

NISE Network Online Workshop

Wildfires & Air Quality - Providing a Relevant Portal
to Get Audiences Invested in the Conversation

Tuesday, April 30, 2024



Today's Presenters:

Tim Hecox, World Forestry Center in Portland, OR

Kevin Czajkowski, GLOBE Mission EARTH, University of Toledo, Ohio; NASA Langley Research Center, Virginia

Christopher White, The Discovery in Reno, NV

Nicholas Wethington, spectrUM Discovery Area in Missoula, MT

Stacey Forsyth, CU Science Discovery in Boulder, CO

Welcome! As we wait to get started with today's discussion, please:

Introduce yourself! Type your name, institution, and location into the [Chat Box](#)

Questions? Feel free to type your questions into the [Chat Box](#) at any time throughout the webinar or use the raise your hand function in the participants list and we'll unmute your microphone.

Today's discussion will be recorded and shared on nisenet.org at: nisenet.org/events/online-workshop

Wildfires & Air Quality Resources

Hands-on Activities, Professional Development Resources,
Citizen Science Projects, and more: nisenet.org/air

Citizen Science, Civics, & Resilient Communities (CSCRC)

Extreme weather & resilience planning forums to engage
in active learning about heat waves, sea level rise,
extreme precipitation, and drought:

nisenet.org/CSCRC

Making Earth & Space Science More Relevant & Inclusive:

nisenet.org/making-relevant-inclusive

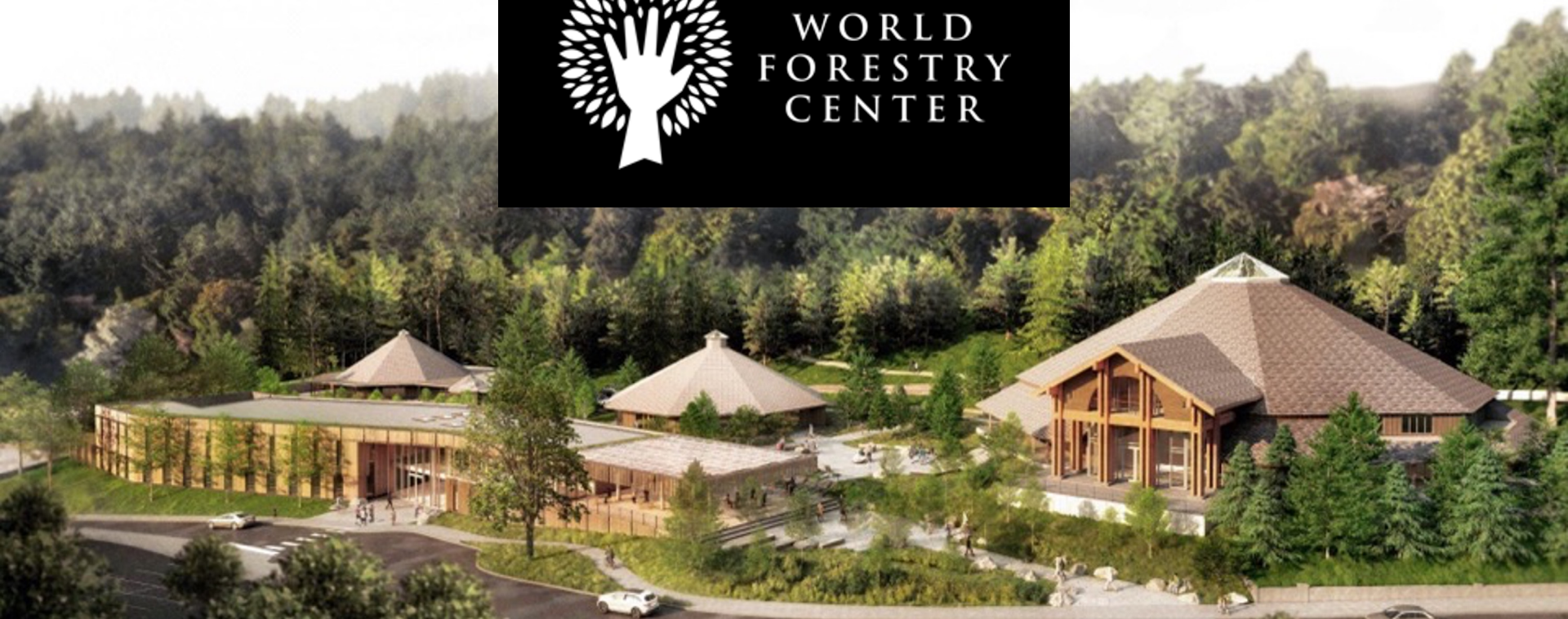
Air Quality Awareness Week 2024 is May 6-10:

epa.gov/air-quality/air-quality-awareness-week





WORLD
FORESTRY
CENTER



How we manage forests impacts everyone





**Social problems require
social solutions**



**How do we make forests
a social priority?**

Few → Many



The Wildfire Problem



10 UNESCO forests
net carbon emitters



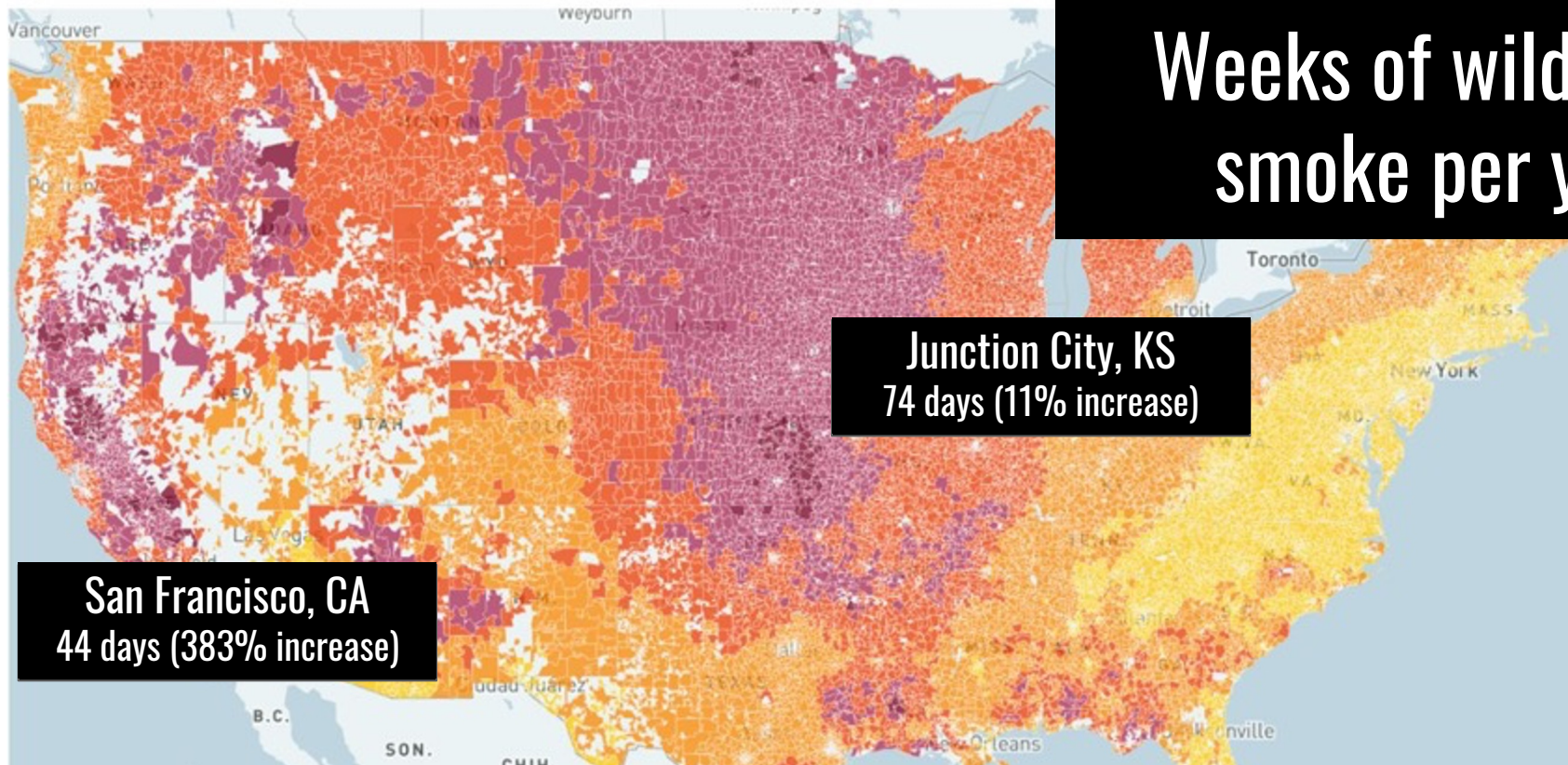
Insurance claims
up 1666%



2021 wildfires
= 350 million cars

**Impacting our most
vulnerable communities**





Weeks of wildfire smoke per year

Junction City, KS
74 days (11% increase)

San Francisco, CA
44 days (383% increase)

“Wildfire smoke in 2020 led to a surge in Covid-19 cases and deaths in California, Oregon and Washington.”

