Crisis Mapping and Community Health: How Direct Relief is Improving Health Emergency Response with Facebook Disaster Maps

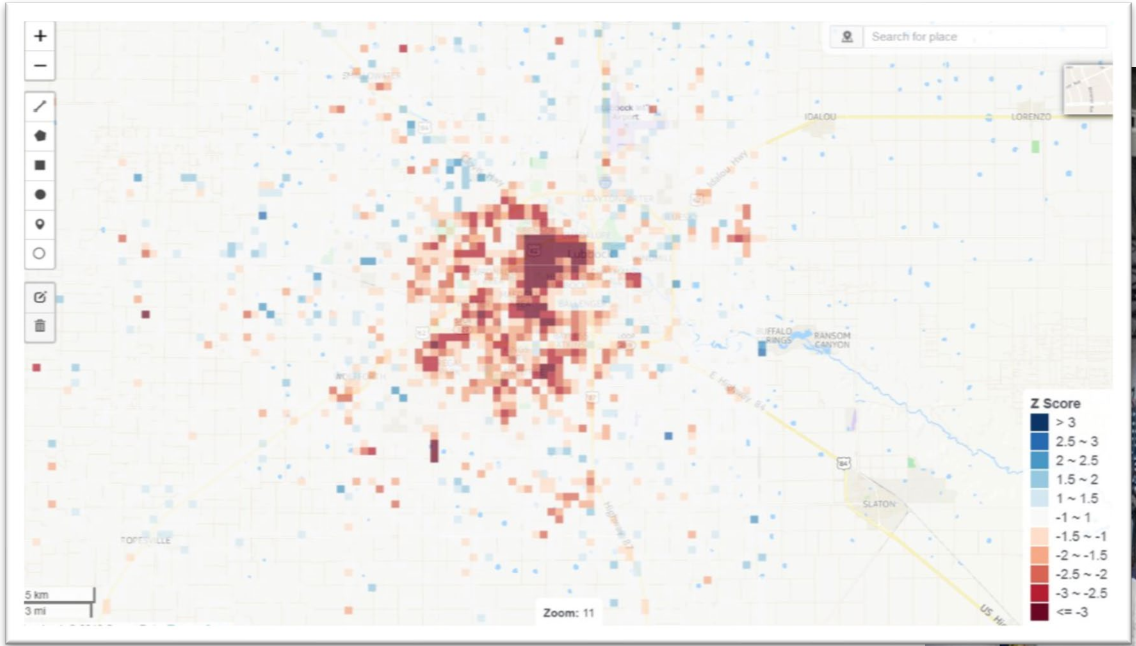
Andrew Schroeder, Director of Research and Analysis, Direct Relief

Breakout Session

esri

Crisis Mapping and Community Health

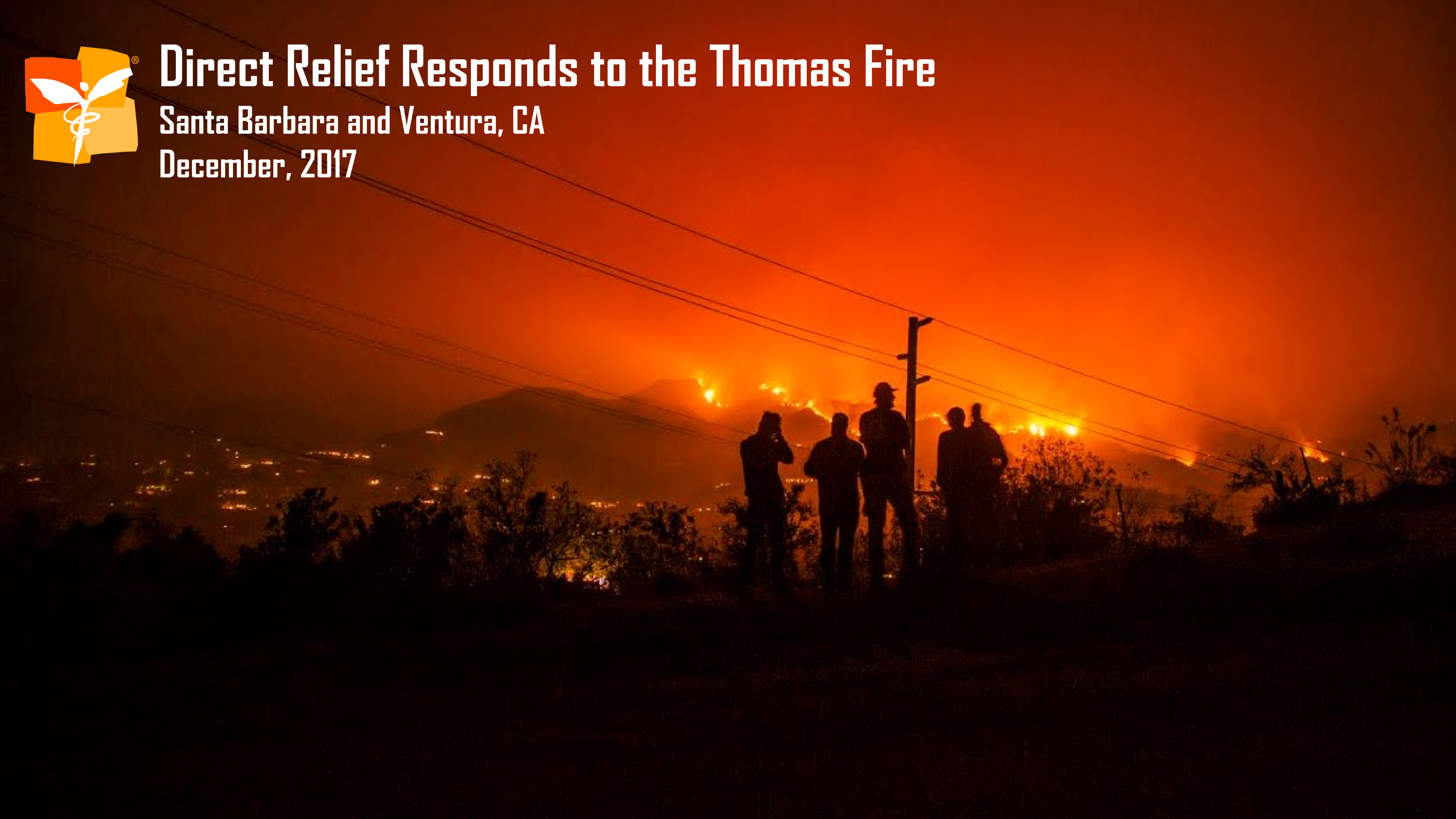
How Direct Relief is Improving Health Emergency Response with Facebook Disaster Maps



