Border 2020 San Ysidro Port-of-Entry Community Air Study

San Diego-Tijuana Air Quality Task Force meeting

Tijuana Baja California September 26, 2018

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Research Team

The new Border 2020 study is an expansion of previous research that established community air monitoring in San Ysidro, CA.

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  University of Washington
- Javier Emmanuel Castillo Quñones
  Universidad Autónoma de Baja California, Tijuana campus
- Vanessa Galaviz, Angelica Ruiz
  State of California Office of Environmental Health Hazard Assessment
- Penelope (Jenny) Quintana, Zohir Chowhdury
  San Diego State University School of Public Health
- David Flores
  Casa Familiar, San Diego

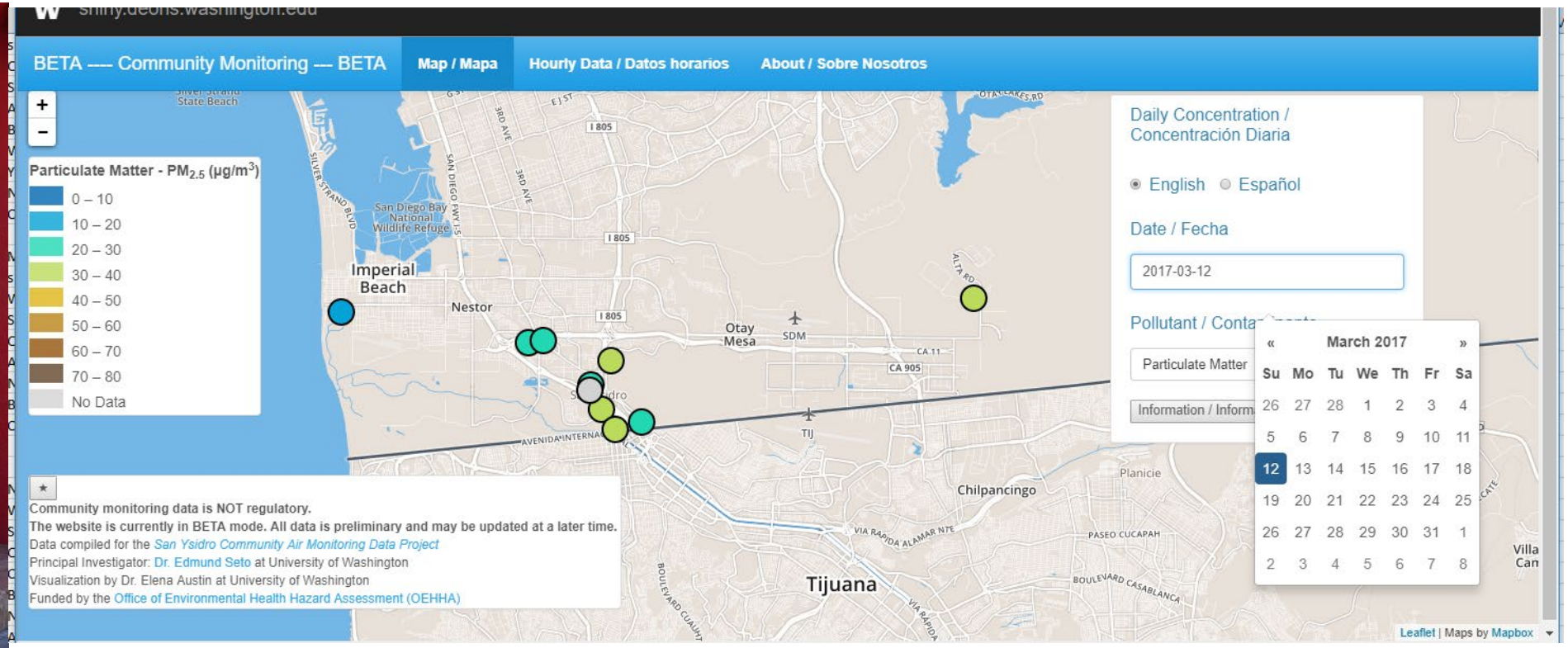
San Ysidro CA Air Study (funded by CA OEHHA)