“Documented to cause both acute and chronic diseases and their exacerbations...”

“Respiratory conditions increased from up to 10 times...”

Wildfire as a symptom of climate change



Wildfire as a driver of climate change

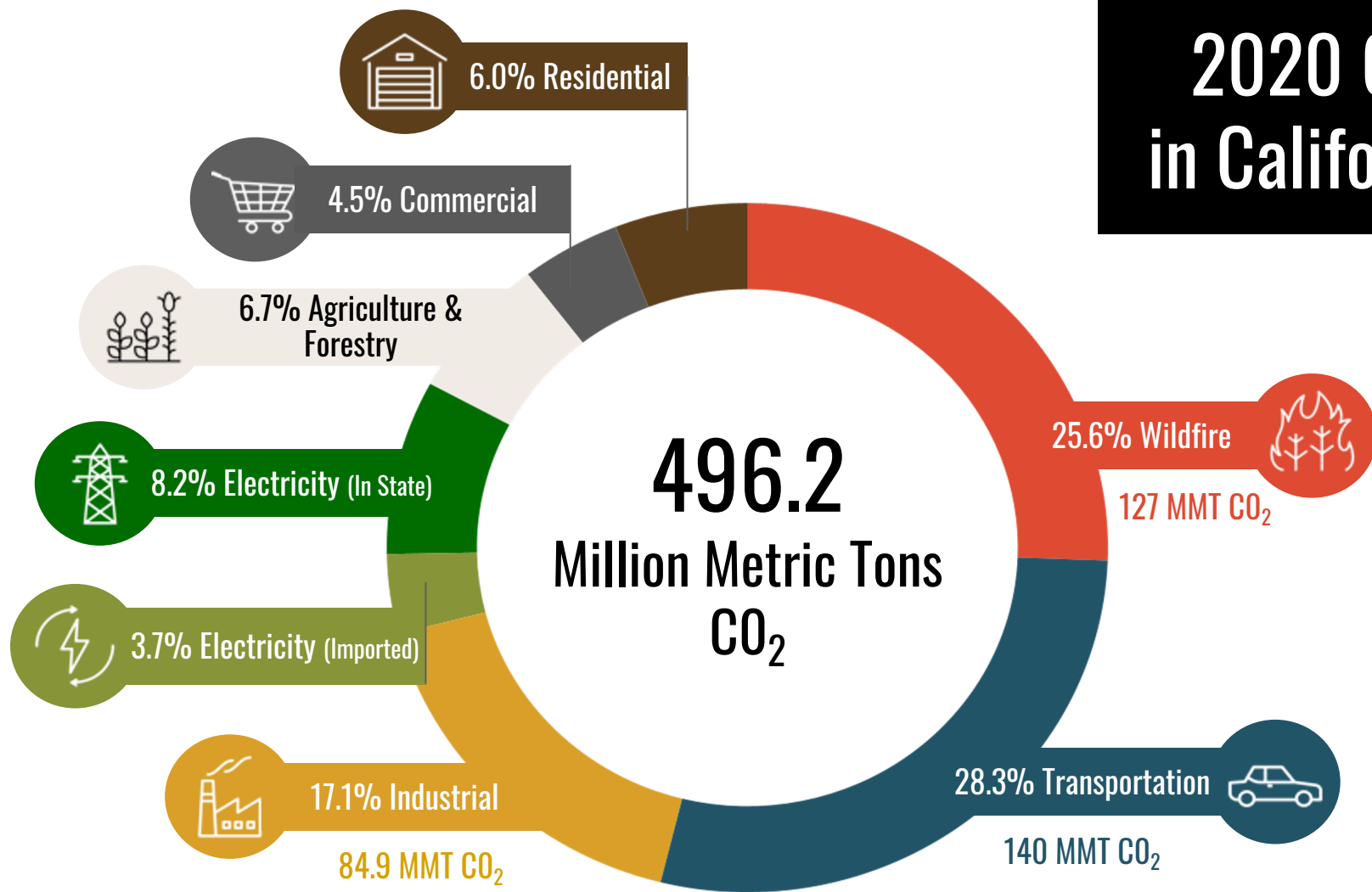


2020 CA wildfires erased 20 years of CO₂ reductions



127 Million Tons CO₂

2020 GHG in California



People are paying attention

REVEALED: America's West Coast, California and Florida could be 86% MORE at risk of wildfires in the next 30 years due to climate and population change

(Daily Mail)

Study reveals chemical link between wildfire smoke and ozone depletion

California's Wildfires Had an Invisible Impact: High Carbon Dioxide Emissions

(New York Times)

Wildfire smoke impacts Arctic ice thousands of miles away

New Research Shows Coastal Waters Affected By Wildfires

Study: People of Color and Low-Income Residents Most Vulnerable to Wildfire Impacts

California fires are so severe some forests might vanish forever

(LA Times)

Barcelona is calling in reinforcements to guard against extreme wildfires

Reviewing the horrid global 2020 wildfire season

Drier, warmer night air is making some Western wildfires more active at night

Wildfire Season Is Now All Year, Forcing Businesses to Think Ahead

(Wall Street Journal)

'Fire weather': dangerous days now far more common in US west, study finds

More Than 40 Million Acres of Land Have Burned in Siberia

Wildfire smoke may be contributing to premature births.

(The Guardian)

Wildfire Smoke Is Terrible for You. But What Does It Do to Cows?

(WIRED)

1 in 6 Americans live in areas with significant wildfire risk

(Washington Post)

How Wildfires Impact Our Health, As Well As The Environment

(Forbes)

Wildfire Smoke Is Poisoning California's Kids. Some Pay a Higher Price.

(New York Times)

Mechanical thinning



+



Prescribed burning

We know how
to fix this

= Resilient forests





Co-benefits of managing forests



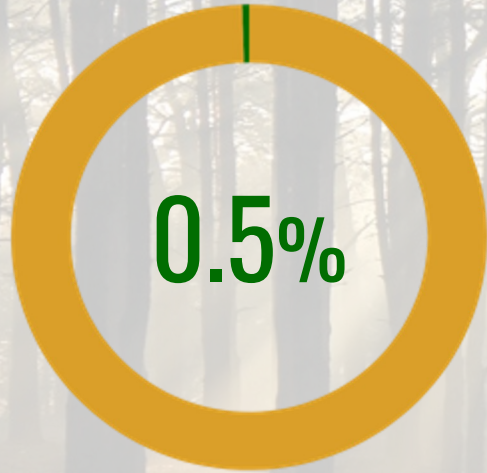
**Why aren't we changing
conditions on the ground?**



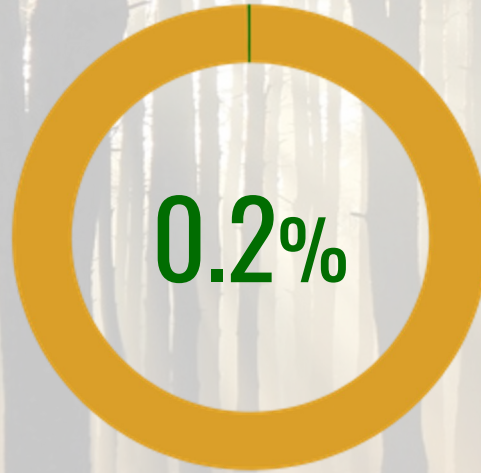
How important are forests to us?

Oregon: 50% forested
Washington: 52%
forested

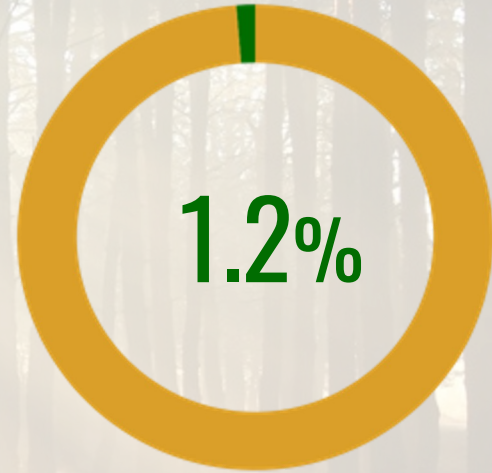
California: 33% forested



of Oregon Budget



of Washington Budget



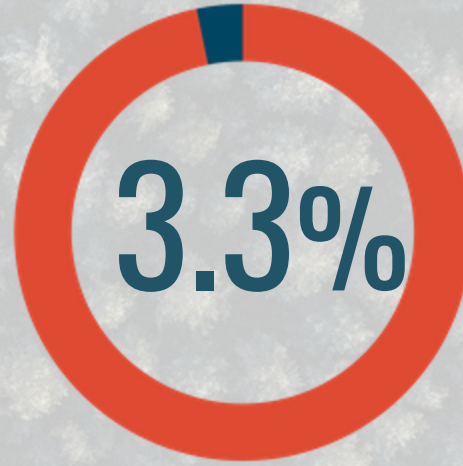
of California Budget

How important are forests to us?