Direct Relief Responds to the Thomas Fire

Santa Barbara and Ventura, CA

December, 2017

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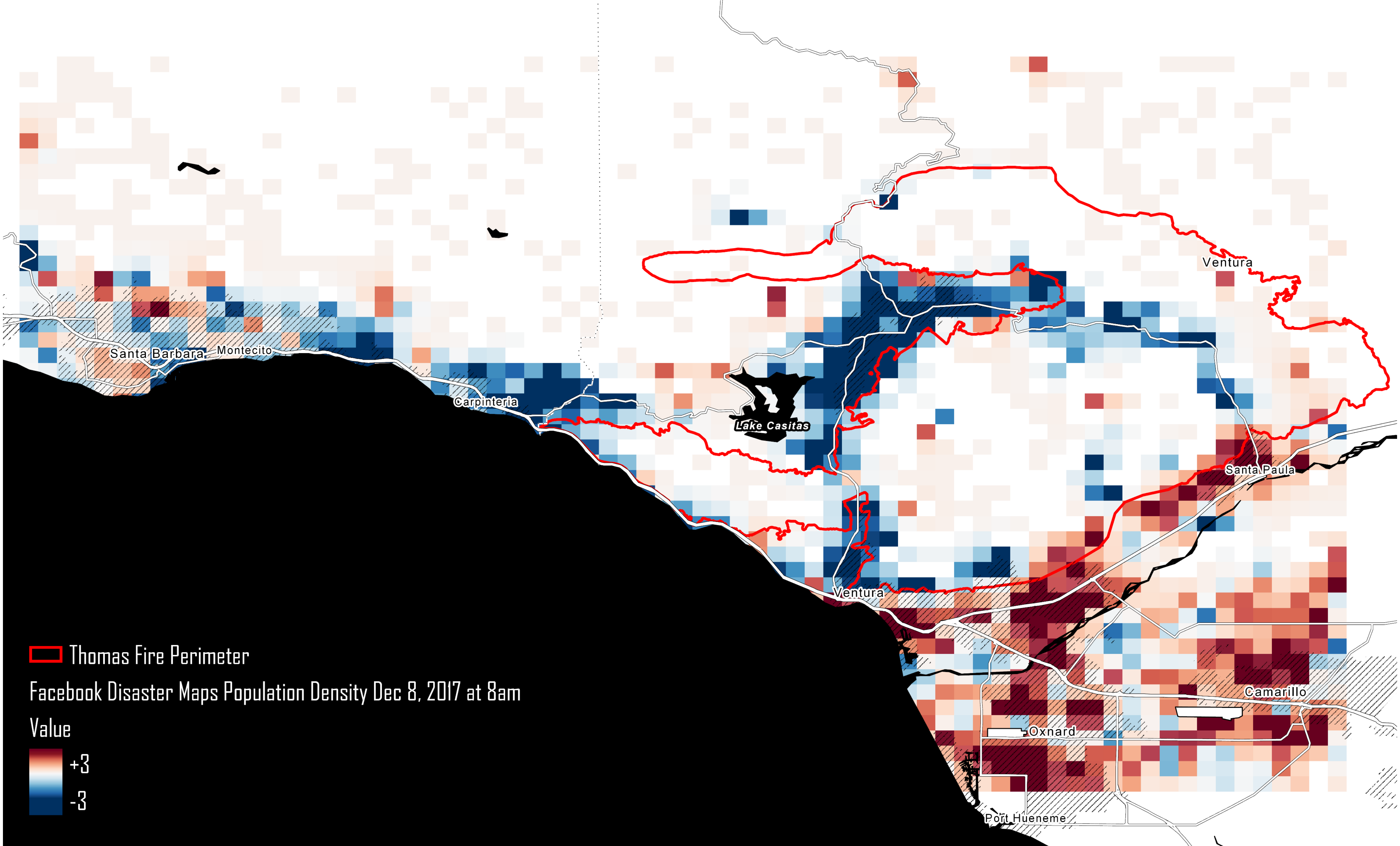

Ventura
Santa Barbara
Montecito
Carpinteria
Lake Casitas
Santa Paula
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Camarillo
Oxnard
Port Hueneme
Thomas Fire Perimeter
Facebook Disaster Maps Population Density Dec 8, 2017 at 8am
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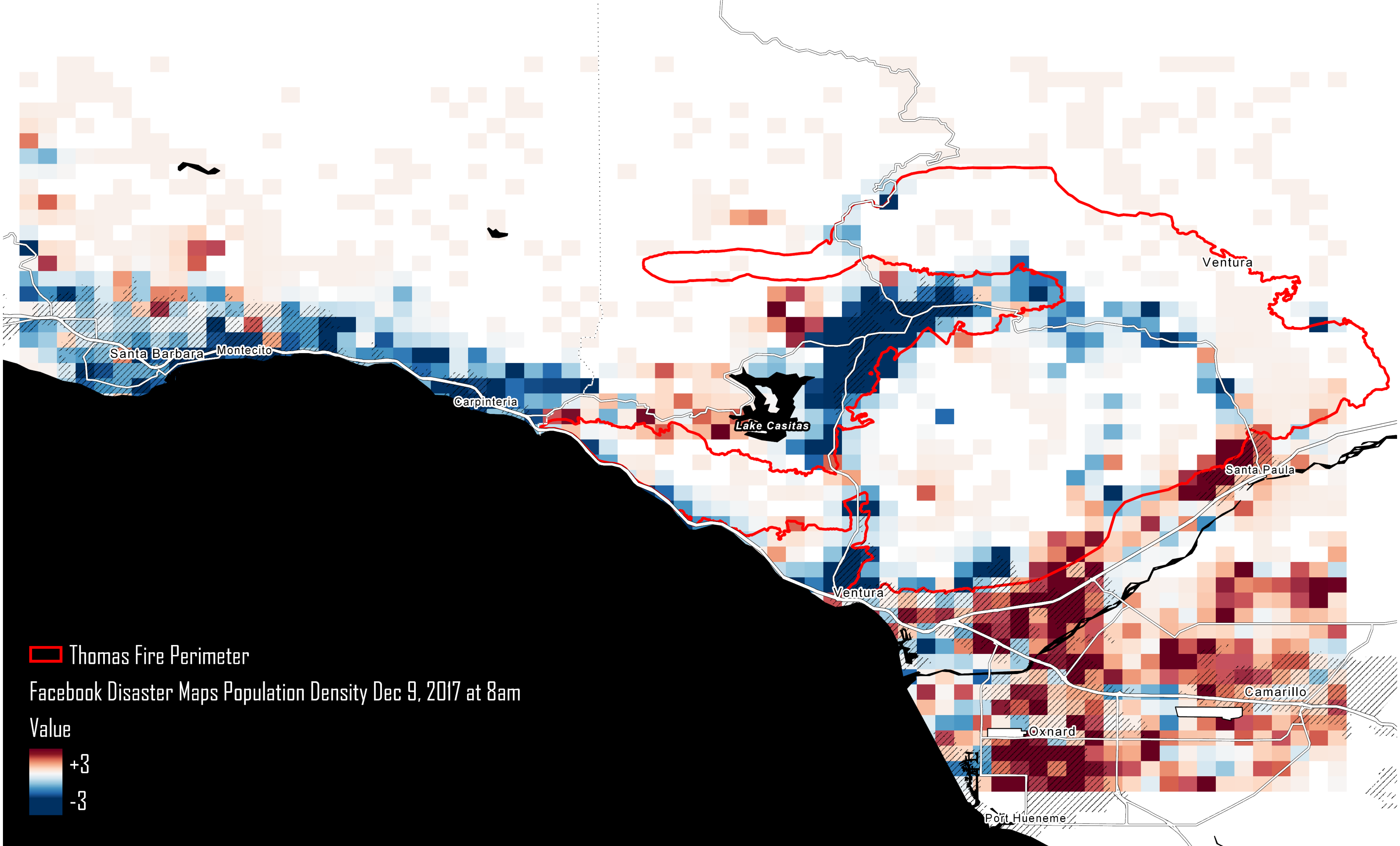

