Alexis Bradshaw
UTSA Senior Public Health
How is AQI Measured & Reported
EPA Standards for Monitors FRM and FEM Monitors
Monitoring Stations & Sensors
EPA AirNow Map and Fire/Smoke Map
Texas AirNow Map
National Park System Air Quality Monitoring
IQ Air Map (Personal Home Monitors0
Purple Map (Personal Home Monitors)
Future Mobile Air Quality Monitors
Future Satellite Monitors

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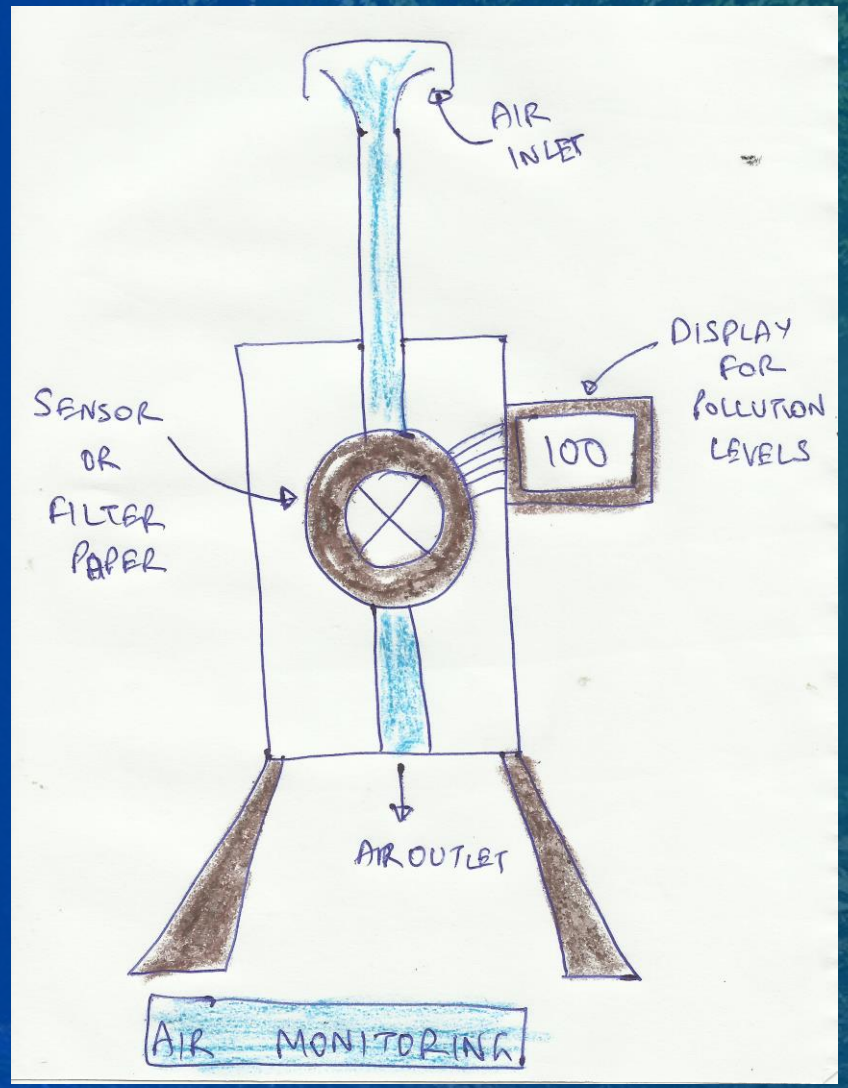
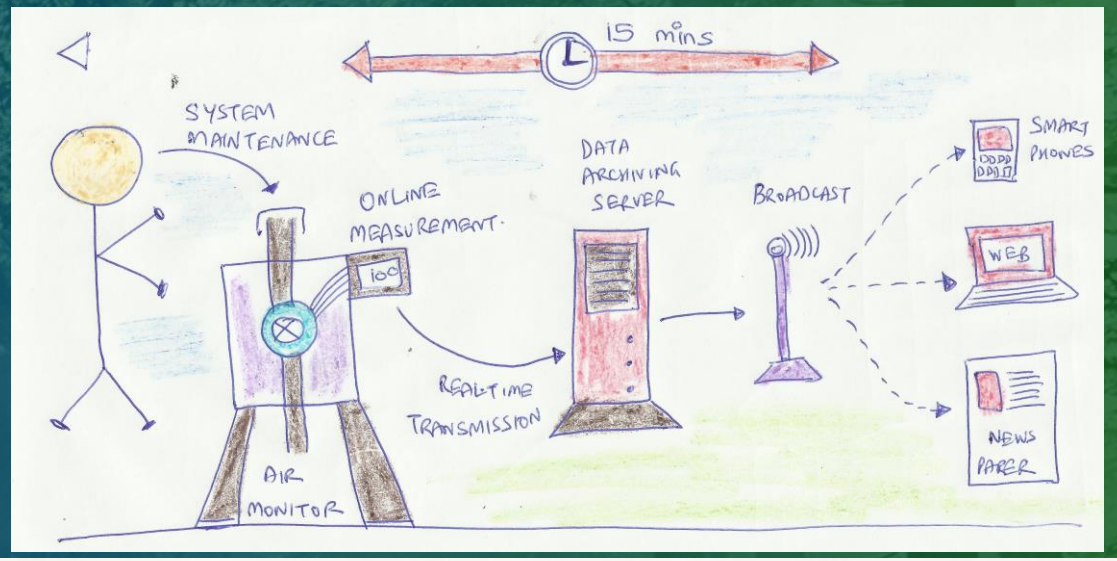
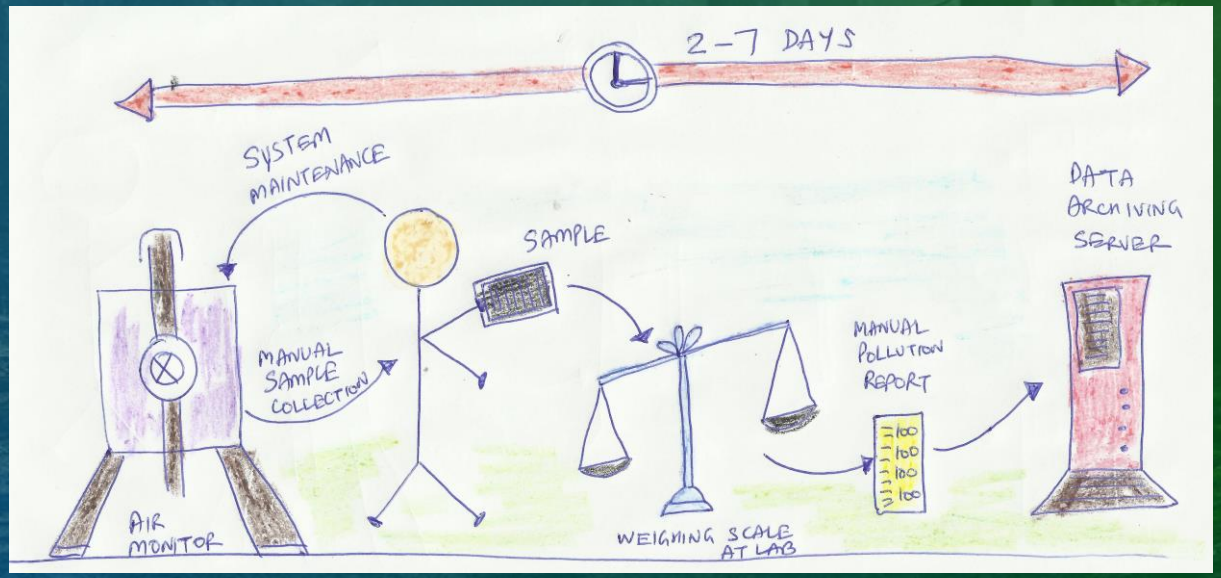
Air Monitoring 101 Simplified







https://urbanemissions.info/blog-pieces/air-monitoring-101/

EPA Air Monitoring Methods for Criteria Pollutants

Government Reference-Grade Air Quality Monitors

Represent the ***scientific standard for air quality monitoring***. This equipment has strict standards for measurement performance and is typically used to support air quality decision-making, policymaking, and evaluation of attainment for regulatory standards at both state and federal levels

Federal Reference Method (FRM) FRM monitors are designed specifically to meet air quality measurement standards developed by the EPA.

Federal Equivalent Method (FEM) FEM monitors involve other types of technology but still must provide a comparable level of performance as assessed against official standards of the EPA.