*Giving to all Environmental and Animal Orgs.



of US Budget



of Charitable Giving*

A young man with dark skin, wearing a blue t-shirt, is shown from the chest up, reaching his right arm upwards towards a dense wall of green ivy. He is looking up at the ivy with a focused expression. The background is a lush, green wall of ivy with some small white flowers. The overall tone is hopeful and aspirational.

Driving Social Change

Awareness > Will > Action



**Empowering
new voices**

10-Sector Fellowship

Energy



Policy/Markets



Public Health



Insurance



Philanthropy



Economic Development



Tribal Communities



Climate Justice

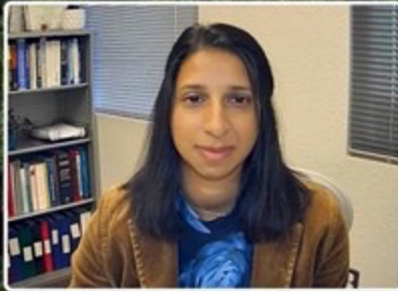


Journalism



Real Estate

Public Health Impacts of Wildfire Smoke Virtual Program



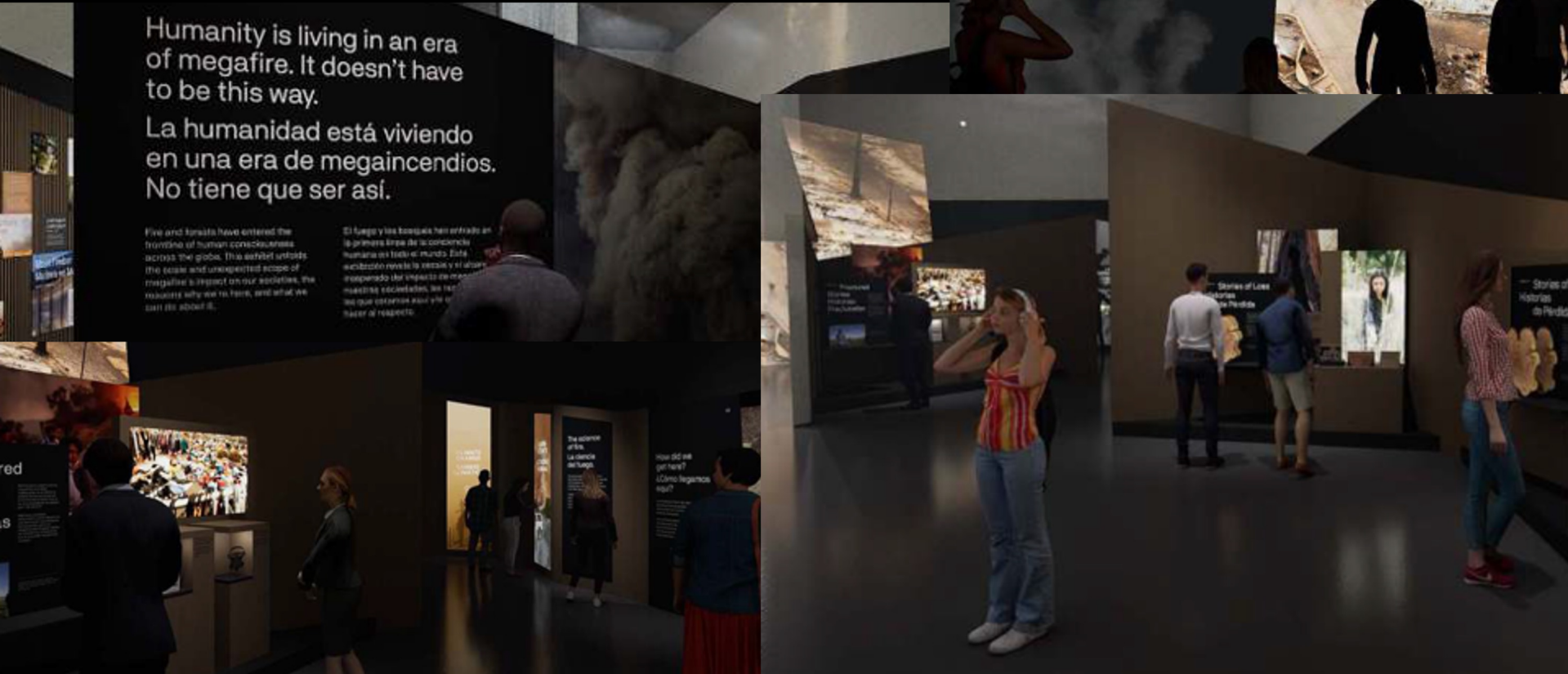
Leveraging Art as an Entry Point into the Wildfire Conversation



Rethinking Fire by Bryan David Griffith

Wildfire Exhibition

In Development



Building a modern day forest culture

WFC Campus Plan



Washington Park, Portland, OR

Why am I having difficulty breathing?

