Days&location=Cleveland&lang=en>

Co-created & Community-Developed Climate Stories.....

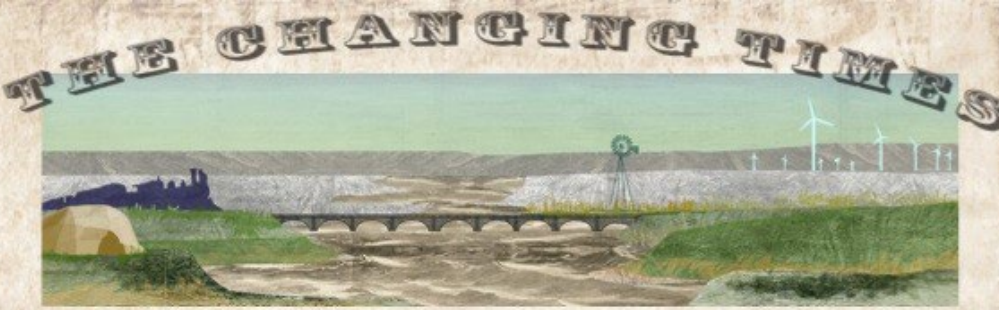
...foster inclusive, locally relevant, actionable climate solutions

...empower communities, enhance engagement, facilitate collaboration, and are a powerful tool in the global effort to combat climate change.

- Inclusivity and Diverse Perspectives
- Local culturally relevant knowledge
- Cultural relevance
- Community voice
- Equitable participation

Stories based in local contexts offer

- personalized motivation
- actionable insights
- Allows for contextualized solutions
- Promotes grass roots advocacy




NO. 1 - VOL. 0015 BOULDER, COLORADO — FOR COMMUNITY CLIMATE CHRONICLES, APRIL 8, 2015 SINCE FALL 2014

BOULDER COMMUNITY CLIMATE PROFILE: CLIMATE ENCOURAGES OUTDOOR ACTIVITIES


MAKING A LIVING	EXPLORING OUTDOORS	WELCOMING VISITORS
The Front Range's temperate climate and foothills beauty draws athletes and artists. There are several government research facilities, a research university, and computer tech firms, attracting engineers, scientists and academics.	Many residents explore via trails crisscrossing one of the nation's largest Open Space environments. Hunting and sport fishing are popular, as are endurance sports. Skiing is a major industry in the Front range area.	Visitors are drawn to the region's natural landscape, 4 seasons with mild winters, cool summers, ample snow in the mountains, and 360 days of sunshine.

COMMUNITY CLIMATE RESILIENCE: PAST AND PRESENT




Then and now, the semi-arid foothills region, now known as the Front Range, has supported active outdoor life. During the early 1800s, Arapahoe, Cheyenne and Kiowa nations moved into this fertile but fairly dry region. During the spring, their ponies fed off the tender willow shoots. Summers, tribes moved to the high plains to hunt bison. Our outdoor way of life is changing, altered by our warming world affected by grasslands transformed into urban communities thirsty for ever-more-precious water. Water irrigation records, compared to more recent measurements, could shed light on how Boulder's outdoor activities are able to thrive to this day.

EVIDENCE OF CHANGE: BOULDER'S CLIMATE RECORD VISUALIZED IN GRAPHS



On the left, see that temperatures have Gradually increased Since 1880. There has been no significant Decrease in precipitation to date. (source: NOAA).

CHANGING TIMES CHRONICLE EDITORIAL: BOULDER'S NEXT SUSTAINABILITY STEPS



Then and now, water sustains Boulder. Increased heat, drought, and insect outbreaks, all linked to climate change, have increased wildfires. Declining water supplies, reduced agricultural yields, health impacts in cities due to heat, and flooding and erosion in coastal areas are additional concerns. These findings reference the NCA's projected changes in this region: <http://nca2014.globalchange.gov/>

2012 Wildfire, Colorado(en.wikipedia.org)



GLOBE is fundamentally a geospatial research program

Examining your GLOBE Land Cover study site.....

- **at different spatial resolutions**
- **at different time scales**
- **Examining different satellite data sets**

...is a first step to identifying locally relevant GLOBE protocols for use in student research.

Are you interested in piloting
this data education activity
with your local GLOBE
students?

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SCAN ME

References

2022 Low, R. D., Nelson, P.V., Soeffing, C., Clark, A., and **SEES 2020 Mosquito Mappers Summer Research Interns**. Adopt a Pixel 3 km: A multiscale data set linking remotely sensed land cover imagery with field-based citizen science observations. In Open Citizen Science Data and Methods, ed. Bowser, A.K. Schaed, S. and de Serbinin, A., Frontiers Research Topics <https://www.frontiersin.org/research-topics/13843/open-citizen-science-data-and-methods>.

2024 Martins, F. P. Crossing GLOBE Observer's Volunteers Data and AI Remote Sensing Land Classification with an Interactive Web Module. Thesis, Universidade Federal de Minas Gerais, Escola de Engenharia, Engenharia Aeroespacial, Belo Horizonte. 51 p.

Student data activity created by GLOBE Partner IGES V-School