https://www.epa.gov/amtic/air-monitoring-methods-criteria-pollutants

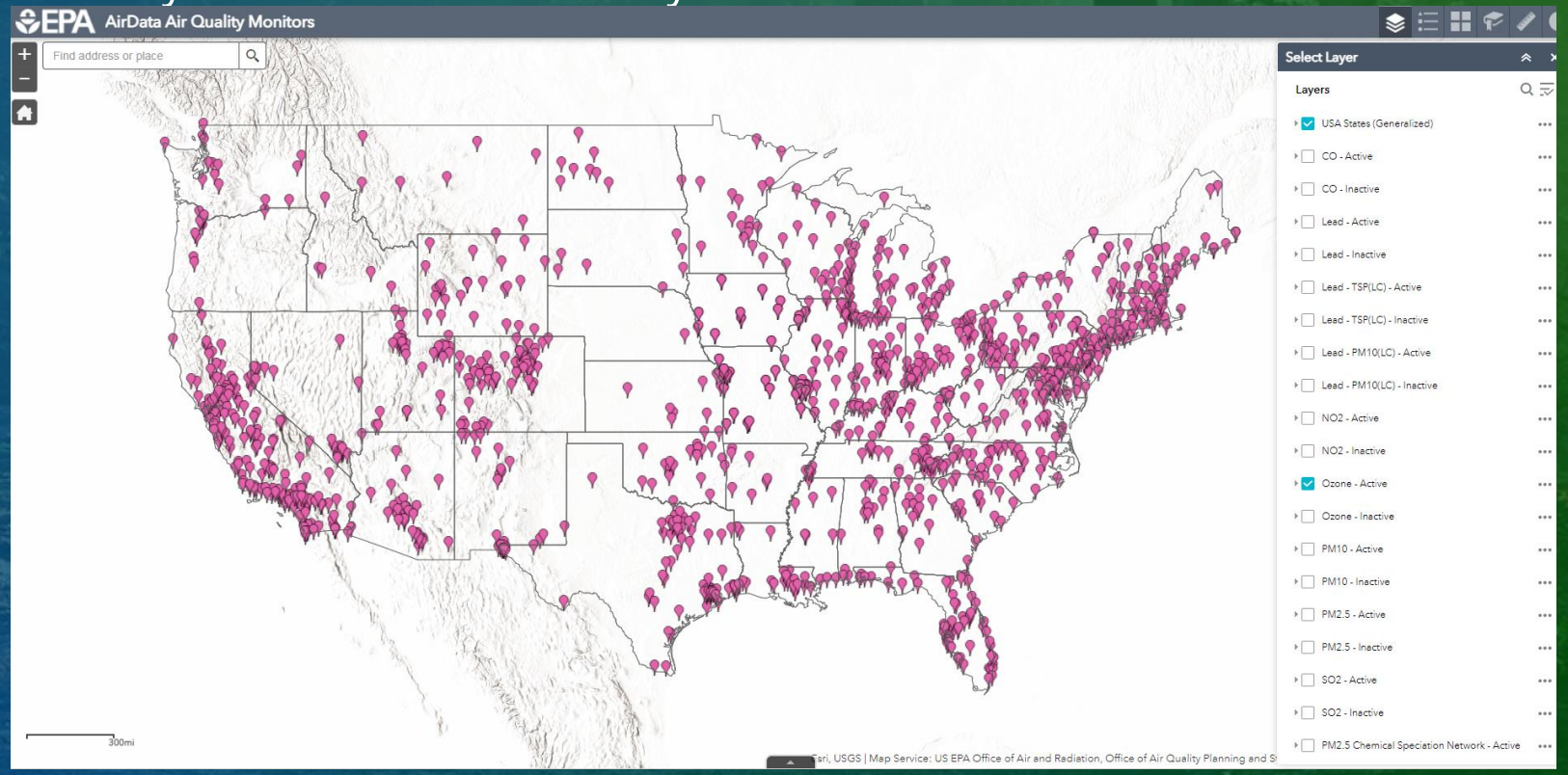
Interactive Map of 4000 EPA FRM Air Quality Monitors

The AirData Air Quality Monitors app is a mapping application available on the web and on mobile devices that displays monitor locations and monitor-specific information. It also allows the querying and downloading of data daily and annual summary data.

Monitor Site Location

Defined by the EPA and must meet their Requirements.

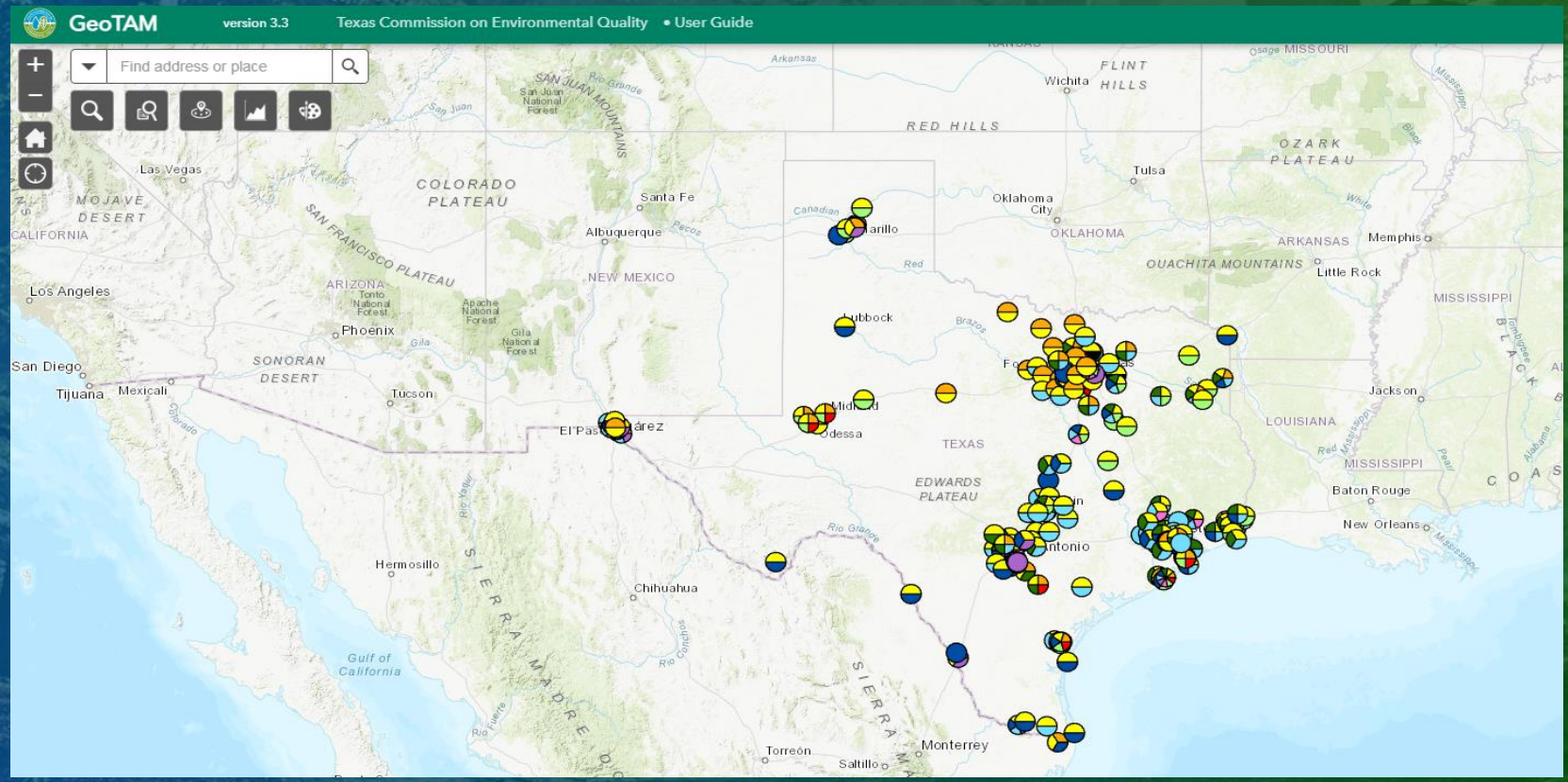
Open Area
Security
Topography
Logistical



https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors

Texas Commission on Environmental Quality (TCEQ)

TCEQ Maintains 200 Plus EPA FRM Monitor Stations



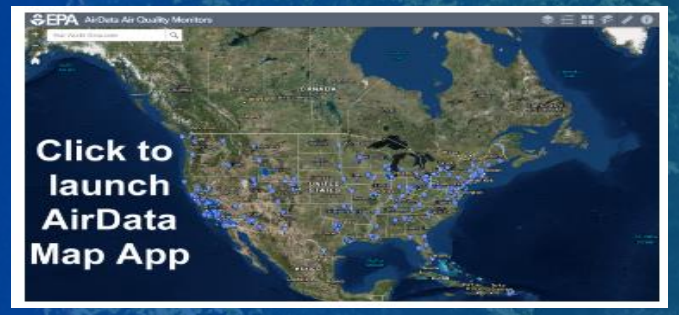
https://tceq.maps.arcgis.com/apps/webappviewer/index.html?id=ab6f85198bda483a997a6956a8486539

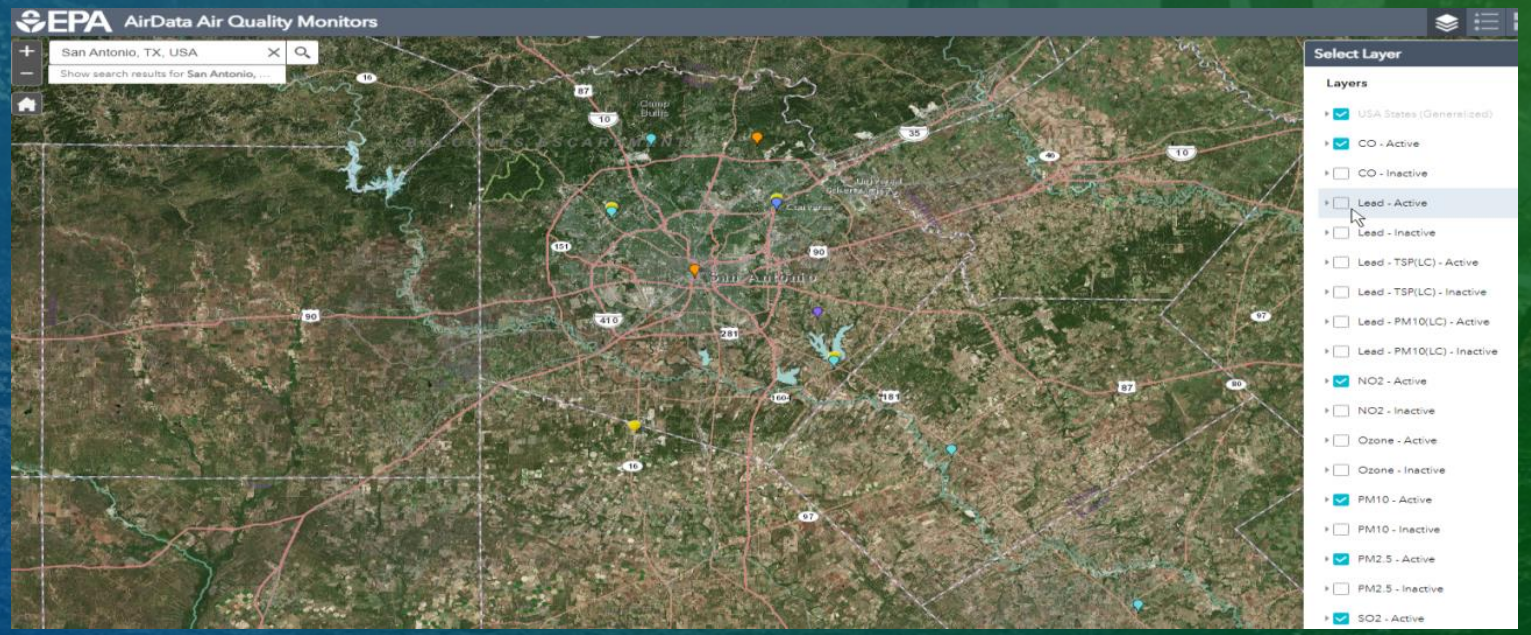
https://www.tceq.texas.gov/agency/air_main.ht ml

Interactive Map of 13 EPA FRM TCEQ Air Quality Monitors San Antonio

The AirData Air Quality Monitors app is a mapping application available on the web and on mobile devices that displays monitor locations and monitor-specific information. It also allows the querying and downloading of data daily and annual summary data.