Kevin Czajkowski and Margaret Pippin

w/ Janet Struble, Jessica Taylor, Sara Mierzwiak

GLOBE Mission EARTH

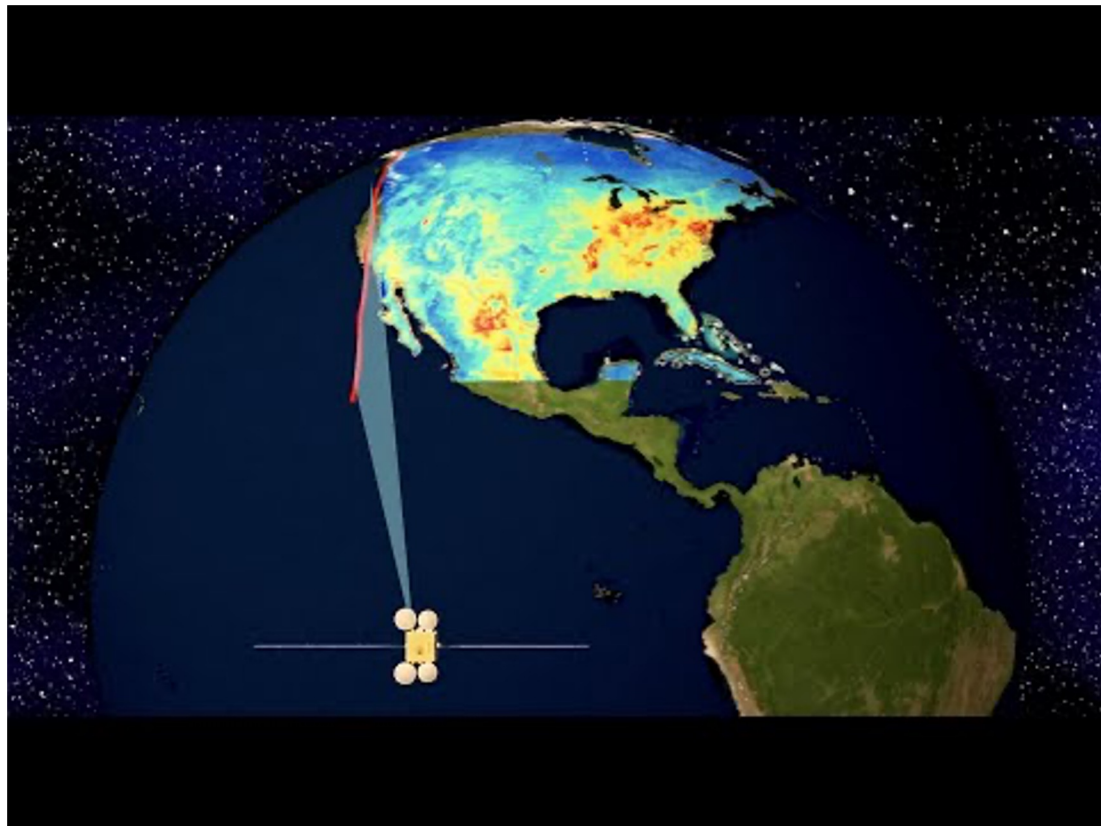
University of Toledo, Ohio

NASA Langley Research Center, Virginia

Visit us at: www.globe.gov/web/mission-earth

TEMPO

Launched April 7, 2023 Hourly air quality data for North America



Linking satellite air quality to small sensor, ground observations

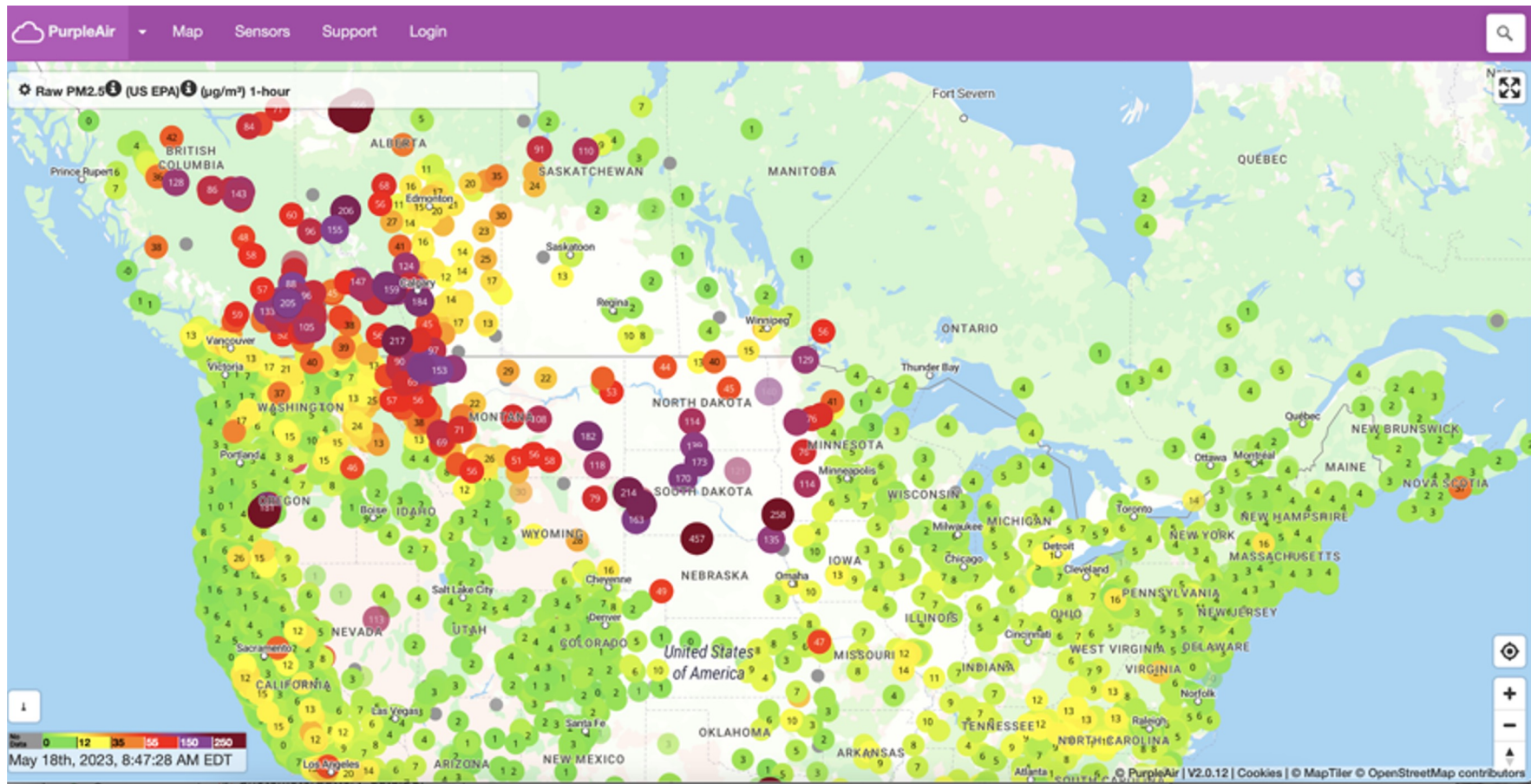


Dr. Margaret Pippin: NASA Langley Research Center, Virginia

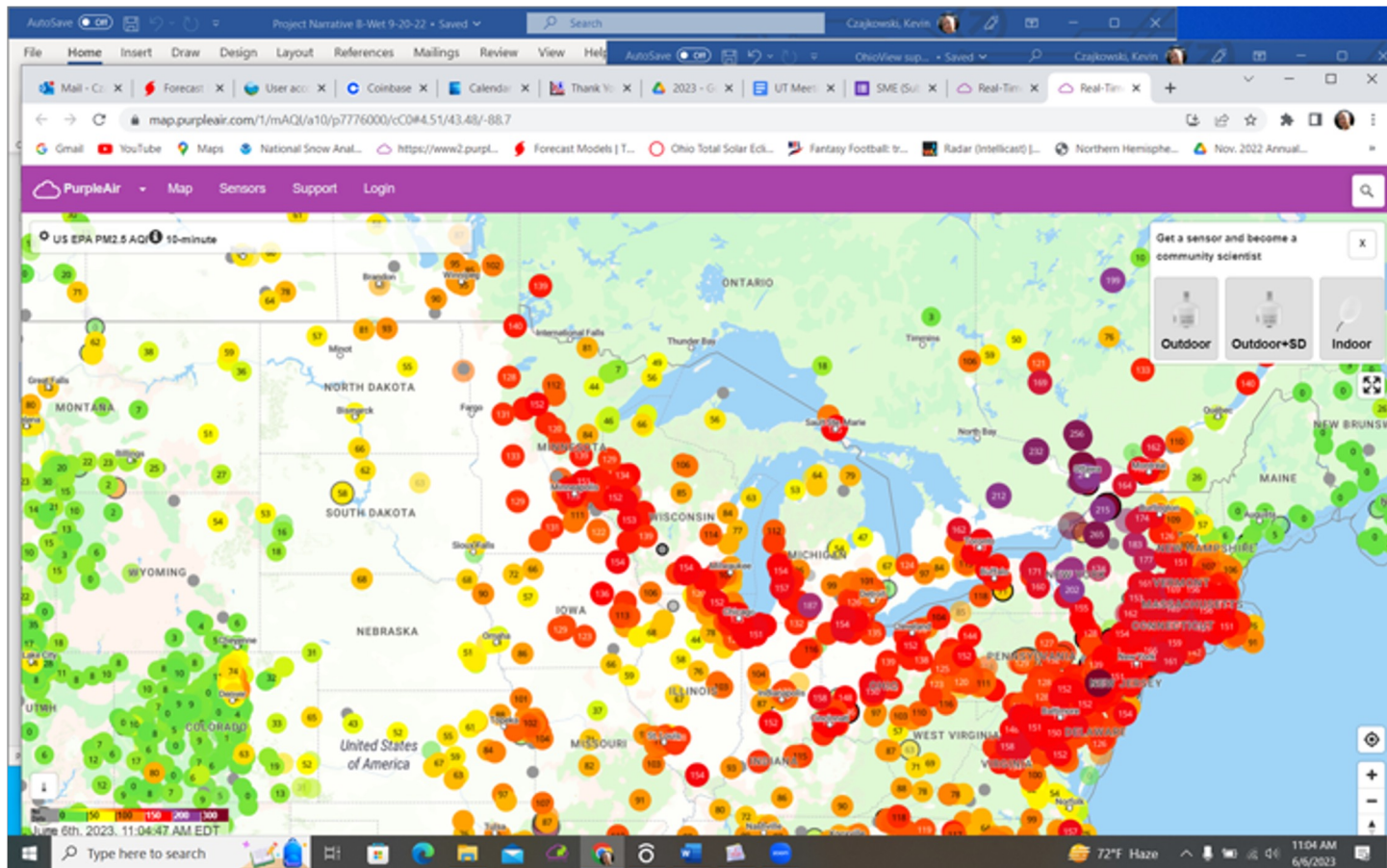
Topics of interest: ozone, water vapor, NO_2 , $\text{PM}_{2.5}$, meteorology, air quality (EPA/DEQ), CAPABLE, GLOBE instruments, hand-held air quality instruments, MyNASADData, Purple Air, TEMPO

Website: <http://tempo.si.edu/index.html>

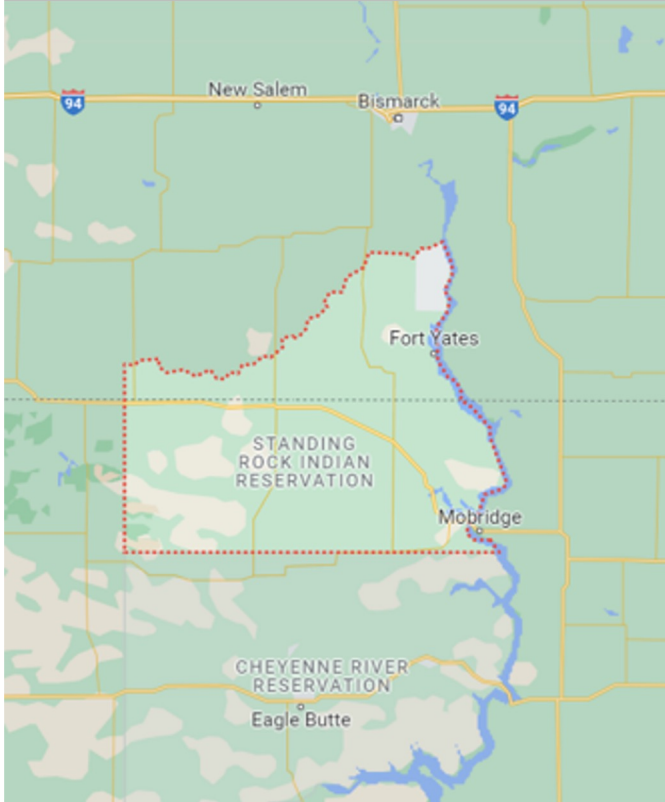
Purple Air Map: Summer 2023: Smoke from Fires in Alberta



Summer 2023: Smoke from Fires in Quebec and Ontario



Fire in the Sky



Samantha Borah

NASA intern &
Graduate Student at
Sitting Bull College
Teacher - Mobridge-
Pollock School District

*"I live in a rural area,
bordering the Standing
Rock Sioux Reservation,
home to the Dakota and
Lakota nations.*

*The closest EPA monitor is
over 100 miles away in any
direction, meaning we do
not have air quality data
being collected and
reported for our area."*

Photographs of the smoke plume as it moved into Sitting Bull College *on May 17, 2023*. Before and After (couple of hours difference)



This experience generated significant discussions between the students and their families.