Thomas Fire Perimeter

Facebook Disaster Maps Population Density Dec 9, 2017 at 8am

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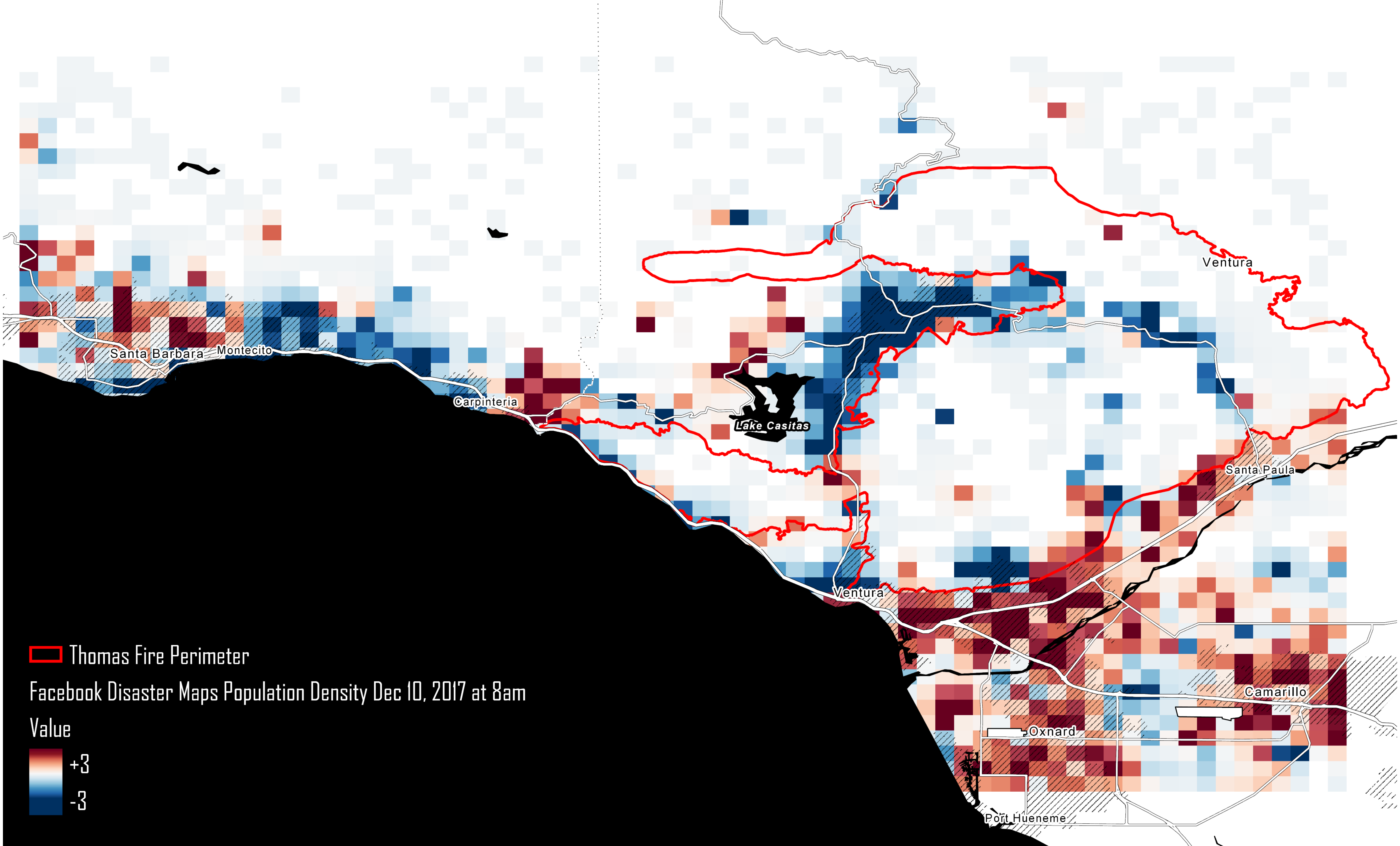