13 Continuous Air Quality Monitoring Systems





https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors

TCEQ Monitor San Antonio Northwest Location

The Environmental Protection Agency (EPA) monitors air pollution around the country through a nationwide network of monitors. When a monitor detects smog in violation of federal standards, it is posted on the AirNow.gov website.
The Texas Commission on Environmental Quality (TCEQ) manages several Continuous Air Quality Monitoring Systems (CAMS) that record pollutant levels daily within the Alamo Area MPO study area. Three of the CAMS are regulatory, or EPA required, monitors: *San Antonio Northwest (C23),* Camp Bullis (C58) and Calaveras Lake (C59). The Environmental Protection Agency (EPA) utilizes a three-year rolling average at these three CAMS to determine the area's air quality status.

Continuous Air Quality Monitoring Systems (CAMS)

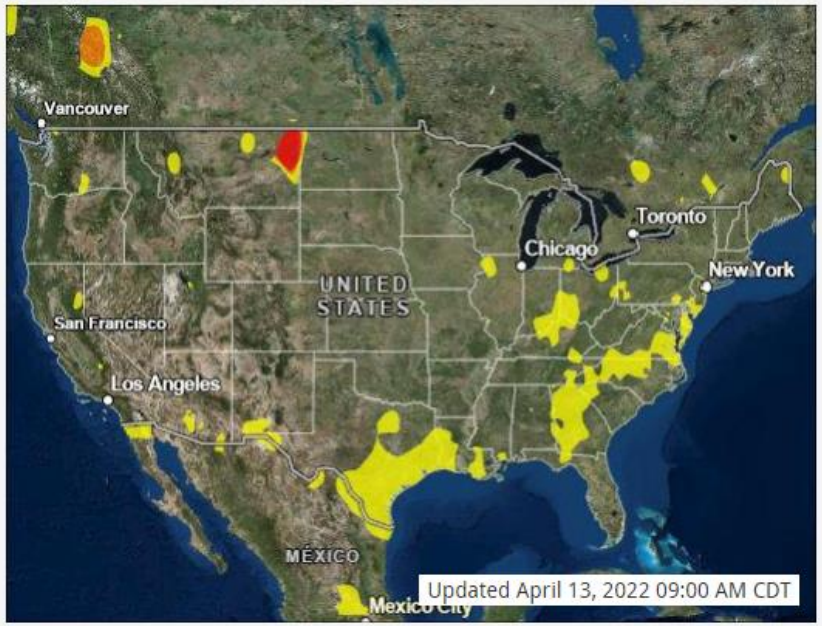
https://www.tceq.texas.gov/agency/air_main.html

EPA's AirNow Interactive Map

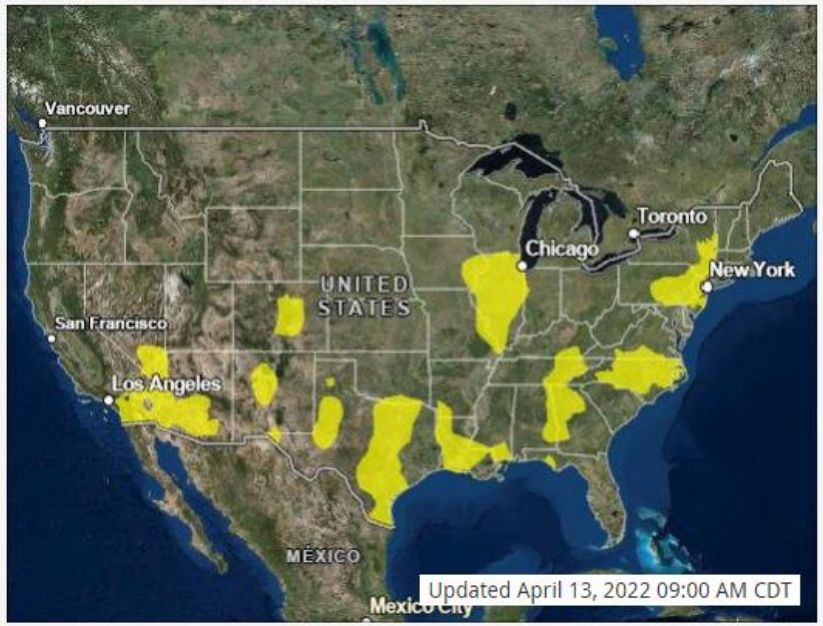
Real Time Data from all the EPA FRM Monitor Stations go to AirNow!

National Maps

Current Air Quality



Today's Air Quality Forecast



More Current Map Options:

- Current by Monitors
- Contours Loop
- Monitors Loop

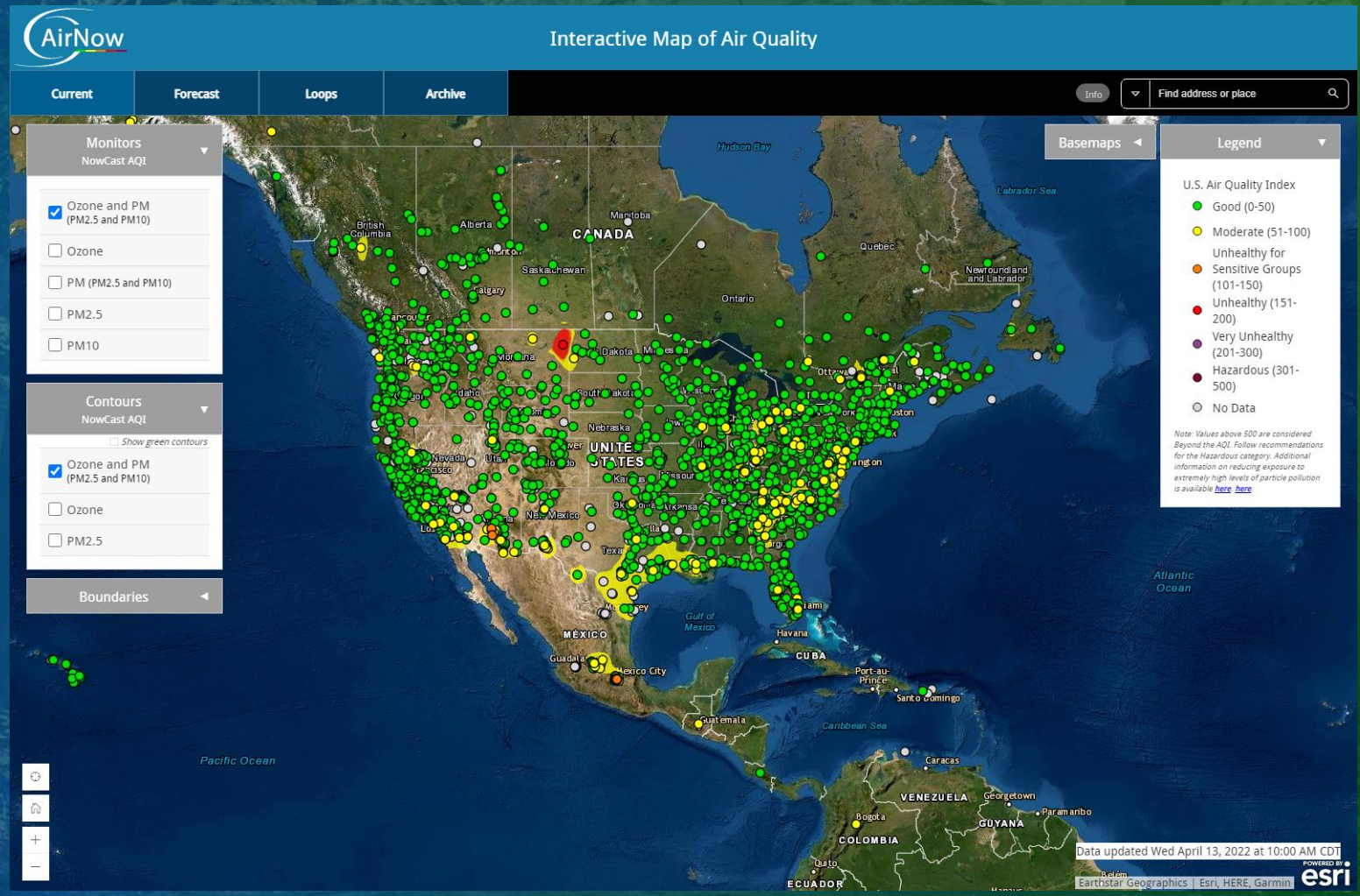
More Forecast Map Options:

- Tomorrow's Forecast
- Today's Forecast by City
- Tomorrow's Forecast by City

https://www.airnow.gov/national-maps/

EPA's AirNow Interactive Map

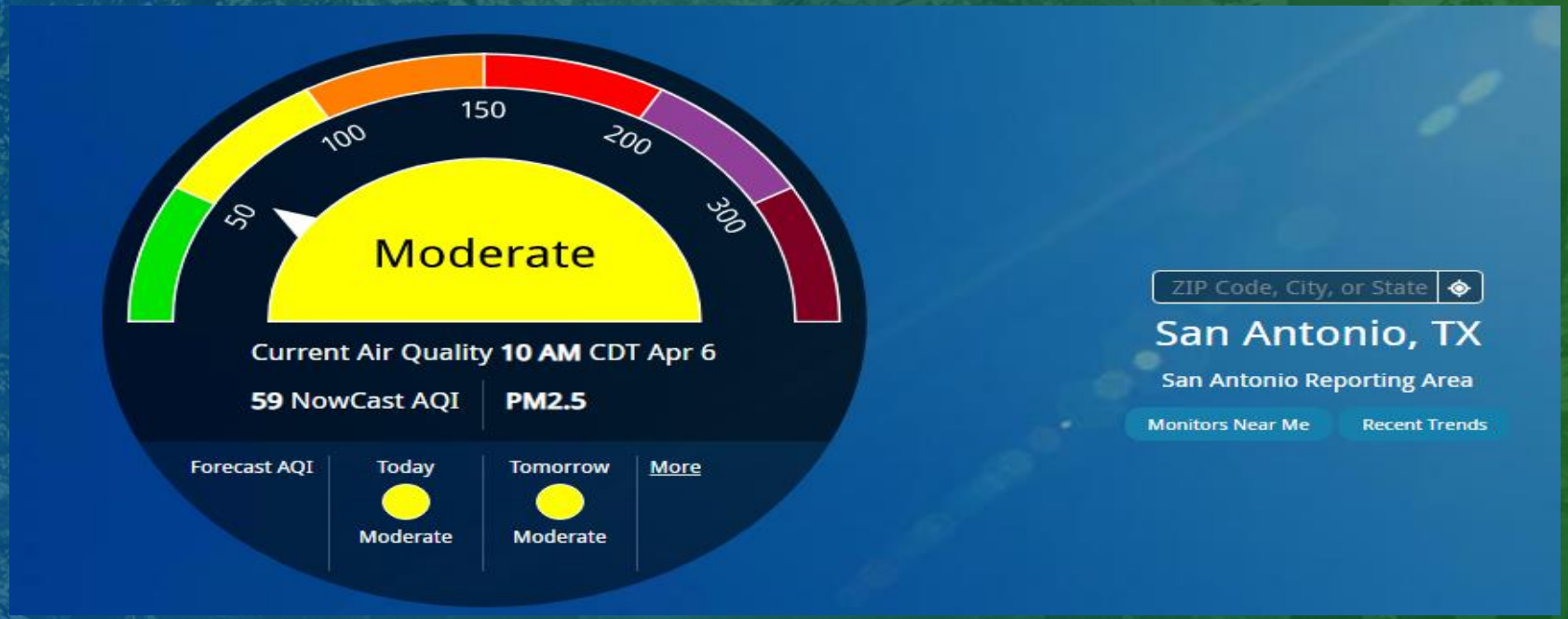
Real Time Data from all the EPA FRM Monitor Stations go to AirNow!