Reports of smoke from Canadian fires

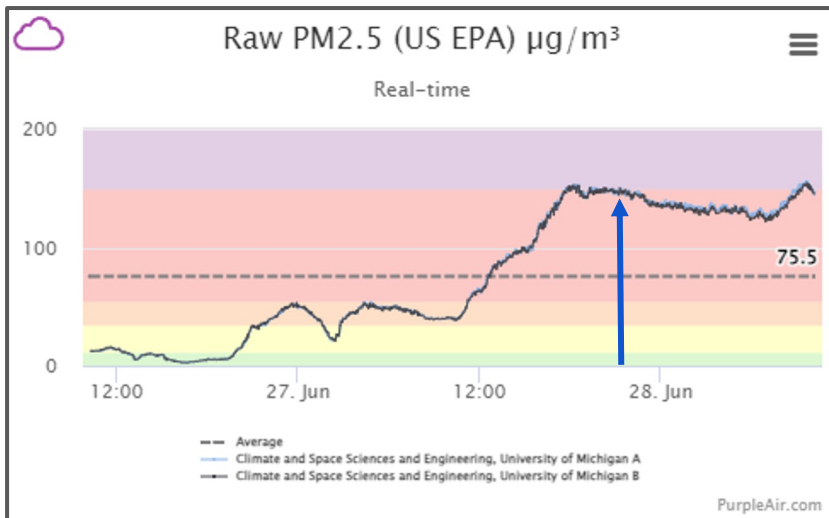




Ann Arbor, MI - June 27th, 2023, ~ 8:30 pm EDT Impact of Canadian Wildfires



June 27th, 2023, @ 8:30 pm EDT
[PM2.5] ~ 150 ug/m³



Introduction to GLOBE Clouds, Sky Color & Visibility via GLOBE SKY WINDOWS & the [GLOBE Observer App](#)

Download the app!

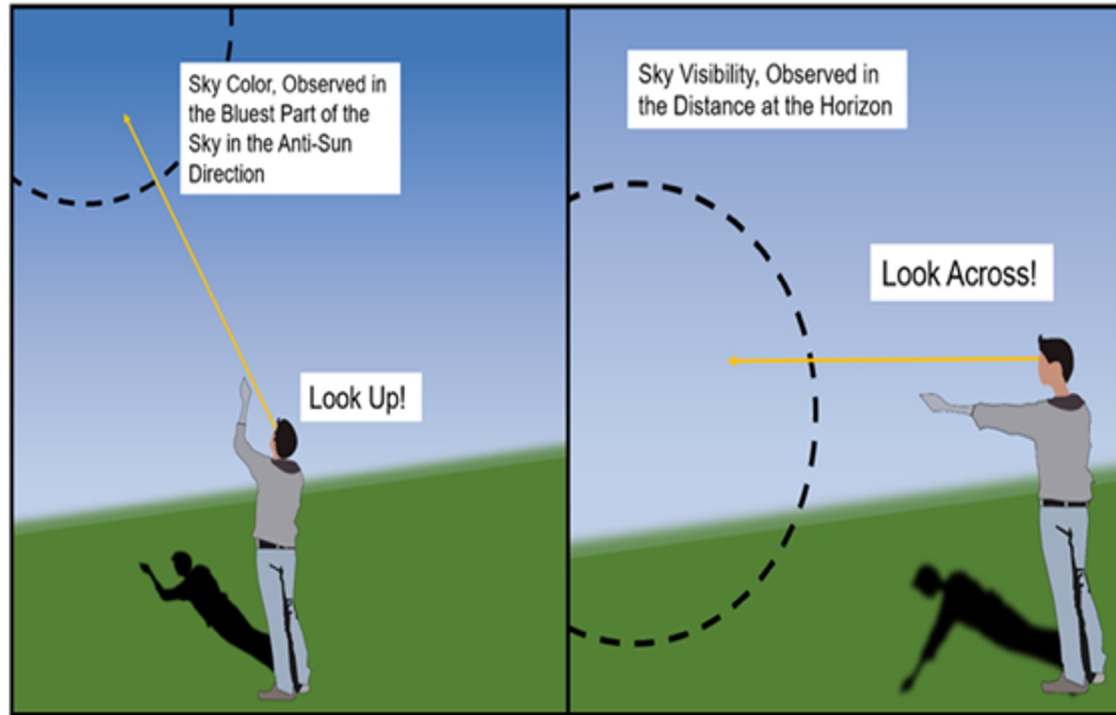
**Search your app store
for “GLOBE
Observer”**








GLOBE Observer Website: www.observer.globe.gov

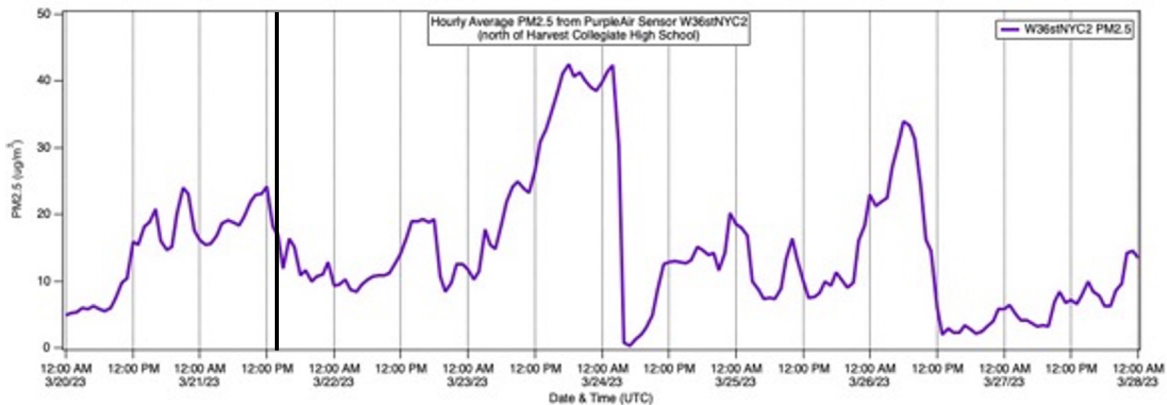
Sky Color and Visibility Parameters related to Air Quality

Deep Blue	<input type="radio"/>
Blue	<input type="radio"/>
Light Blue	<input type="radio"/>
Pale Blue	<input type="radio"/>
Milky	<input checked="" type="radio"/>
 Cannot Observe	<input type="radio"/>



 Unusually Clear	<input type="radio"/>
 Clear	<input type="radio"/>
 Somewhat Hazy	<input type="radio"/>
 Very Hazy	<input type="radio"/>
 Extremely Hazy	<input type="radio"/>

March 21, 2023
10:00 - 10:15 EDT (14:00 - 14:15 UTC)
Local PM2.5 ~17 $\mu\text{g}/\text{m}^3$
AQI: Moderate (Yellow)
OSK: Observed Sky Color



“Normal”
Camera
Settings

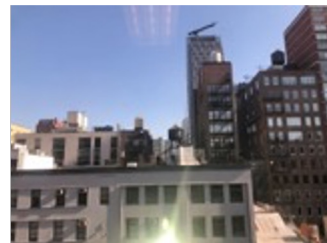
LG 420
OSK: Light Blue



iPhone 13
OSK: Blue



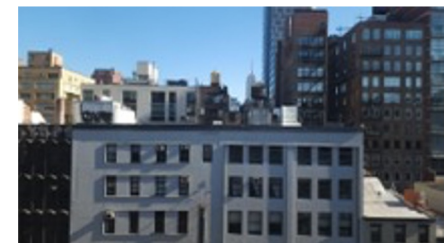
iPhone 8 Plus
OSK: Blue



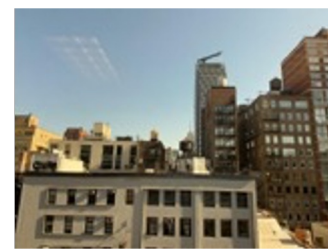
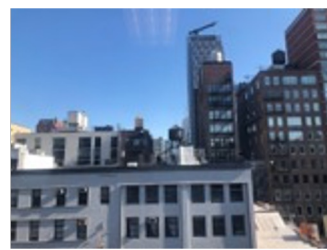
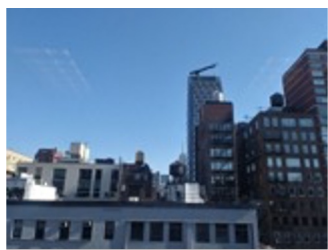
iPhone 14 Pro Max
OSK: Pale Blue