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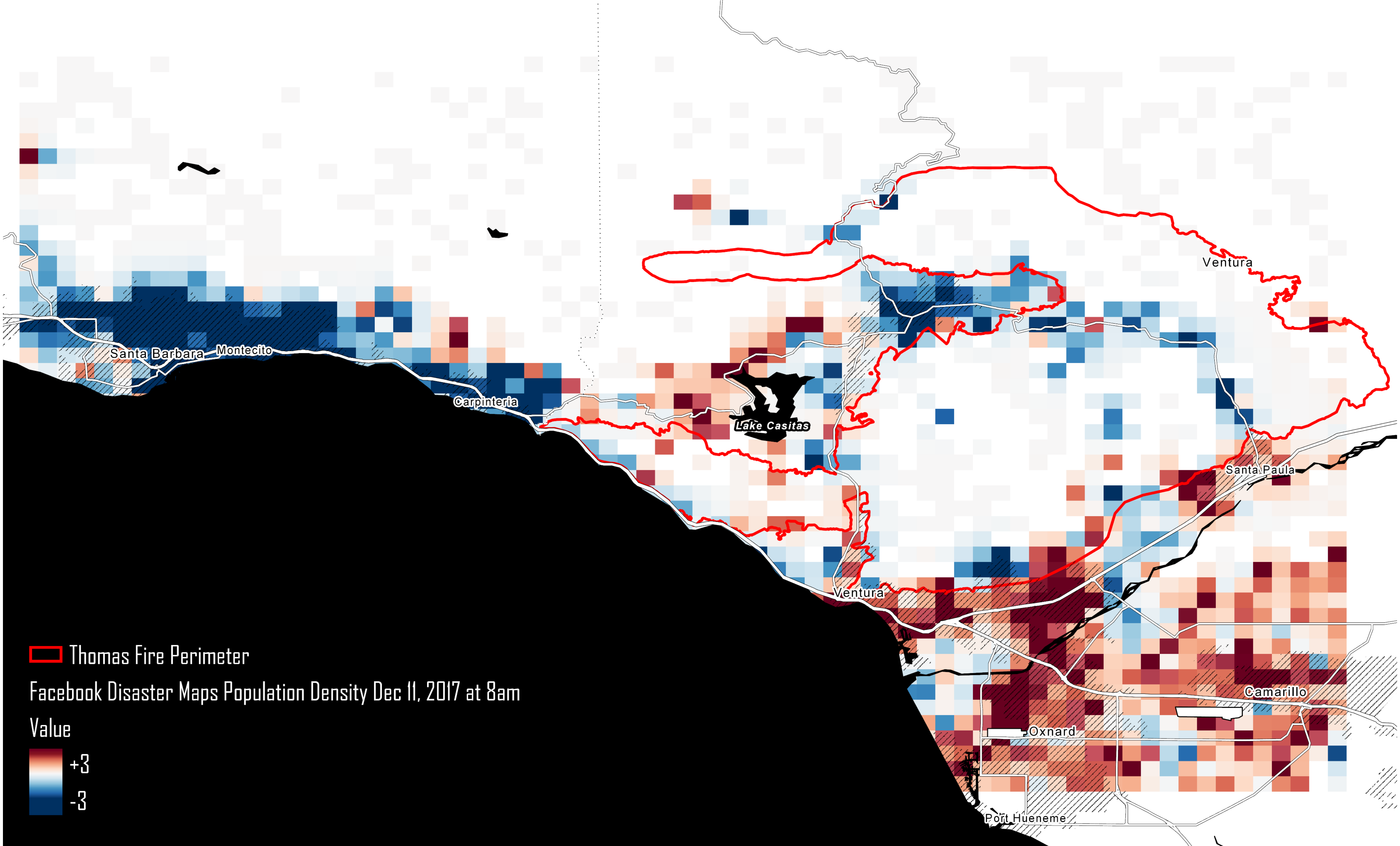
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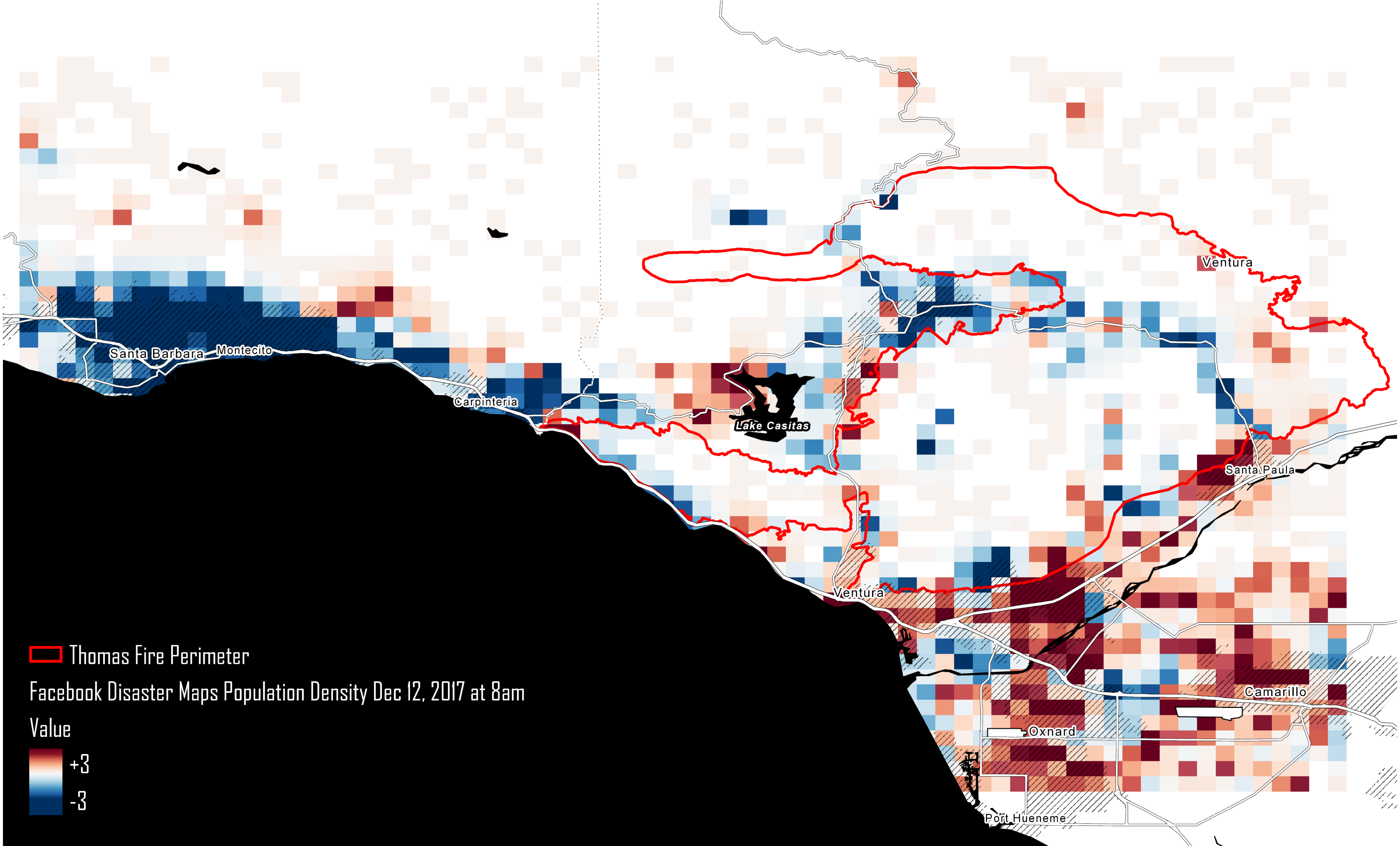