https://www.airnow.gov/?city=San%20Antonio&state=TX&country=USA

EPA's AirNow Desktop + App

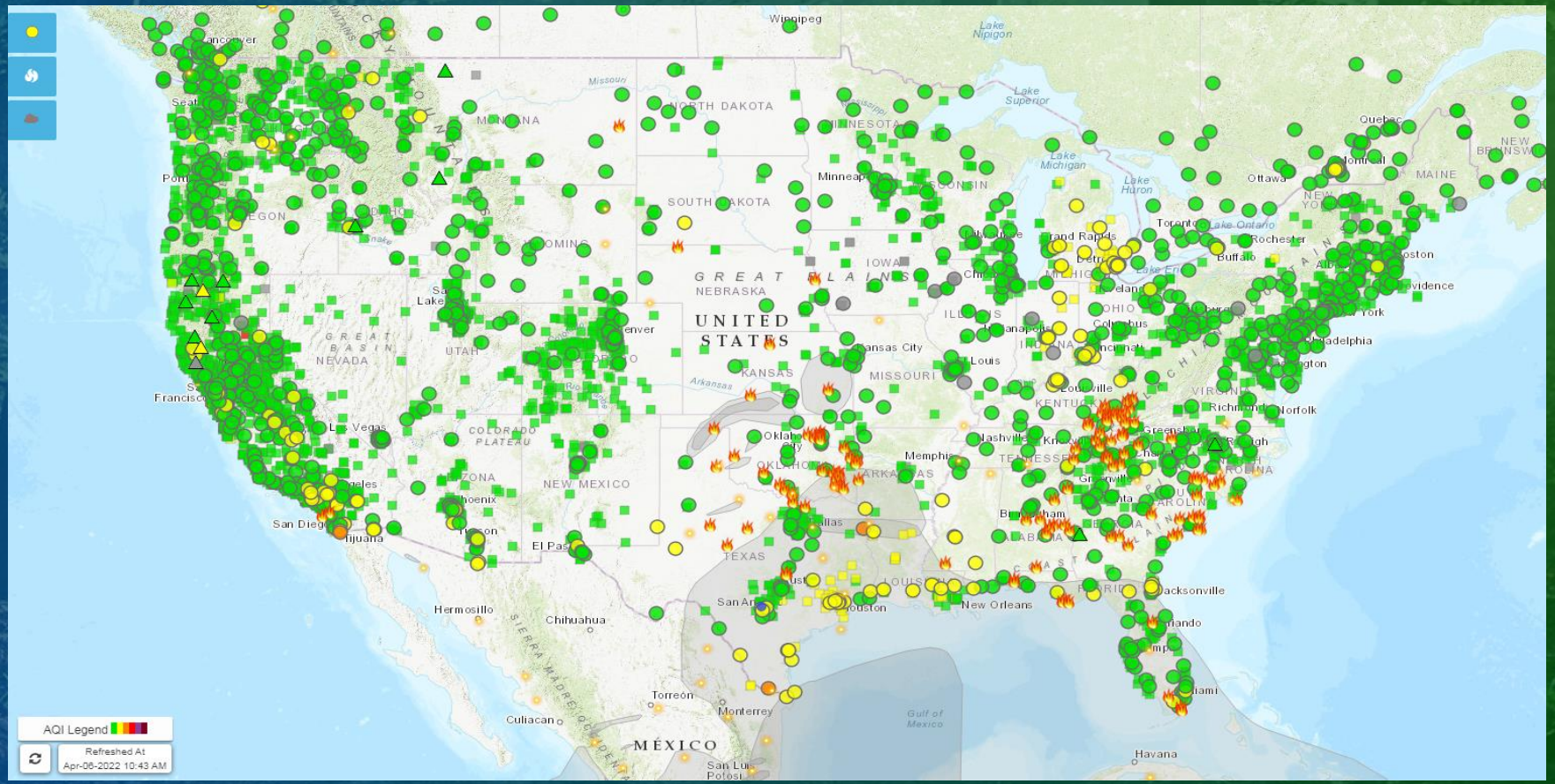
Real Time Data from all the EPA FRM Monitor Stations go to AirNow!



https://www.airnow.gov/?city=San%20Antonio&state=TX&country=USA

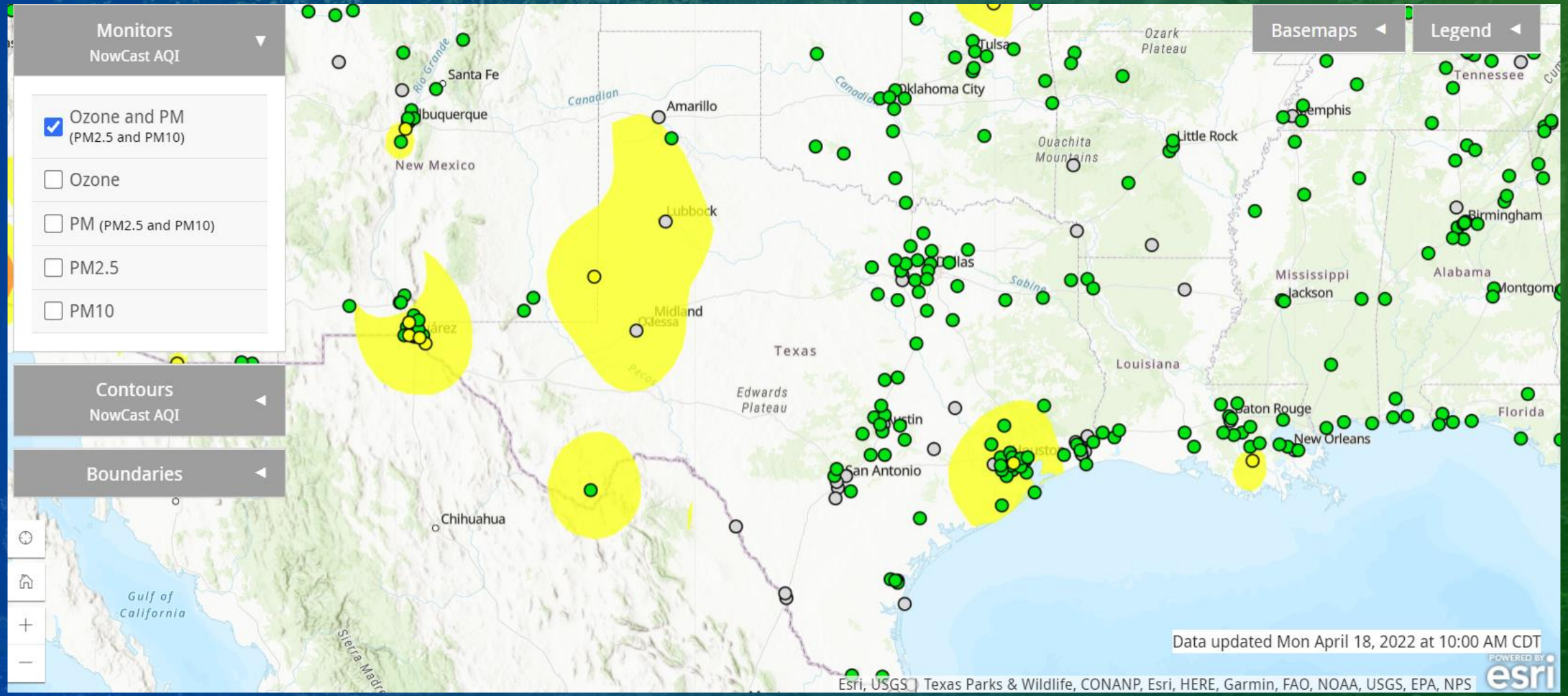
EPA's AirNow Fire and Smoke Map

Real Time Fire and Smoke Data from all the EPA FRM Monitor Stations go to AirNow



https://fire.airnow.gov/

EPA's AirNow Texas Map



National Park Service

Since the late 1970's, the NPS has monitored visibility, gaseous pollutants (mainly ozone), and atmospheric deposition in parks around the country. Meteorological monitoring is also conducted at many locations to help interpret air pollutant levels. Monitoring networks that the NPS participates in include:

Interagency Monitoring of Protected Visual Environments (IMPROVE)

National Atmospheric Deposition Program/National Trends Network (NADP/NTN)