- 2-year study that was funded by the California, USA, Office of Environmental Health Hazard Assessment (OEHHA) to inform air quality at the border in San Ysidro, CA.
- Established a network of 13 low-cost community air monitors that collected air measurements for 1 year.
- Findings may inform CalEnviroScreen – an Environmental Justice Screening Tool used in California for identifying disadvantaged communities exposed to environmental pollution

Next-Gen Community Air Monitor

- Non-regulatory research instruments, calibrated to government monitoring instruments.
- Modified Dylos particle counter with 4-size bins measuring between PM 0.5 – 10 um (changing this to newer Plantower sensor)
- Alphasense electrochemical sensors for traffic-related gas pollutants (CO, NO, NO2, O3)
- Temperature and Relative Humidity
- Cellular network for real-time data transmission
- Internet server for storing and sharing data
- **Data calibration and quality control process** applied before posting to website: www.syairstudy.org
- May add additional commercially available monitors (Edimax, Clarity, Apis)

http://www.syairstudy.org



http://www.syairstudy.org

Note: The sensors inside the monitors are getting old. Some sites no longer meet our data quality objectives.
We plan to refresh the current monitors as part of a new CARB AB617 grant.

BETA ---- Community Monitoring --- BETA | Map / Mapa | Hourly Data / Datos horarios | About / Sobre Nosotros

Hourly Data Plot, Select Sites and Dates

Date / Fecha

2017-10-18

Site Selection Options:

- (•) All
- ( ) Manual Select

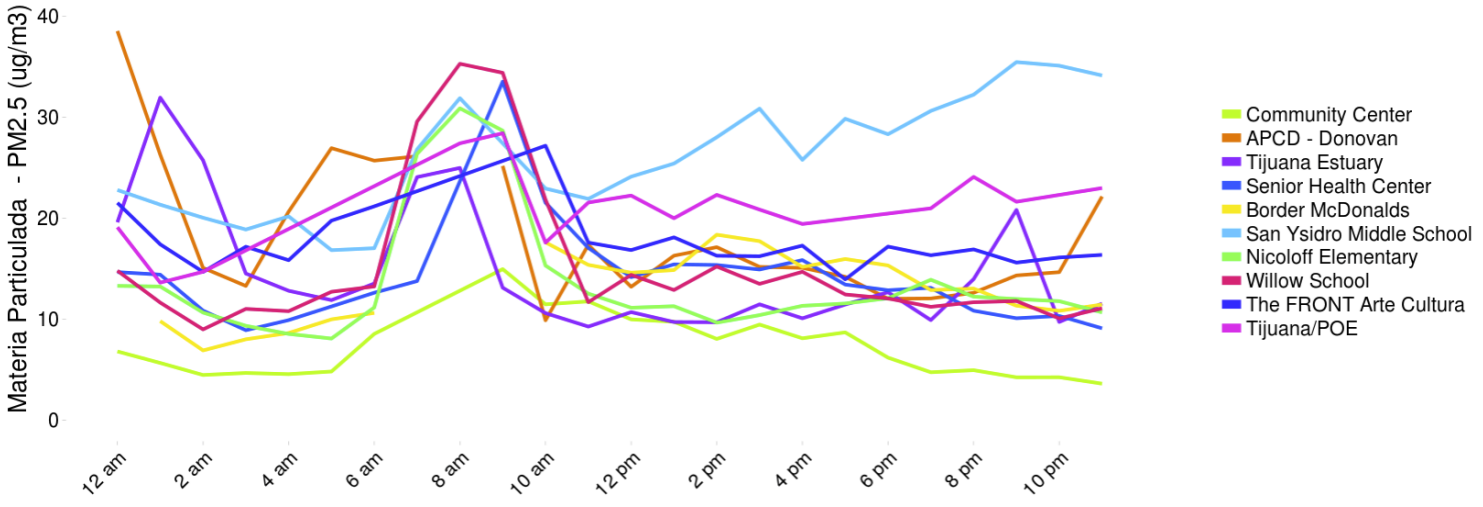
Pollutant / Contaminante

Materia Particulada

Select Plot Limits

0 42 210

0 210



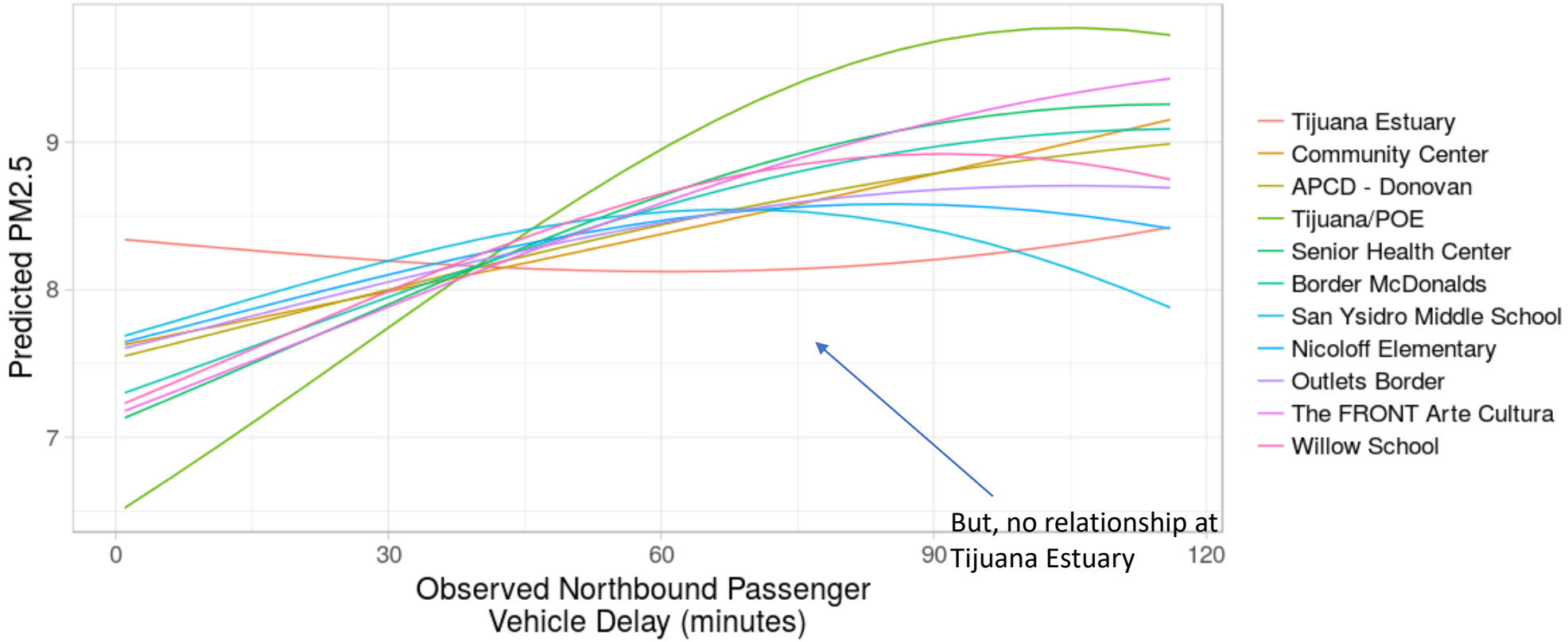
La información se interpreta en relación con los estándares gubernamentales de salud.

Para estos sitios, en este día, existen horas cuando él Materia Particulada medido por esta red de sensores exceda en 24-hora el estándar NAAQS de 35 ug/m3 establecido por la EPA.

Los datos aquí presentados NO son datos reglamentarios y pueden existir errores. Por favor siga las recomendaciones actuales de condiciones en exteriores y de salud del APCD del Condado de San Diego.

Preliminary Findings from the San Ysidro, CA study

Increased northbound border wait times associated with increased particulate matter (PM2.5) levels at the San Ysidro community air monitoring sites, especially Port-of-Entry site (Tijuana side), but not Tijuana Estuary Nature Center (reference site)



log([PM2.5]) = intercept + s(delay, by=site) + s(dayofweek)+ s(hourofday) + s(Temp)
s() is a penalized spline term (non-linear)
predicted PM2.5 concentration for a range of delay times, keeping day of week, hour of day and temperature constant.