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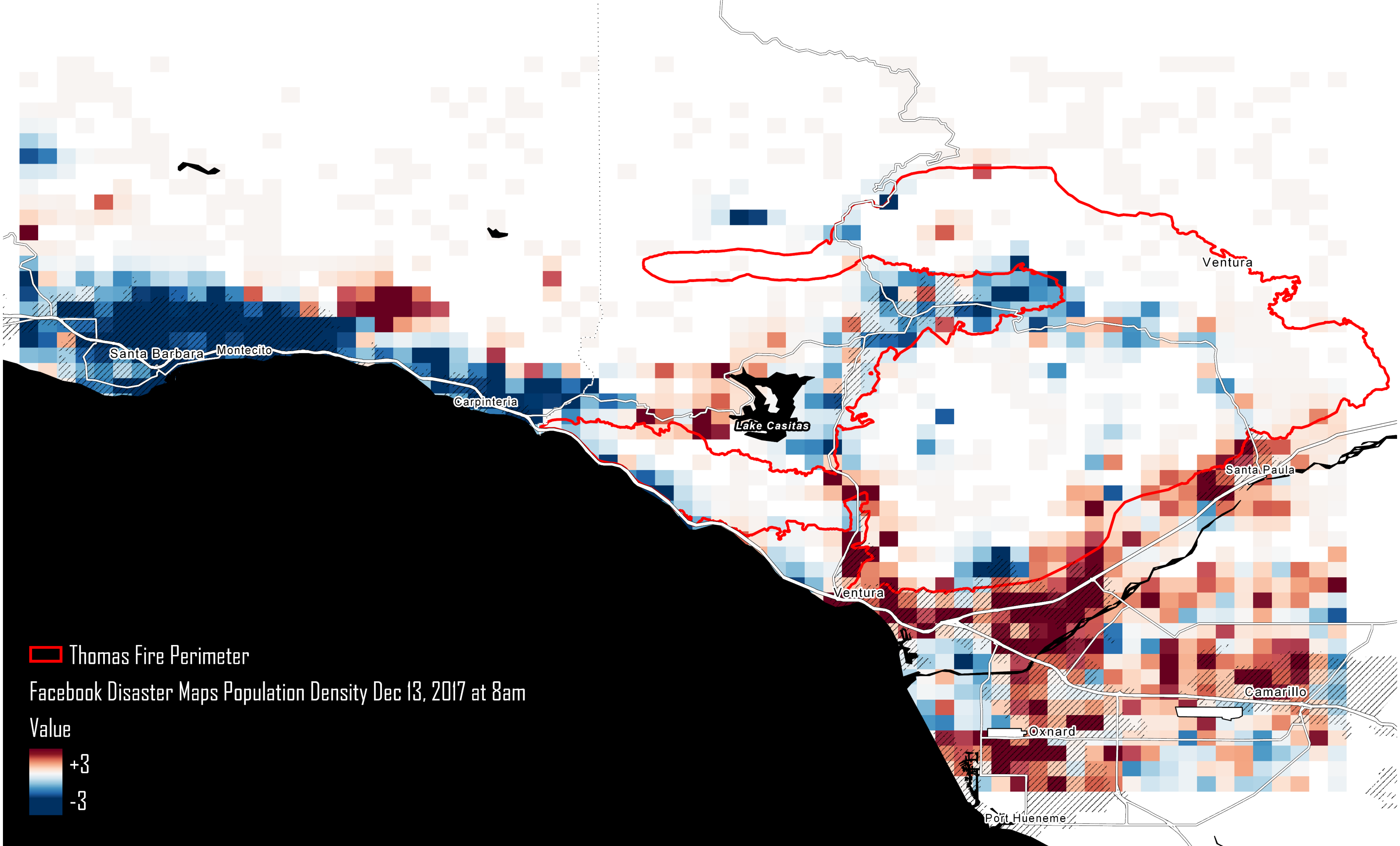
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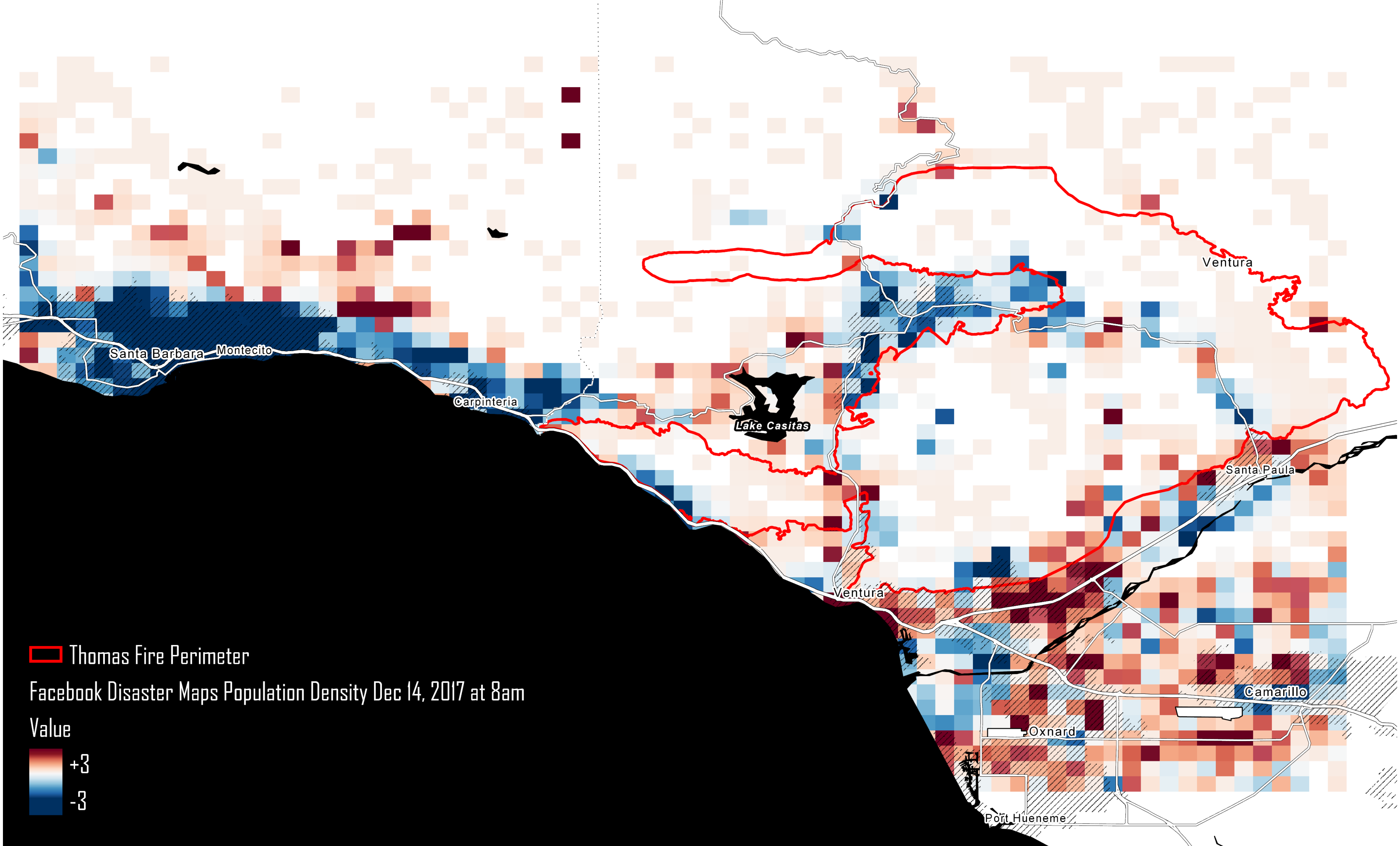