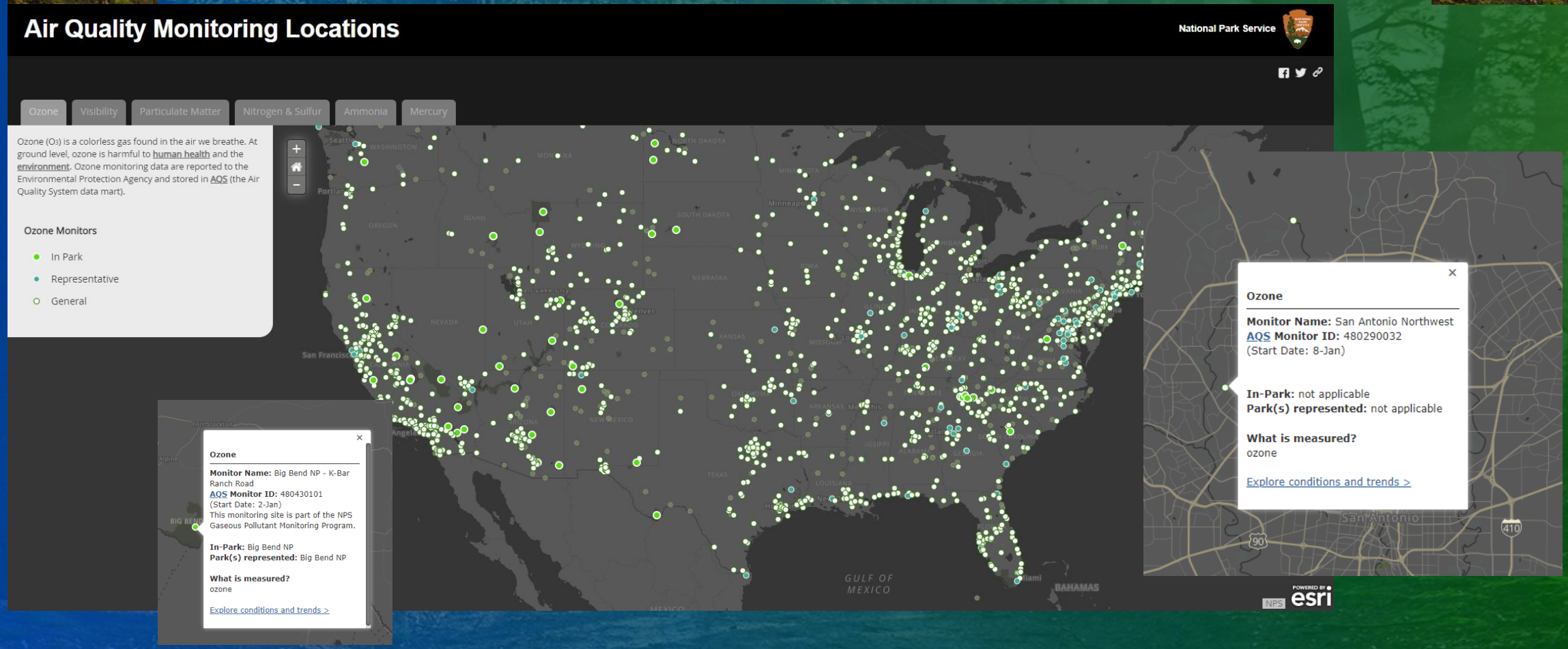
- National Trends Network (NTN)
- Mercury Deposition Network (MDN)

Clean Air Status and Trends Network (CASTNet)

Gaseous Pollutant and Meteorology Program (GPMP)

https://www.nps.gov/gis/storymaps/MapSeries/v1/index.html?appid=8bf71cd473d34b9da19cf97fa42ef742

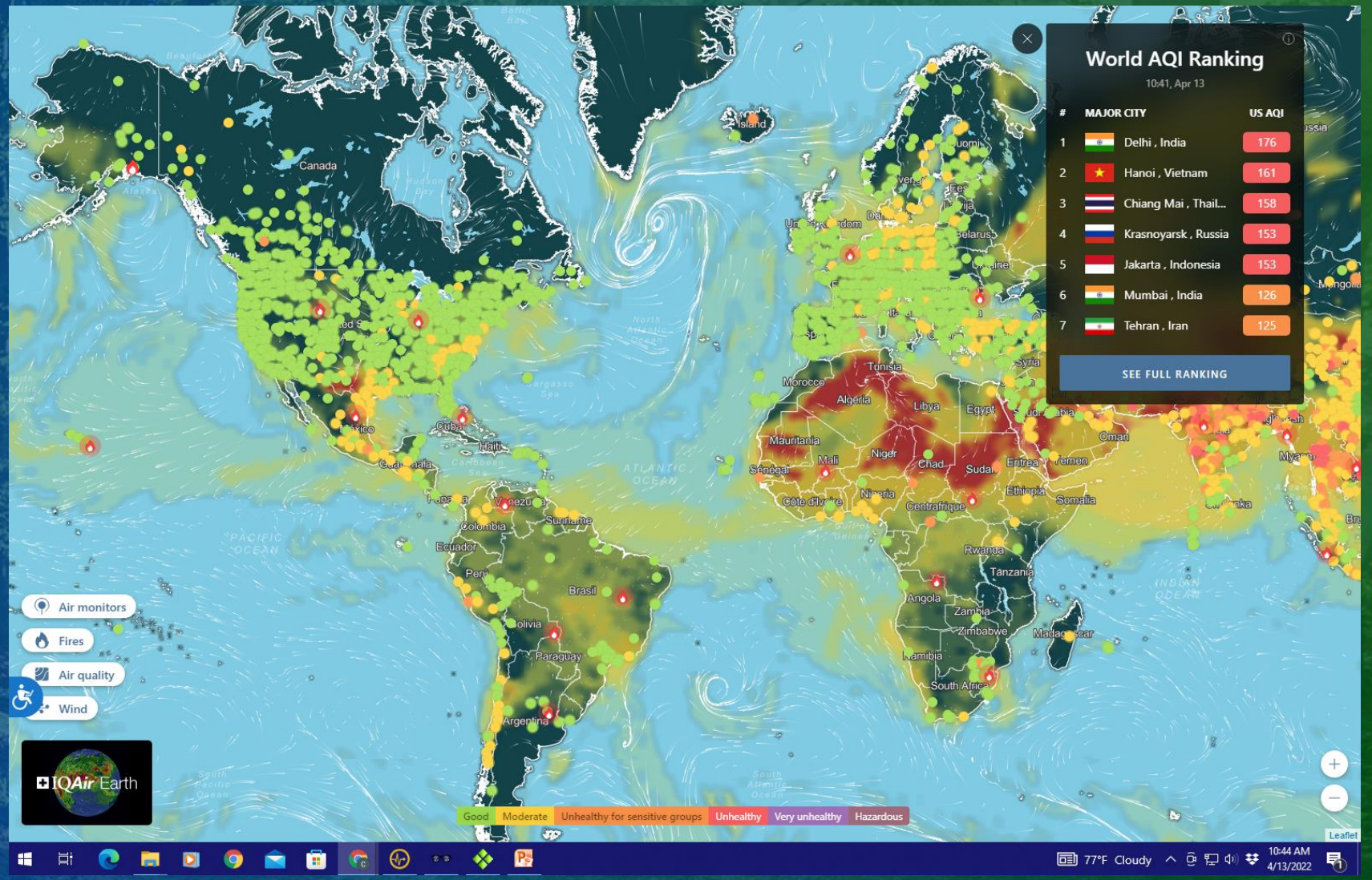
National Park Service



https://www.nps.gov/gis/storymaps/MapSeries/v1/index.html?appid=8bf71cd473d34b9da19cf97fa42ef742