Wait time data obtained by hourly scraping CBP website https://bwt.cbp.gov/

New Border 2020 Project Goals

- Project funded by US EPA Border 2020 program
- Establish 6 new air quality monitors south of the US Port of Entry (POE) in Tijuana.
- Document changes in air quality near the POE in relation to factors such as meteorology, border wait times.
- Engage with stakeholders: residents, academic researchers, and air quality agencies.
- Integrate data into current syairstudy.org website (after calibration applied) , make data freely available

Study Advisory Board

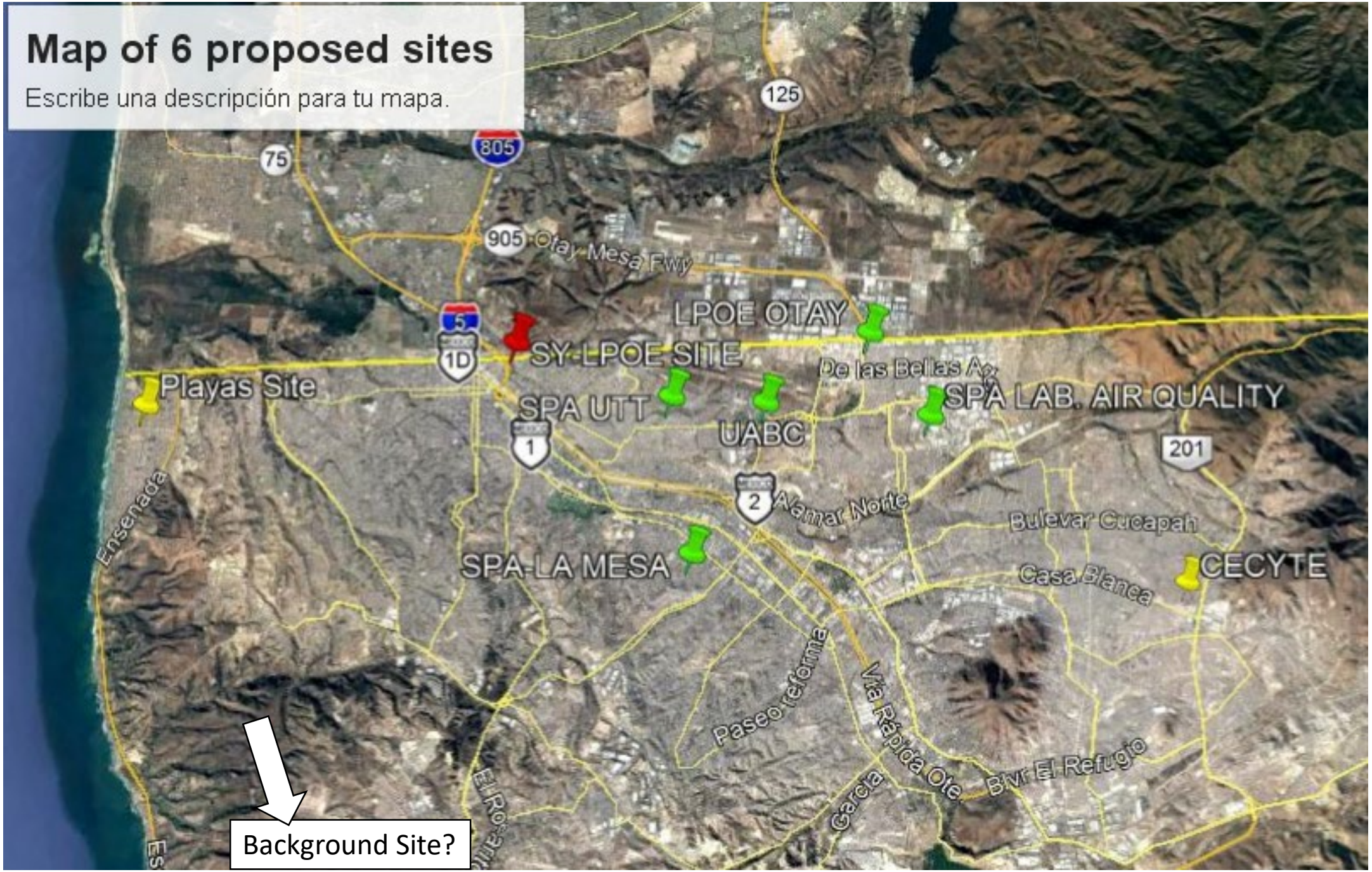
Jeremy Bauer	US EPA Border office
Margarito Quintero	SPA (Director de Planeación y Política Ambiental)
Saul Guzman	SPA (Director de Gestión Ambiental)
Alberto Raul Tovar	SPA (Departamento Calidad del Aire)
Ing. Eduardo Perez Gutierrez	City of Tijuana, Director of Environmental Protection
Ana Burgos Soto	Dirección de Protección al Ambiente de Tijuana (Departamento de AnálisisAmbiental)
Elizabeth Chaney	UC San Diego Cross-Border Initiative
Rene Peralta	Professor of Architecture, Woodbury University and Co-founder Generica
Robert Kard	San Diego Air Pollution Control District
Don Hammond	California Air Resources Board, Monitoring & Laboratory Division
Jesus Amparo Lopez Vizcarra	UABC-Facultad de Turismo y Mercadotecnia
Adriana Guillermina Rios Vazquez	UABC-Facultad de Turismo y Mercadotecnia