Samsung S22
OSK: Blue



“Unfiltered”
Camera
Settings



IV. Fun Activity! Aerosols “Sticky Grid” (Up in the Air Activity)

Elementary GLOBE What's Up in the Atmosphere? Exploring Colors in the Sky

Up in the Air Aerosol Sampler Grid

Date: _____ Name: _____

Time of collection: ____:____ AM or PM (circle one)

Aerosol Sampler Grid:

6						
5						
4						
3						
2						
1						
	1	2	3	4	5	6

Elementary GLOBE What's Up in the Atmosphere? Exploring Colors in the Sky

Up in the Air Student Activity Sheet

Name: _____ Time: ____:____ AM or PM (circle one)

Date: _____

Are there clouds?
☐ no clouds
☐ some clouds
☐ lots of clouds
☐ fog

Is there precipitation?
☐ none
☐ rain
☐ sleet
☐ snow

Is there wind?
☐ gentle wind
☐ strong wind
☐ no wind

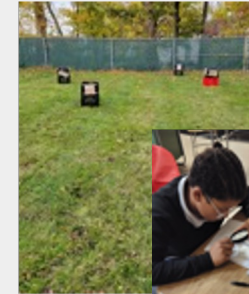
Visibility:
☐ very clear
☐ clear
☐ somewhat hazy
☐ very hazy
☐ extremely hazy

Temperature:
☐ cold
☐ chilly
☐ comfortable
☐ warm
☐ hot

Weather data was collected:
☐ when the sampler was put outside
☐ when the sampler was collected

Aerosol Sample Analysis (8-10 Random Squares):

	# Aerosols
Sample Square 1	
Sample Square 2	
Sample Square 3	
Sample Square 4	
Sample Square 5	
Sample Square 6	
Sample Square 7	
Sample Square 8	
Sample Square 9	
Sample Square 10	
Total (add Squares 1-10)	
Average (divide total by 10)	



Record results for colored dots from sticky grids

	N	S	E	W
Sample 1	4.6	9.6	2.0	9.4
Sample 2	1.8	6.5	2.4	1.9
Sample 3	3.5	9.1	5.1	2.6
Sample 4	1.5	2.5	1.7	1.3

Images Credit: GME Teacher
Janene Smith

Student Research

1. Have your students conduct research projects using GLOBE data.
2. Multiple opportunities for students to present their research! In-person and virtually!

Local



Regional



University of Toledo
2801 W. Bancroft, Toledo, OH 43606
Lancelot Thompson Student Union
Ingman Room and Room 2582



Student Union



International



Virtual

GLOBE INTERNATIONAL VIRTUAL SCIENCE SYMPOSIUM

Kevin Czajkowski	Kevin.czajkowski@utoledo.edu
Janet Struble	Janet.struble2@utoledo.edu
Margaret Pippin	m.pippin@nasa.gov

Website: <https://www.globe.gov/web/mission-earth/overview/air-quality-initiative>

Email: <http://globe.mission.earth@gmail.com>

Twitter: [@globemissionear](https://twitter.com/globemissionear)



Facebook: <https://www.facebook.com/globemissionearth/>

YouTube channel: <http://tinyurl.com/globemissionearth>

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Wildfire Education at The Discovery

Chris White
Education Manager
The Discovery
Reno, NV



Who is The Discovery

- We are the leading place in our region as the home for informal science, technology, engineering, art and math (STEAM) learning.
- We have inspired over 160, 000 visitors
- We had over 7000 students come through our doors for field trips for the 2021-2022 school year & 9,500+ for this current school year
- We have provided over \$56,000 in donor-provided financial assistance to families in 2022 so they can experience The Discovery.

Why Wildfires

- Wildfires are extremely important
- Wildfires are natural
- Wildfires are getting out of control.



How do we engage our community?

- We look for the share holders and asked plenty of questions.
- Network within the wildfire community zoomed (COVID times) shareholders.
- Looked for relevant and actionable information.





How are we engaging our visitors?

- Develop interactives where we stress the importance of the community when it comes to fire fighting
- Walk visitors through the importance of wildfires in the context of our region.
- Create opportunities of engagement where we can educate and contextualize.

How are working with our students?

Again, we work with the experts!

Use inquiry-based learning to encourage collaborative learning.

Foster an experience that is:

- Iterative
- Collaborative
- Relevant,

Build in Constraints and keep the growth mindset in mind.



Thank you!





ResilienceMT: A Climate Resilience Exhibition for Montana Communities

Nick Wethington
Associate Director
spectrUM Discovery Area

Our exhibition focused on the Big Idea:

Montana communities share stories of resilience and continue to build their toolboxes as they adapt to a changing climate.

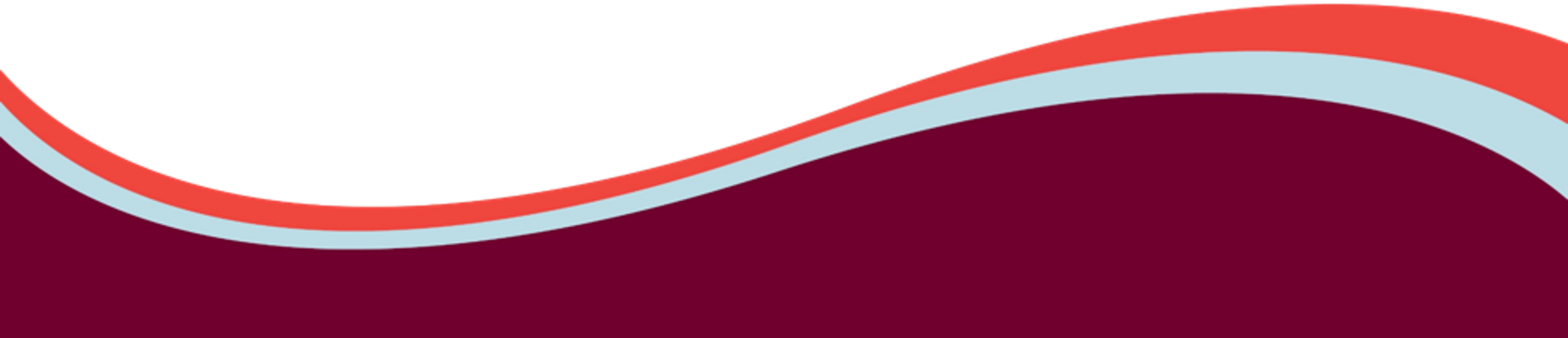
Exhibit Elements highlighted community resilience around the following themes:

- Wildfire and Smoke
- Drought
- Flooding
- Extreme Heat



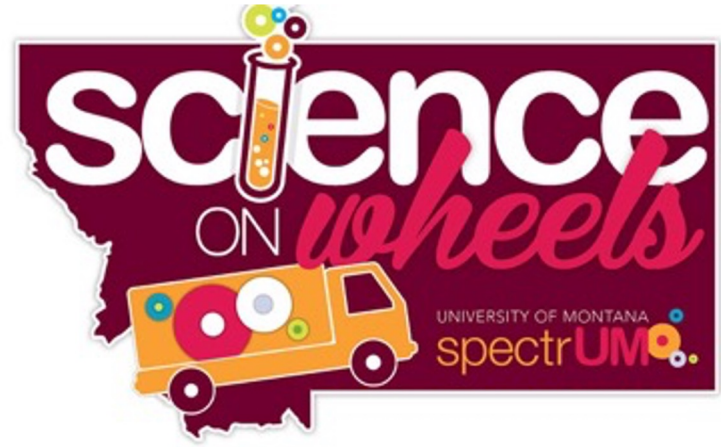
spectrUM works with rural and tribal community partners from across the state to develop programs and exhibitions for our museum and partner communities.

Partners for ResilienceMT include teachers, school administrators, and climate change coordinators from the Blackfeet and Aaniiih Nakoda tribes.



The ResilienceMT Exhibition is a mobile experience designed for our museum as well as our Science on Wheels program.

We've hosted in our museum, held a community storytelling event around climate resilience, and visited the MT communities of Hamilton, Corvallis and Fort Belknap Agency. Community climate resilience forums are an additional component of this project.



Stories of Community Resilience

The Amskapi Piikani Put Their Climate Adaptation Plan Into Action On The Land

As part of the longstanding tradition of caring for the lands where the Amskapi Piikani (Blackfeet) have resided for thousands of years, they created their Climate Adaptation Plan in 2018. They implemented the water sector of the plan, merging Western science with Piikani Knowledge, or the Indigenous way of knowing.

Prominent in the plan are efforts to restore beavers to the land and create beaver dam analogs (BDAs) to increase natural water storage and repair streamside habitat.

One current example is a partnership between the Blackfeet Environmental Office and the Piikani Lodge Health Institute agricultural producers to use climate-smart practices to enhance traditional Piikani territory.

Beaver dams:

- Slow the flow of streams and recharge groundwater
- Reduce flooding and wildfire risk
- Create deep ponds that provide habitat for fish and other aquatic life
- Enhance floodplains to improve water quality and animal habitat



Learn More!

Check out the Resilience Links at tinyurl.com/ResilienceMT or use the QR Code below to explore further.



Nature's Superpowers



FIND INSPIRATION IN NATURE!