IQ Air World Air Quality

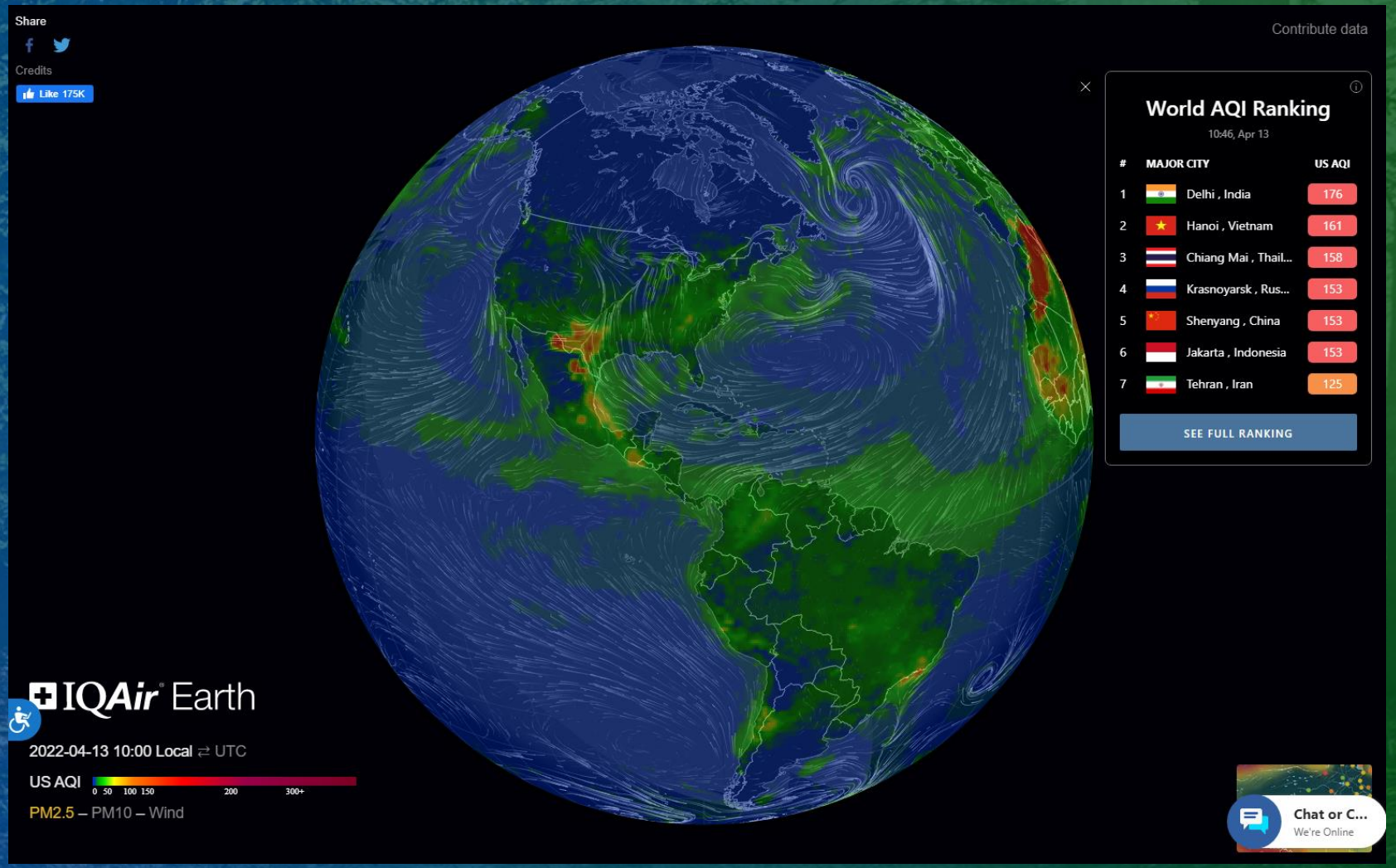
Personal Outdoor Air Monitors



https://www.iqair.com/us/air-quality-map

IQ Air Earth Air Quality

Personal Outdoor Air Monitors

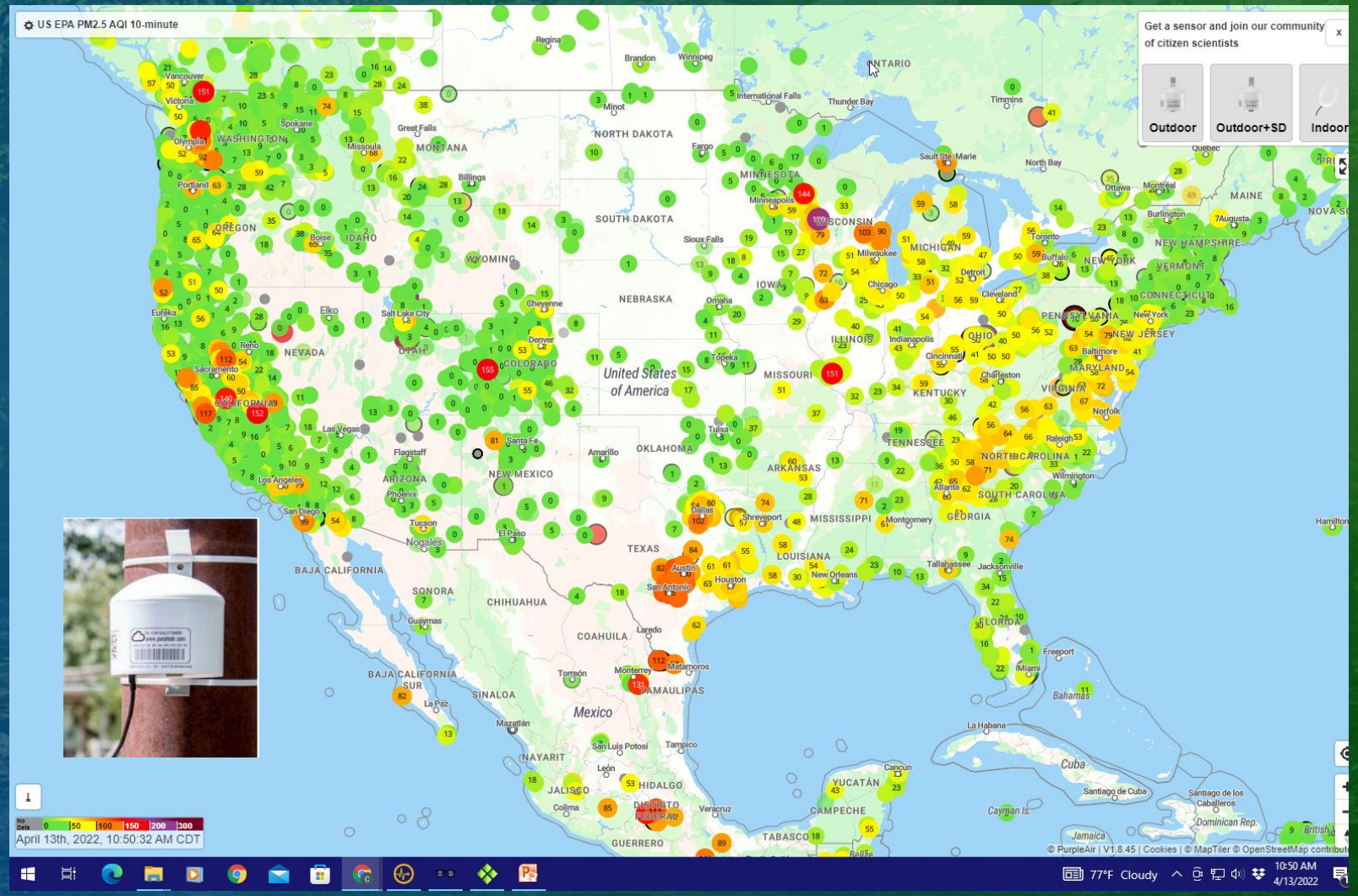


https://www.iqair.com/us/earth?nav=

Purple Air Monitors Map

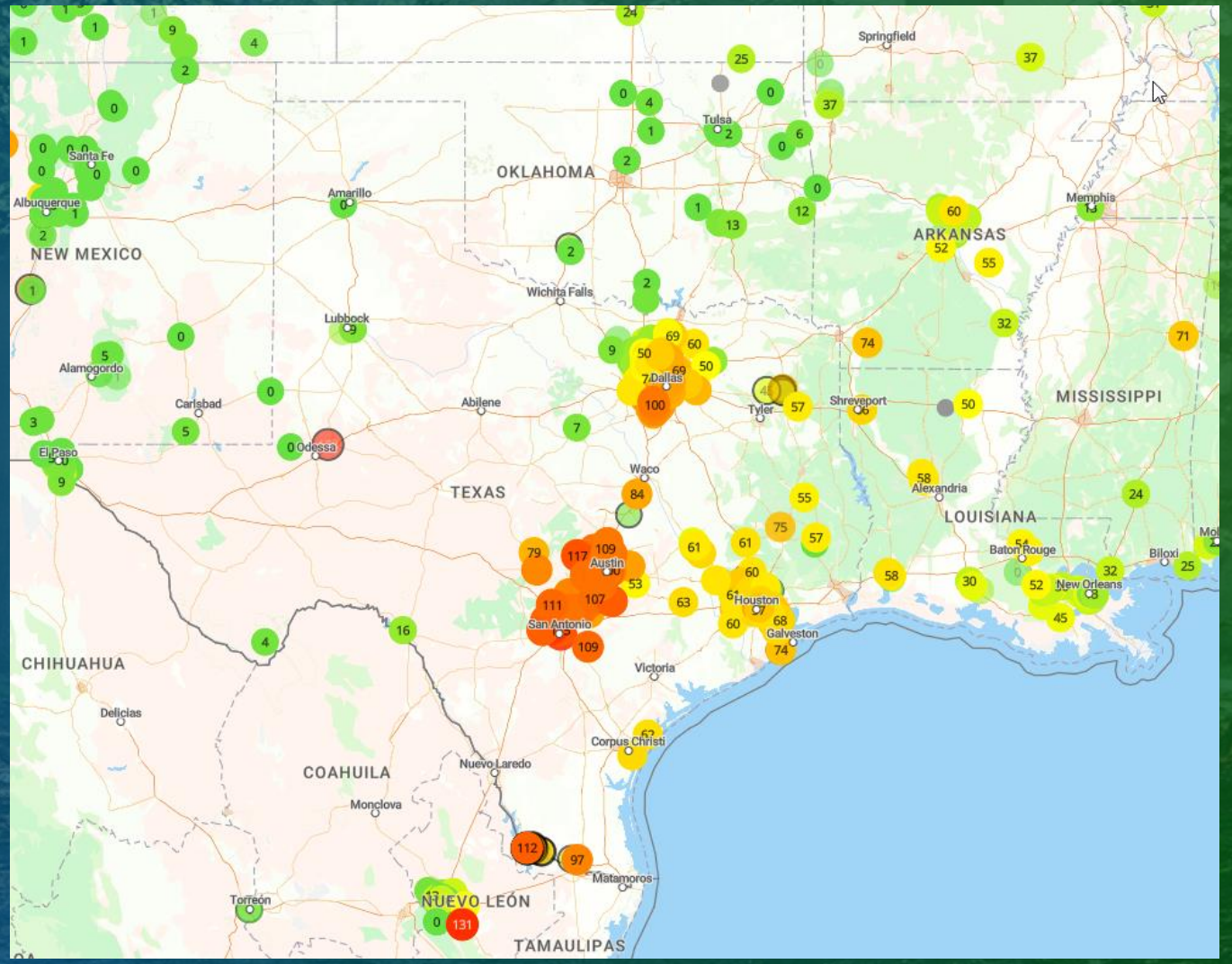
There are over 9000 Active PurpleAir (PA-PMS) aerosol monitors with sampling locations on almost every continent.

The large geographic coverage of this array of low-cost sensors presents enormous potential for obtaining valuable information on atmospheric aerosol properties and transport processes.



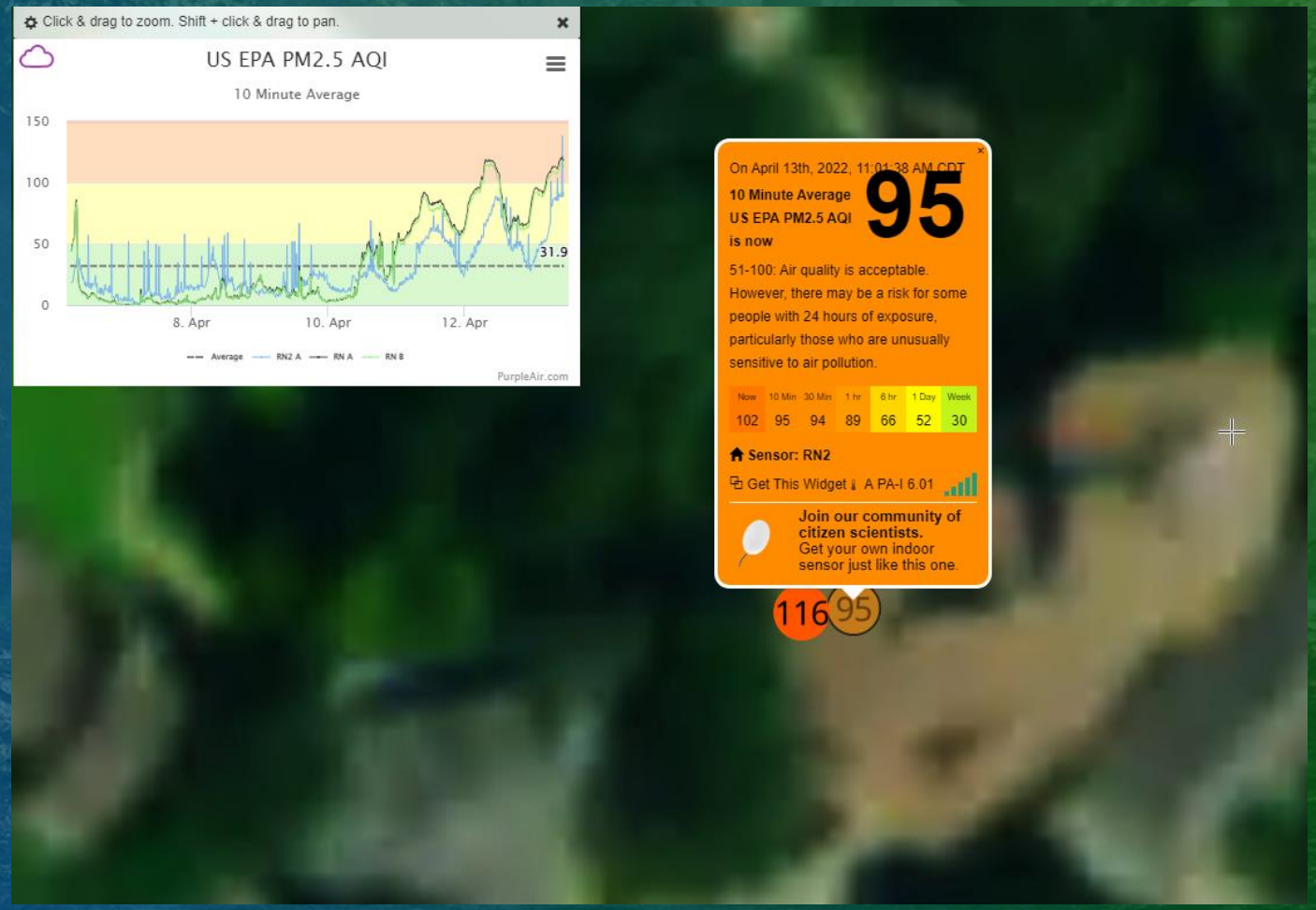
https://map.purpleair.com/1/mAQI/a10/p604800/cC0#4.02/35.43/-97.53=