Where to place monitors?

- Goal: Measure impact of the SY POE on air quality in Tijuana with 6 monitors in total.

We propose:

- 1 monitor in a “background” site.
- 1 monitor co-located with a SPA site.
- 1 monitor at the Otay Mesa truck crossing.
- 3 remaining monitors located at varying distance near the SY POE.

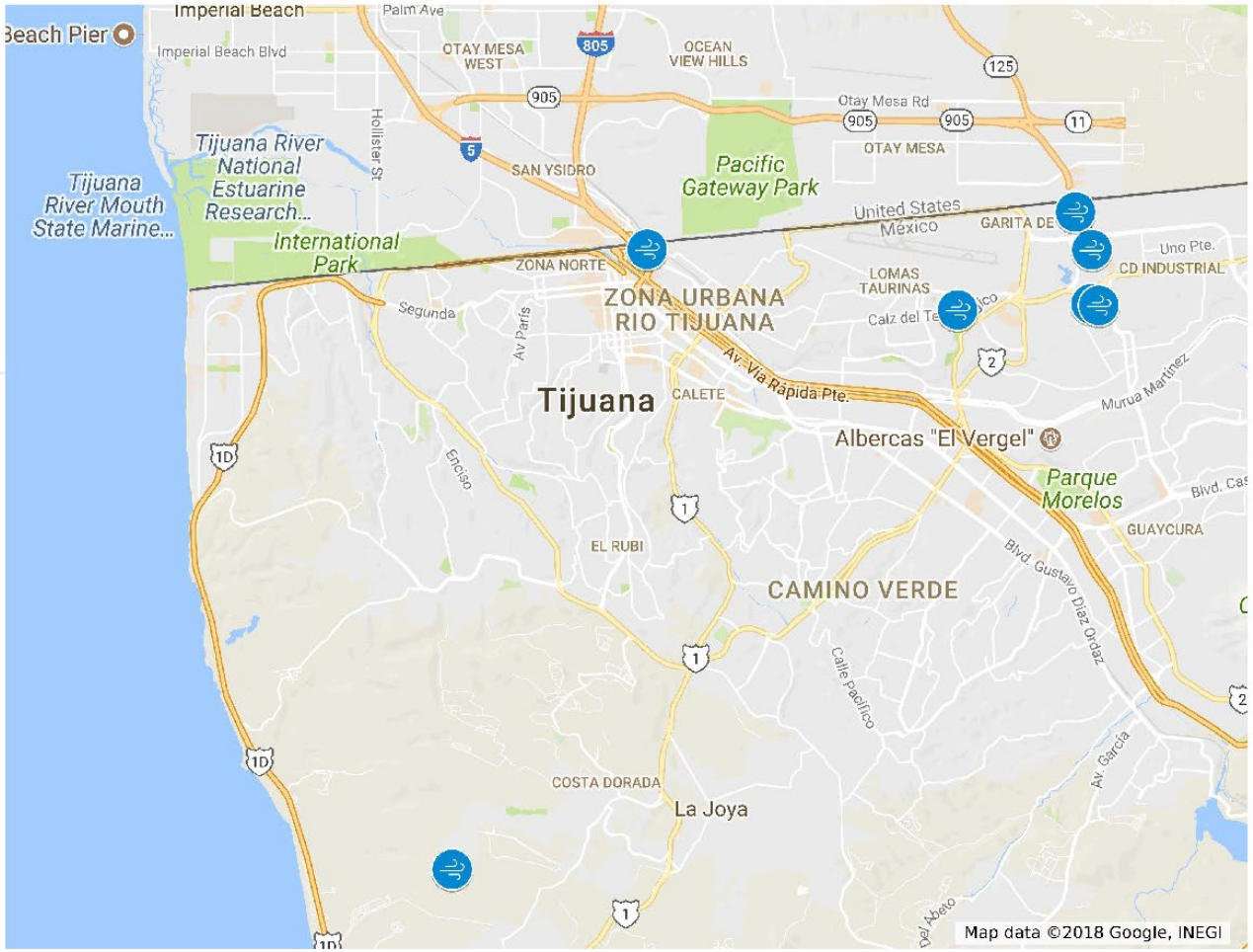

Map of 6 proposed sites
Escribe una descripción para tu mapa.
125
75
805
905 Otay Mesa Fwy
5
1D
LPOE OTAY
SY-LPOE SITE
De las Bellas Av
Playas Site
SPA UTT
UABC
SPA LAB. AIR QUALITY
1
201
2
Alamar Norte
Bulevar Cucapah
Ensenada
SPA-LA MESA
Casa Blanca
CECYTE
Paseo Reforma
Vía Rápida Ote
Blvr El Refugio
García
Background Site?

Border 2020

Potential Sampling Sites

- UABC Library
- Background Site
- Elementary School
- Kindergarten
- House
- Otay POE
- SY POE

Potential Sites



Open Access

http://syairstudy.org/

- Code for visualization is available at: https://github.com/elaustin/syvis_docker
- All data accessible for non-commercial use
- Data requests collected through a webform: https://goo.gl/forms/W74cc7na3X7jAL7p2
- Data distribution includes hourly concentrations measured at the monitoring locations as well as a readme file that includes a sharing license and data description.

Thanks for your attention!

Questions and Advice?

Need: Sites, Data sources - Border wait times, Traffic

Contact:

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EXTRA SLIDES:

Next Steps

- Integrate additional data sources
  - Model changes in pollutant concentration as a function of border wait time
  - Model changes in pollutant concentration as a function of vehicle flow
- Plan network sustainability and community capacity
- Integrate data from multiple sensor types using ***common calibration and deployment approaches***