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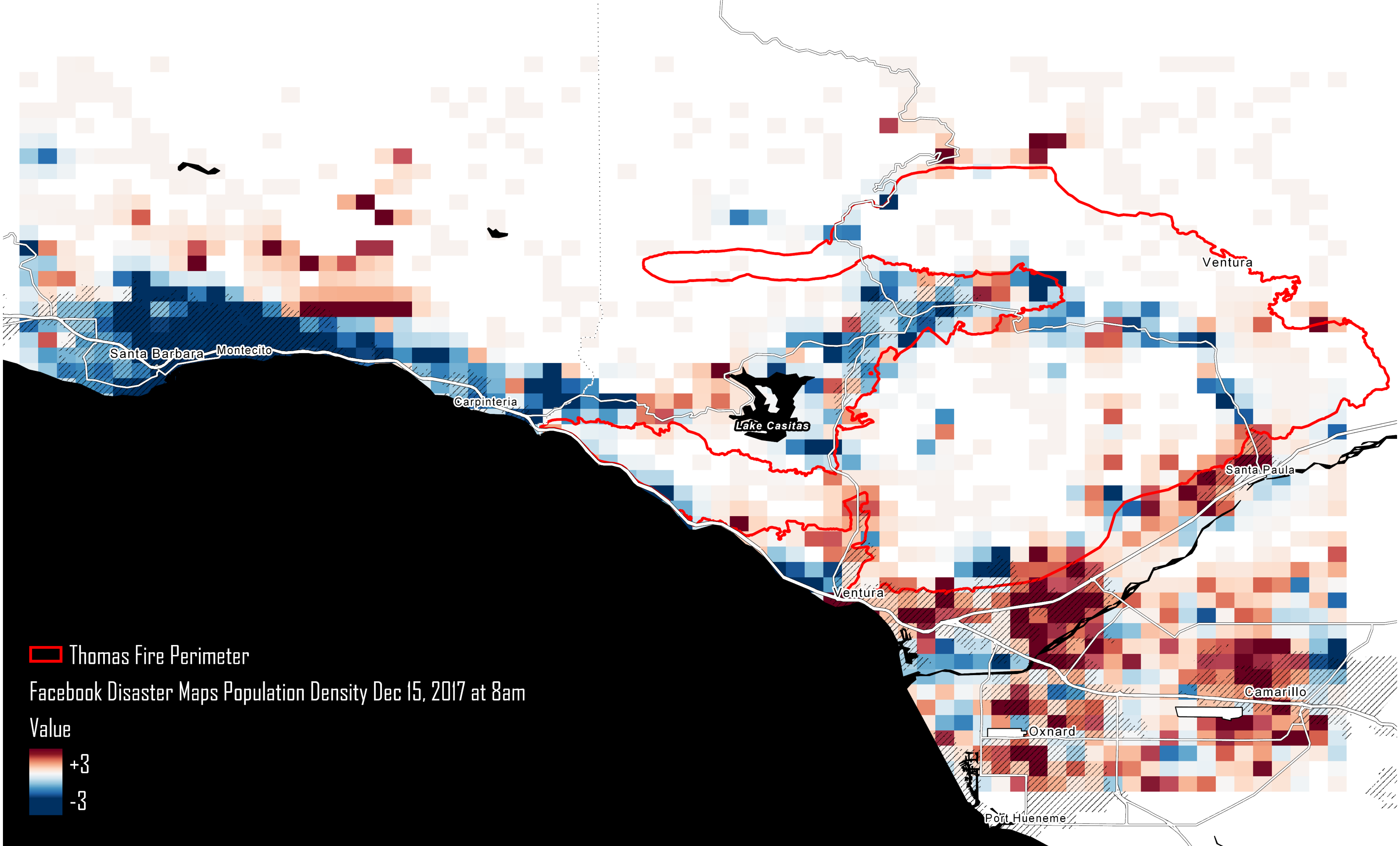
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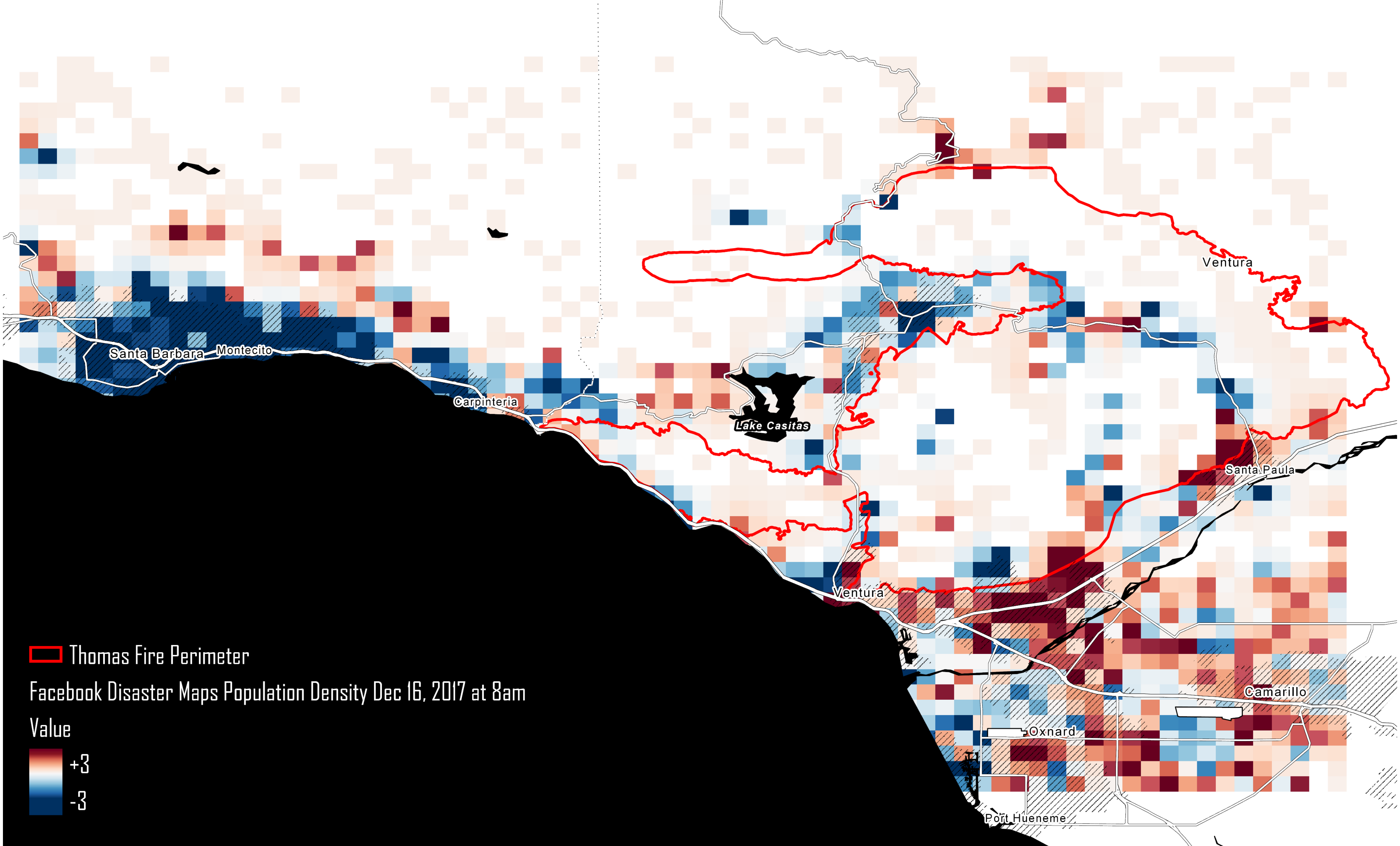