Purple Air Map



https://map.purpleair.com/1/mAQI/a10/p604800/cC0#4.02/35.43/-97.53=

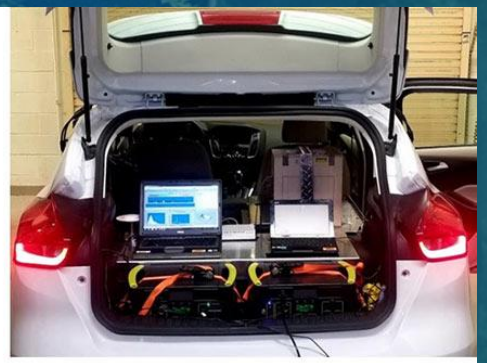
Purple Air Map, Dr. C's Monitors

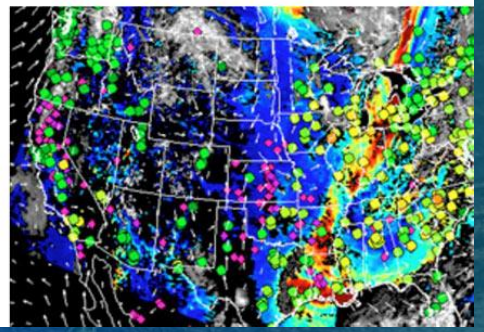


https://map.purpleair.com/1/mAQI/a10/p604800/cC0#4.02/35.43/-97.53=

Air Quality Monitoring 2.0

How different types of air monitoring technologies are contributing to a more holistic understanding of air pollution.





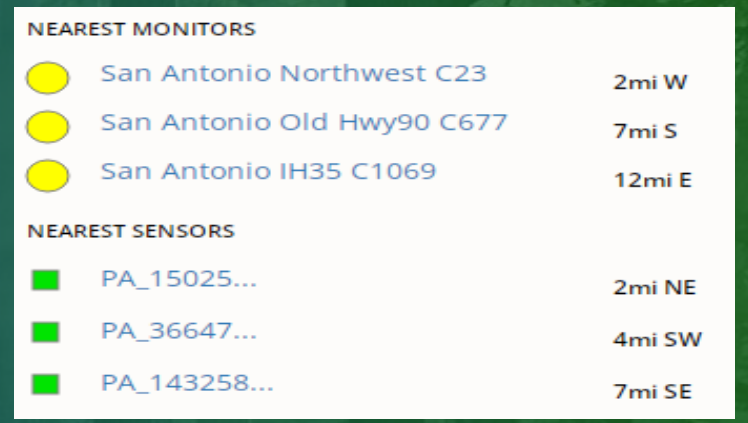
As air quality monitoring expands across the globe, so too do the types of monitoring technologies available. While in the United States, air quality monitoring began with the implementation of reference-grade equipment by the federal government, it has evolved to leverage alternative technologies such as mobile sensors, stationary low-cost sensors, air quality measurement conducted by satellites, and even the use of moss to detect air pollutants

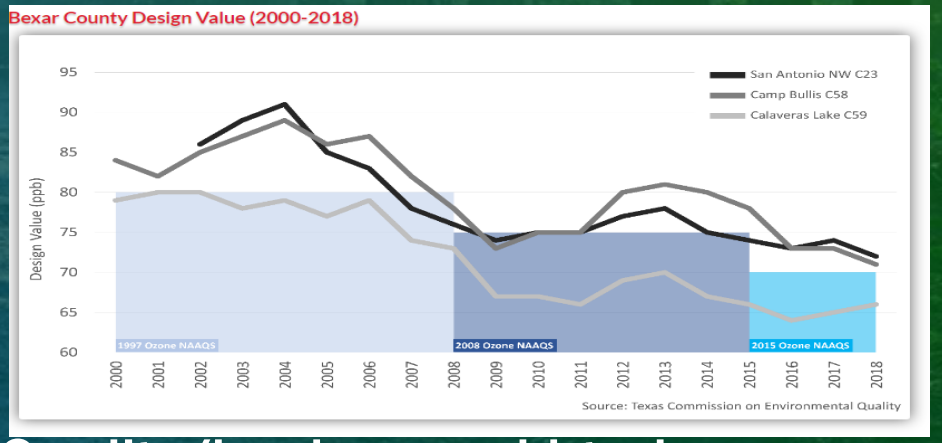
https://www.clarity.io/blog/air-quality-monitoring-2-0-how-different-types-of-air-monitoring-technologies-are-contributing-to-a-more-holistic-understanding-of-air-pollution/

Alamo Area Metropolitan Planning Organization

A Metropolitan Planning Organization (MPO) is an agency created by federal law to provide local direction for urban transportation planning and the allocation of federal transportation funds to cities with populations greater than 50,000. There are about 400 MPOs across the country. While most MPOs are part of a city, county or council of governments, the Alamo Area MPO is an independent agency.

The MPO's mission is to provide a comprehensive, coordinated and continuous ("3C") transportation planning process for the safe and efficient movement of people and goods, consistent with the region's overall economic, social and environmental goals. The MPO places special emphasis on providing equal access to a variety of transportation choices and effective public involvement in the transportation planning process.

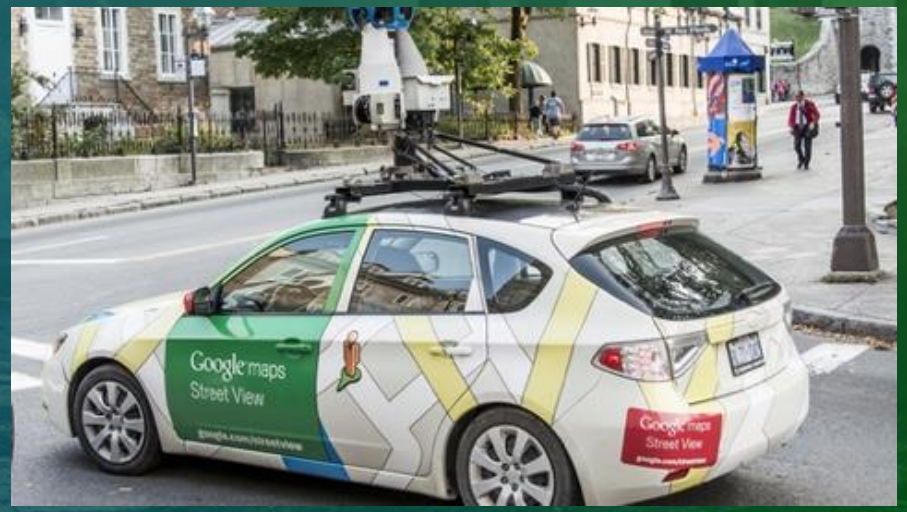




https://www.alamoareampo.org/AirQuality/background.html

Google Street Cars and Mobile Air QualityMonitoring

Google is working with with Aclima – a San Francisco environmental sensor company – to expand their expand their environmental sensor network globally. Air quality sensors from Aclima will be installed in fifty of its Street View vehicles. The detectors will provide data on the quantities of carbon dioxide, carbon monoxide, nitric oxide, nitrogen dioxide, ozone, and particulate matter in the environment.



https://www.aclima.io/

https://smartcitiesconnect.org/google-street-view-cars-receive-air-quality-sensors/

Aclima Mobile Air QualitySensors

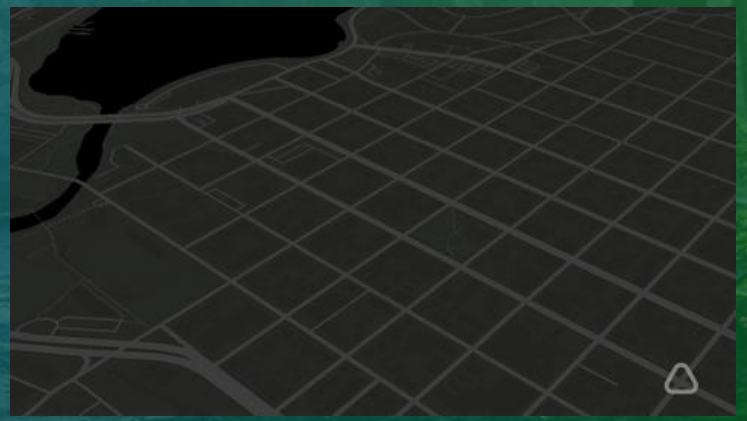
Ground Truth for Cleaner Air

Aclima is the leader in hyperlocal air quality and greenhouse gas measurement and analysis. Our next-generation platform helps governments, communities, and enterprise customers take bold action to reduce emissions and protect public health.