From lodgepole pines that thrive in fire to tardigrades that survive temperatures ranging from absolute zero to 300°F—we can find inspiration in the remarkable superpowers of the natural world.

What creative ideas, inventions, or superpowers can you suggest for helping Montana communities become more resilient to the changing climate?



Get Wildfire Ready!



VEGETATION MANAGEMENT

1. HOME IGNITION ZONES

To increase your home's chance of surviving a wildfire, choose fire-resistant building materials and limit the amount of flammable vegetation in the three home ignition zones. The zones include the **Immediate Zone** (0 to 5 feet around the house), the **Intermediate Zone** (5 to 30 feet), and the **Extended Zone** (30 to 100 feet).

2. LANDSCAPING AND MAINTENANCE

To reduce ember ignition and fire spread, trim branches that overhang the house, porch, and deck and prune branches of large trees up to 6 to 10 feet depending on their height from the ground. Remove plants containing resin, oils, and waxes. Use crushed stone or gravel instead of flammable mulches in the **Immediate Zone** (0 to 5 feet around the house). Keep your landscape in good condition.

FIRE RESISTIVE CONSTRUCTION

3. ROOFING AND VENTS

Choose a fire-rated roofing product(s), such as composite shingles, metal, concrete, and clay tiles, offer the best protection. Inspect shingles or roof tiles and replace or repair those that are loose or missing to prevent ember penetration. Also in eaves, but provide ventilation to prevent condensation and rot. Roof and attic vents should be screened to prevent ember entry.

4. DECKS AND PORCHES

Never store flammable materials underneath decks or porches. Remove dead vegetation and debris from under decks and porches and between deck board joints.

5. SIDING AND WINDOWS

Embers can collect in small nooks and crannies and ignite combustible materials radiate heat from flames can crack windows. Use fire-resistant siding such as brick, fiber-cement, stucco, or stone, and use burglar-proof tempered glass windows.



TALK TO YOUR LOCAL FORESTRY AGENCY OR FIRE DEPARTMENT TO LEARN ABOUT THE SPECIFIC WILDFIRE RISK WHERE YOU LIVE.

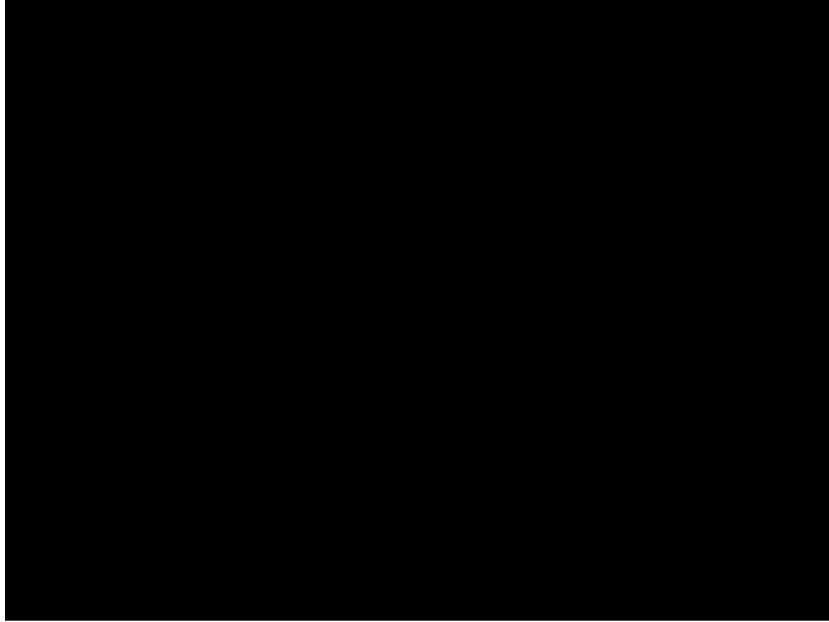


VISIT [FIREWISE.ORG](https://www.firewise.org) FOR MORE DETAILS

Order a Reducing Wildfire Risks in the Home Ignition Zone checklist/poster at [Firewise.org](https://www.firewise.org)



Breathe It In!



Climate Smart Missoula



How to build a Do-It-Yourself Fan/Filter Air Cleaner

using a 20-inch Box Fan and a high efficiency air filter

Build one for ~\$40 and to clean the air in a small to medium sized closed room.



A simple system for local air

Do use a repair fan with a fused plug - safety label on the cord



MATERIALS:

- 1 - 20" Box Fan
- 1 - 20" x 20" MERV 11 or MERV 13 pleated air filter
- Tape or bungee cords to hold the filter in place

ASSEMBLY:

1. Follow the manufacturer's instructions to assemble the Box Fan.
2. Place the filter on the back of the fan with the airflow arrow pointing towards the fan. **When the fan is turned on it should pull air through the filter.**
3. Secure the filter with tape or a bungee (no masking or duct tape while the date when the filter is first used on the filter air tape).



WARNING: Box fans - if an older model or used incorrectly - can ignite and start a house fire. The most common cause of fires is the motor backing up under load and overheating. You can prevent this if you:

- Use a repair fan equipped with a fused plug
- Keep the fan and motor clean (oil and dirt can cause overheating and catch on fire)
- Keep children and loose clothing away from the fan. If the fan does not start quickly and run smoothly do not use it.

Now you know the risk! We tested several brands of new box fans with filters attached, as described here, and found them to operate at or below their maximum design operating temperature when they are clogged and still maintained.

NISE-Net Inspired Air Quality Exhibit

IF YOU COULD "HEAR"
AIR QUALITY, WHAT
WOULD IT SOUND LIKE?

TOUCH THE BUTTONS ON
THE MAP TO "HEAR" THE
AIR QUALITY OF DIFFERENT
PLACES DURING THE
SUMMER OF 2017.

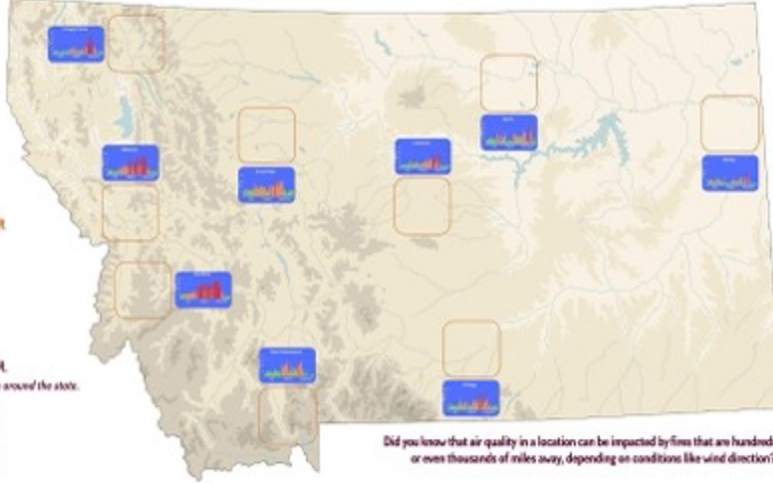


2017 WAS A PARTICULARLY
ACTIVE FIRE SEASON FOR MONTANA.

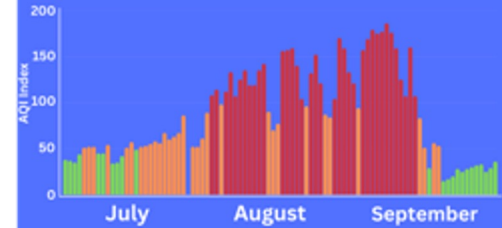
Listen to how air quality differed for regions around the state.



AIR QUALITY SONIFICATION



Hamilton



SMART FIRES & Weather Station



SMART FIRES

SENSORS,
MACHINE LEARNING &
ARTIFICIAL INTELLIGENCE
IN REAL TIME FOR
FIRE SCIENCE

Wildfire plays a vital role in Montana's diverse ecosystems but also poses a growing threat to Montanans' health, safety, and livelihoods. The National Science Foundation's EPSCoR program is supporting a research and education project to understand and improve the use of prescribed fire to manage wildfires and its impacts in our state.

Researchers from Montana universities and colleges are working with state agencies, private companies, and non-profit organizations to develop technologies, partnerships, and educational opportunities that strengthen our ability to prevent, respond to, and live with wildfire.

 MONTANA NSF EPSCoR
SMART FIRES



The SMART FIRES project is developing and deploying new technologies and research designed to better understand the behavior of prescribed fire and its impacts on Montanans, particularly in rural and tribal communities. The project team is:

- Conducting prescribed fire sciences research to better understand fire smoke and to better predict wildfire emissions and air quality impacts.
- Developing artificial intelligence and machine learning methods to support fire decision-making, mitigate risk, and improve communication with fire managers and community stakeholders.
- Advancing "smart" fire and imaging sensor technologies to understand prescribed fire fuels and smoke.
- Strengthening Montanans' responses to wildfire and prescribed fire to help inform fire management decisions.
- Promoting STEM education and workforce development for Montanans of all ages, including in rural and tribal communities.