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Port Hueneme
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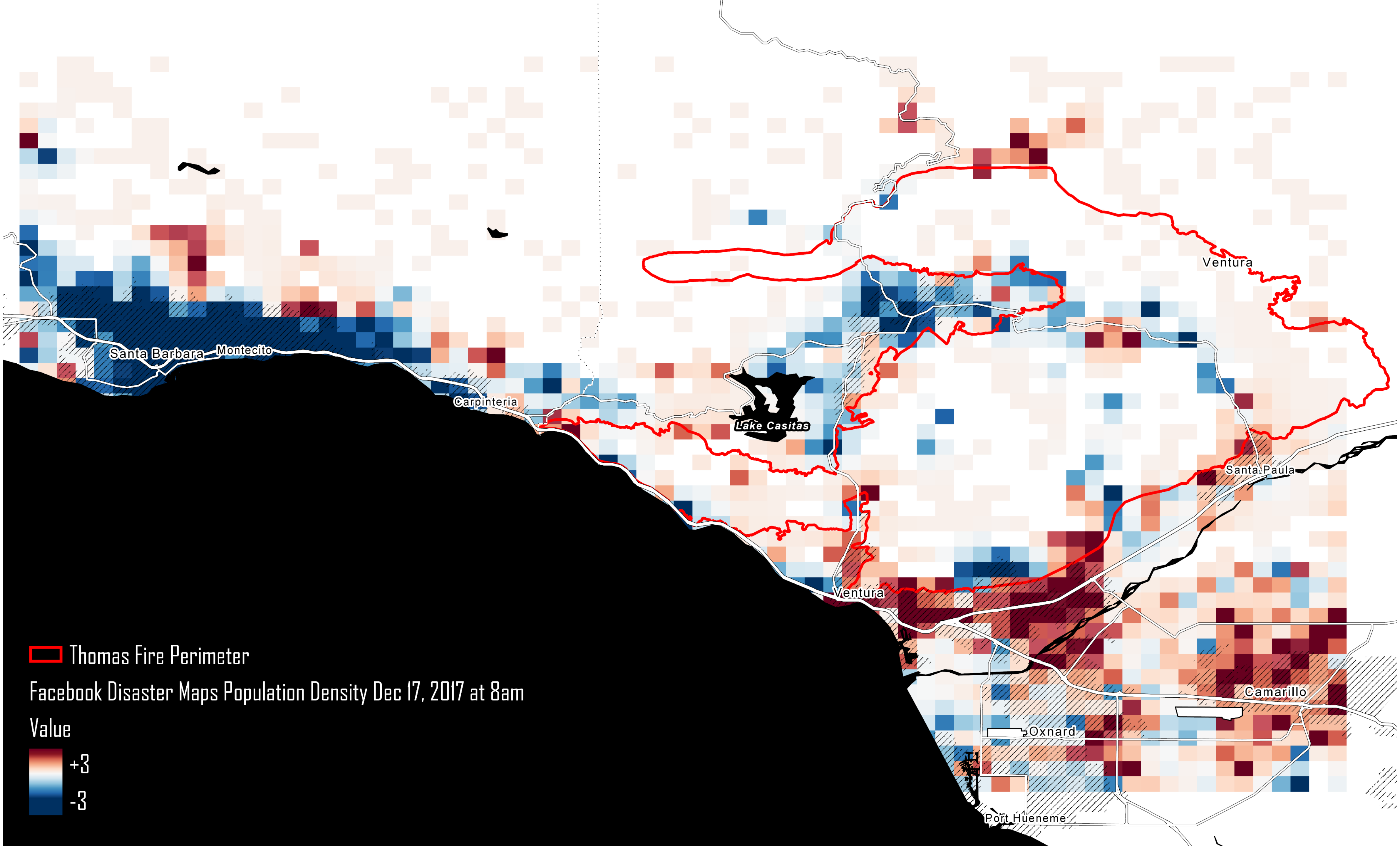