UNIFIED SENSING PLATFORM

Measure what matters, everywhere

Aclima has introduced a new way to measure air pollution and greenhouse gases, at the resolution needed to target emissions reductions, protect human health and advance environmental justice. With our platform, governments, communities, and enterprise customers can diagnose and take action to reduce pollution like never before.



https://www.aclima.io/

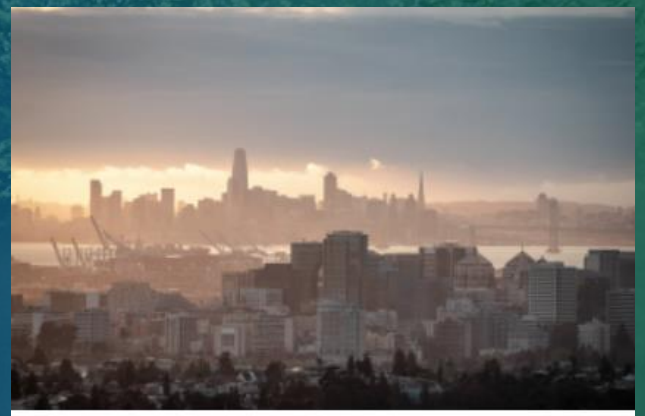
https://smartcitiesconnect.org/google-street-view-cars-receive-air-quality-sensors/

Aclima Mobile Air QualitySensors

2 MIN READ

Aclima and Google Now Measuring Air Pollution and GHGs Block by Block in Hamburg

Together with the City Science Lab of the Hafencity University Hamburg (HCU) and a working group from the City of Hamburg, Project Air View has launched in Germany. Just a few days before the 20th...



3 MIN READ

New Research Shows Racial and Ethnic Disparities in Hyperlocal Air Pollution

Peer-Reviewed Study Drawing on Data from Aclima Mobile Measurements Published in PNAS Reflects the Lived Experience of Communities of Color in the Bay Area. A new peer-reviewed hyperlocal air...

8 MIN READ

Aclima Launches Hyperlocal Air Monitoring in Los Angeles and San Bernardino Counties

In collaboration with environmental justice and climate action leaders, local and state government agency and elected officials, and community members, Aclima launched hyperlocal mobile air...

https://www.aclima.io/

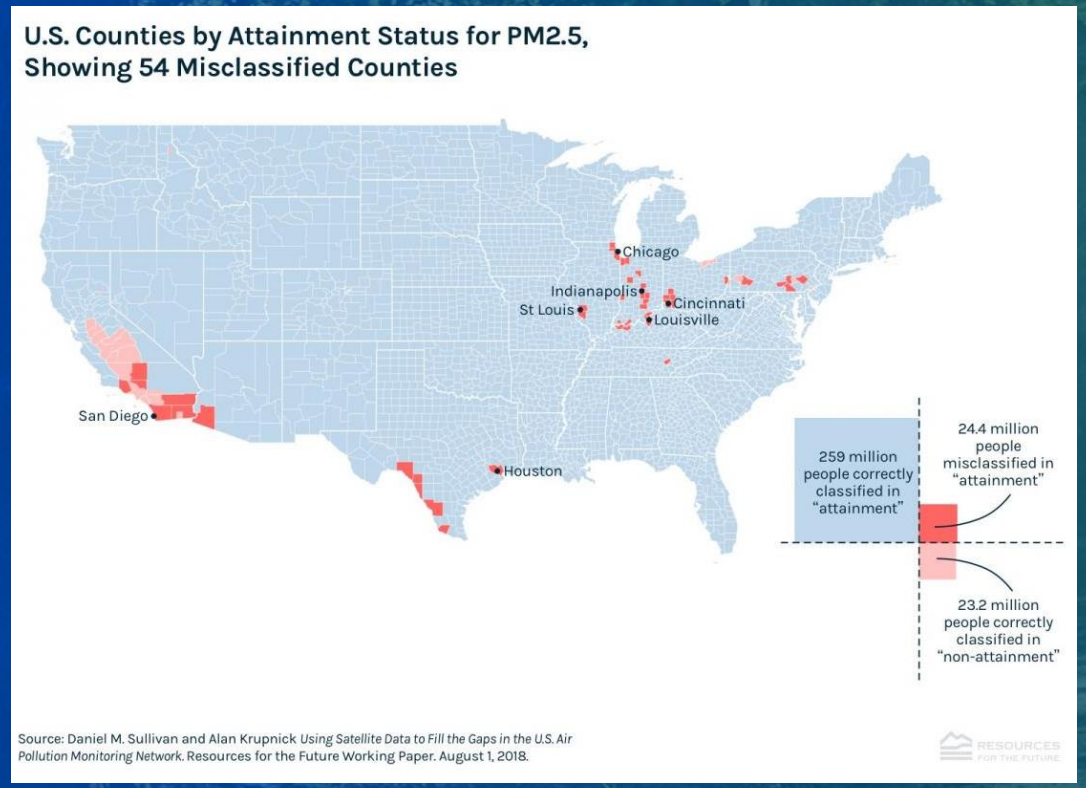
Aeroqual Monitoring Systems

We design and deliver integrated, real-time air quality monitoring systems. Now you can measure air quality, without the hassle, cost and risk associated with traditional air monitoring projects.

Blog
International air quality standards: how do they compare?

https://www.aeroqual.com/

Resources for the Future 70 Satellite PM2.5 Data



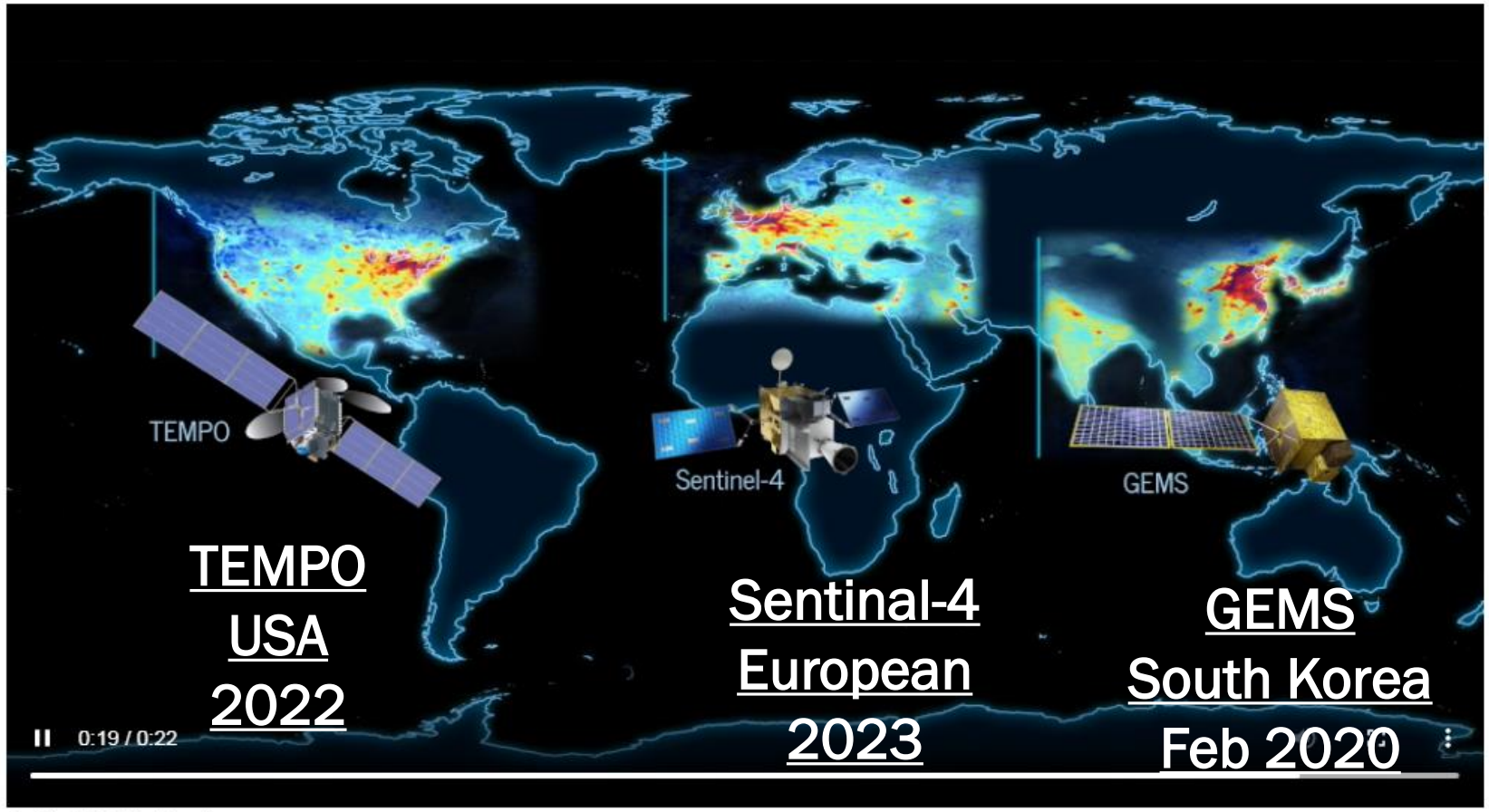
Researchers at Resources for the Future used satellite data to measure fine particulate matter concentrations, finding that 24 million more Americans than previously thought live in misclassified areas that don't meet federal air quality standards.

Beyond the eye-popping conclusions, RFF's study demonstrates why new technology is needed to fill the gaps in data. One of the biggest opportunities here are nimble and increasingly affordable sensors that can transform how we measure and track pollution

https://media.rff.org/documents/RFF20WP-18-21_0.pdf

Satellite Air Quality Sensors

Air Quality Satellite Constellation Begins Taking Shape



Current satellite instruments that monitor air quality — such as NASA's Ozone Monitoring Instrument (OMI) on Aura and ESA's TROPOspheric Monitoring Instrument (TROPOMI) on the Sentinel-5 Precursor (Sentinel-5P) — circle the Earth in sun-synchronous polar orbits that only allow them to make once-daily measurements over any given part of the planet.

https://www.nasa.gov/feature/langley/air-quality-satellite-constellation-begins-taking-shape/

https://www.nasa.gov/feature/langley/the-future-of-monitoring-air-quality-from-space

clarity

Air Quality Monitors

Air pollution monitoring for governments, businesses, and communities.

Clarity's customers around the world use our sensing-as-a-service air quality monitoring solution to eliminate blind spots and protect the health of their communities.

https://www.clarity.io/