- Extend network both sides of the border

Requirements for Monitor Siting

Monitor Siting Criteria

1. The monitor measures PM in multiple sizes, CO, NO, NO2, O3, temperature and relative humidity.
2. The monitor should not be placed directly at any emission source like an exhaust pipe that would greatly influence the measurements.
3. Avoid trees, walls, or other barriers that might affect the air reaching the monitor.
4. The monitors require an 120V AC outlet. The power consumption is very low (less than 2A) and so a typical household 15A service is fine.
5. Grounded electrical outlet for safety.
6. Data will be transmitted via cellular network. Thus, the site and positioning of the monitor at the site should be able to provide good cellular network signal. Tentatively, we are using T-mobile as the cellular provider.
7. The monitor will be mounted on a tripod or similar secure mount. The tripod should be stable, weighed down, etc. in order to prevent the monitor from falling over or blowing away in high wind conditions.
8. The space requirements are minimally, a 3 x 3 ft area for the tripod with the monitor mounted on it at a height of roughly 5 ft.
9. The site and the monitor location should be readily accessible by project staff, but reasonably secure from theft, tampering, and vandalism. For example, sites may be elevated and out of reach, protected behind a fence or accessible only from within a secure building.

Monitor Installations

CASA – EL SALON

RESIDENCE

NICOLOFF ELEMENTARY SCHOOL

Monitor Co-Location

Colocation is necessary in order to Calibrate these low-cost non-regulated monitor with government regulated monitors to ensure the readings are accurate and have a point of reference.


SY13
SY12
SY5
SY6
SY14
SY3
SY4
SY2
DRX