Photo courtesy of University of Montana, Lisa Olson, Rob Wilbur, mounted on University of Montana

For More Information:
www.mtnsfepscor.org
info@mtsfepscor.org

Project dates: August 1, 2023 to July 31, 2028
 This award is based on work supported by the National Science Foundation under Grant DUE-2242762. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

 MONTANA NSF EPSCoR
SMART FIRES






NISENet Webinar
Wildfires &
Air Quality

April 30, 2024

Cal-Wood Fire (Oct 2020)



Constructive Hope

(Based on work of Maria Ojala, Martha Monroe, Louise Chawla & others)

Focus on fostering:

- Individual Agency
- Collective Action
- Social Trust

Provide opportunities for:

- Environmental Action
- Reflection
- Sharing with Families & Communities

Field Course for Teens



Integrating Art, Poetry & Creative Writing



“Reflections on the Future”

Amy Hoagland, Artist



“The stainless steel etched plates will serve as a memorial to what the forest once was, but also to express positive hope for the future.”

Community members were invited back... As this event coincided with the 1 year anniversary of the fire, it provided an opportunity for mourning, celebration, and a collective recognition of the impacts of climate change on the local landscape for an audience disproportionately impacted by climate change.”

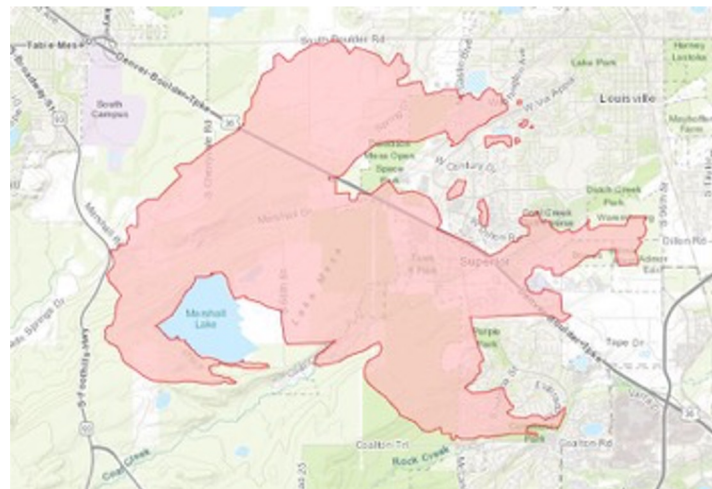
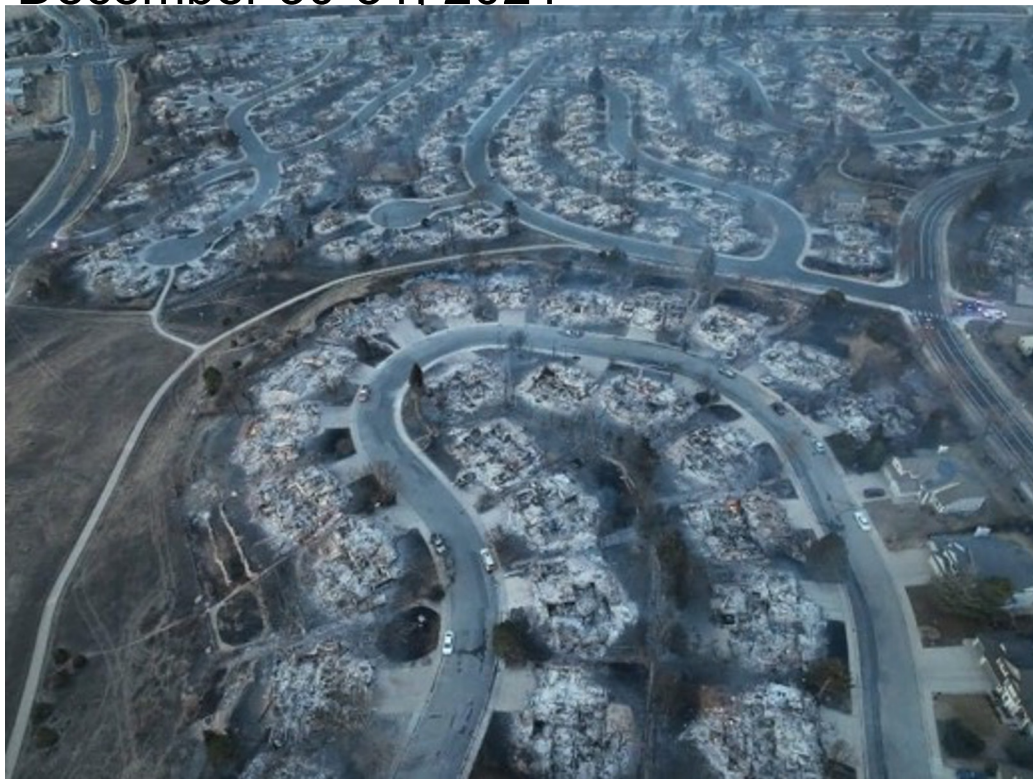
Engaging Families





Marshall Fire

December 30-31, 2021



Focus on Restoration and Resilience



Empowering Youth Voice

In partnership with
Growing Up Boulder





Nature Stage



Conquer the Crown

“Tempestry” Project





Science Discovery
UNIVERSITY OF COLORADO **BOULDER**



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Thank You!



(Applause)

Resources & Opportunities



Learn more and access the
NISE Network's online
digital resources:
nisenet.org/browse-topic

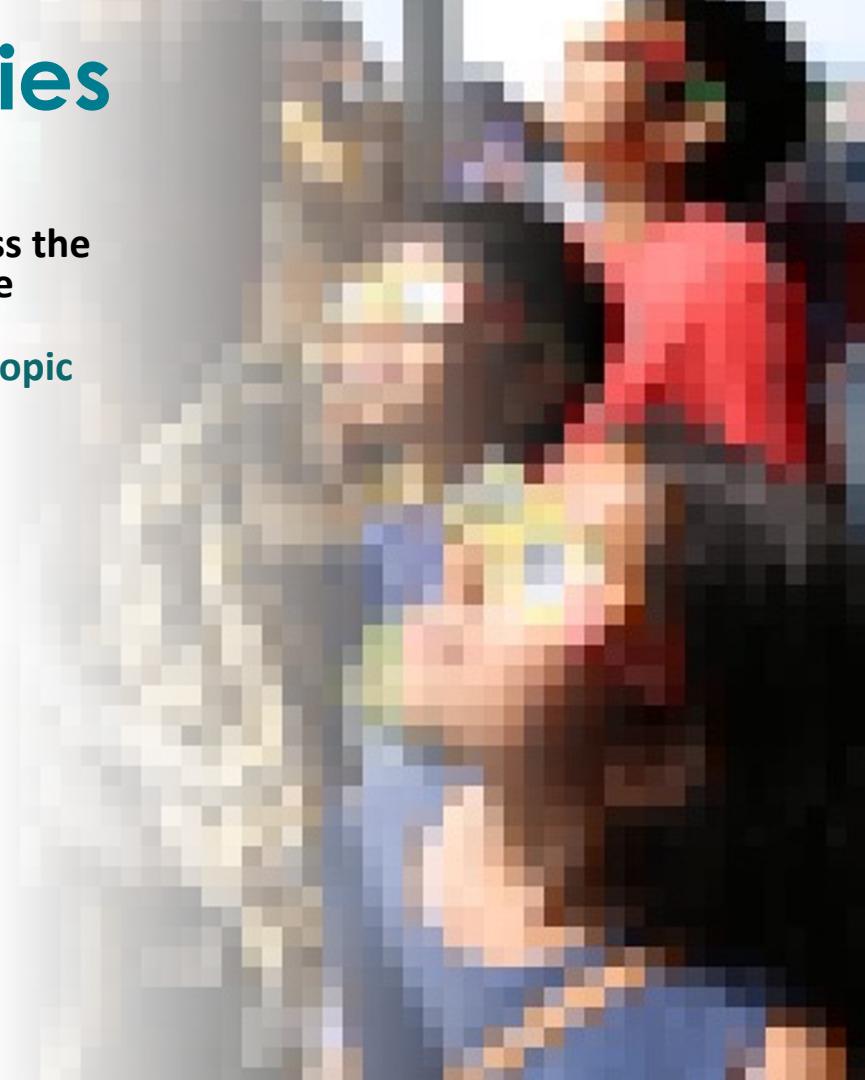


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Next Online Workshop...

Find Your Place in Space - Engaging the Artemis Generation with Activities, Apps and More

Tuesday, May 7, 2023

2pm-3pm Eastern / 11am-12pm Pacific

Register today:

<https://nisenet.org/events/online-workshop/online-workshop-Artemis2024>

Futures Thinking - Exploring Ideas and Developing Skills to Shape Our World

Tuesday, June 11, 2023

2pm-3pm Eastern / 11am-12pm Pacific

Register today:

<https://nisenet.org/events/online-workshop/futures-thinking>



Find the NISE Network at the 2024 ACM InterActivity Conference!

May 15-17, 2024 in Madison, WI



nisenet.org/acm2024

Thank You



Q&A

Use the raise hand feature or type your question in the chat