Ventura
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Carpinteria
Lake Casitas
Santa Paula
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Camarillo
Oxnard
Port Hueneme
Thomas Fire Perimeter
Facebook Disaster Maps Population Density Dec 17, 2017 at 8am
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DirectRelief
DirectRelief

How does Facebook population movement mapping work?

The disaster maps datasets are aggregated across time and space in the following ways:

- Temporal aggregation: While timely data is needed during a disaster, feedback from our partners indicated that organizations do not process and respond to new inputs in real time. For this reason, we share data at regular intervals (e.g., every hour, every six hours, every 24 hours). [2]
- Spatial aggregation: We aggregated geolocalized points to 360 square meter grid or local administrative boundaries.
- Spatial smoothing: Once we have calculated each metric (e.g., the number of people in administrative or pixel unit *x* during time period *y*), spatial smoothing is performed. For each spatial location, we compute a weighted average of the value in the tile itself with the values in neighboring tiles; tiles that are closer have a bigger contribution to the final result . This local averaging results in a map with a smoother, clearer signal, reducing noise due to random variation while preserving the key signal and further protecting privacy.

crisis_name	time_window	area_id	n_baseline	density_baseline	n_crisis	density_crisis	n_diff	percent_change	z_score
"Flood in Country X"	t1	a1	x1	x1 / total n_baseline at t1	y1	y1 / total n_crisis at t1	y1 - x1	100*(y1 - x1)/x1	(y1 - x1)/(Var(y1 - x1)^0.5)
"Flood in Country X"	t2	a2	x2	x2 / total n_baseline at t2	y2	y2 / total n_crisis at t2	y2 - x2	100*(y2 - x2)/x2	(y2 - x2)/(Var(y2 - x2)^0.5)
"Flood in Country X"	t3	a3	x3	x3 / total n_baseline at t3	y3	y3 / total n_crisis at t3	y3 - x3	100*(y3 - x3)/x3	(y3 - x3)/(Var(y3 - x3)^0.5)
"Flood in Country X"	t4	a4	x4	x4 / total n_baseline at t4	y4	y4 / total n_crisis at t4	y4 - x4	100*(y4 - x4)/x4	(y4 - x4)/(Var(y4 - x4)^0.5)
"Flood in Country X"	t5	a5	x5	x5 / total n_baseline at t5	y5	y5 / total n_crisis at t5	y5 - x5	100*(y5 - x5)/x5	(y5 - x5)/(Var(y5 - x5)^0.5)

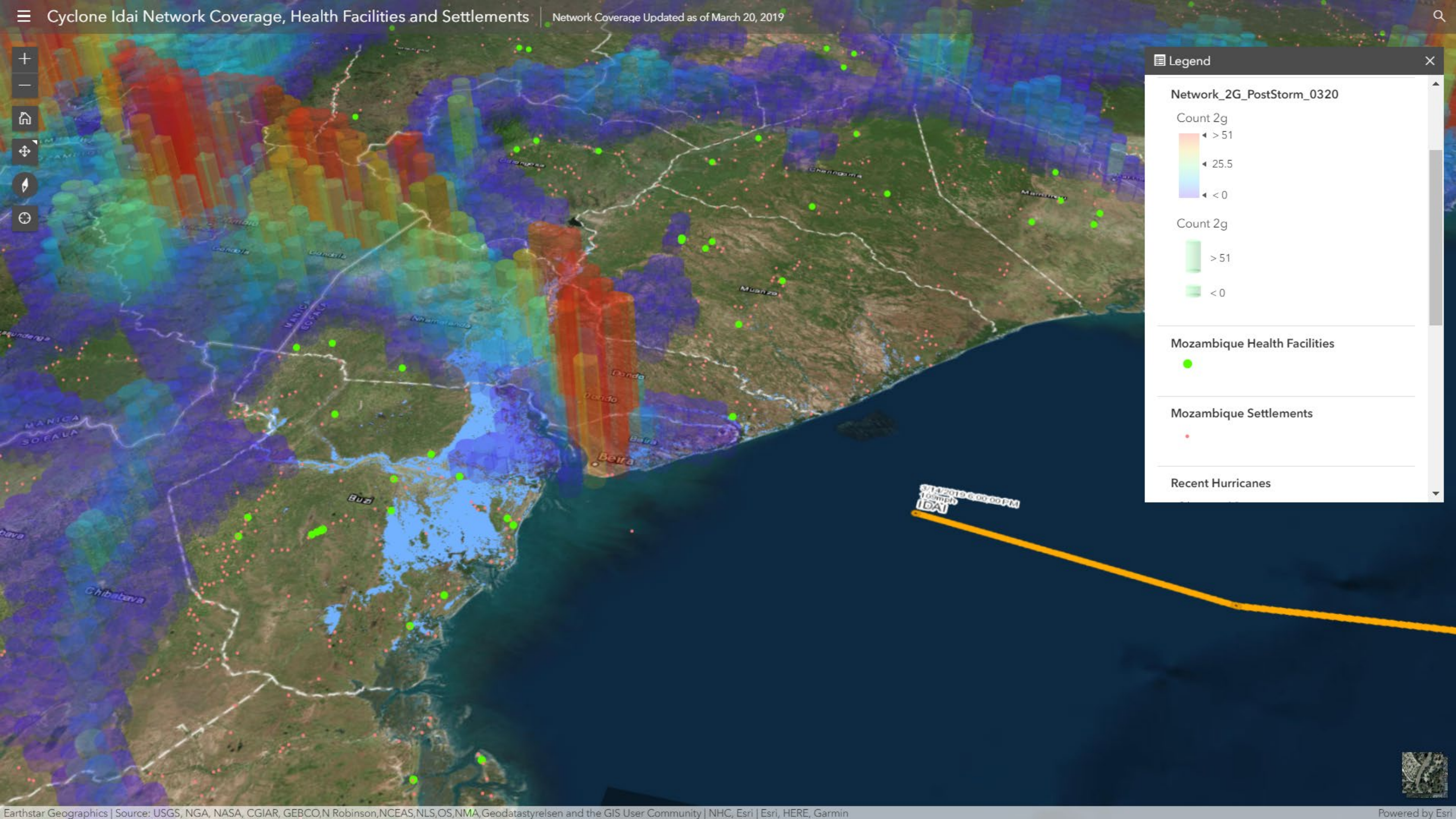
Where:

- **crisis_name:** The name of the event.
- **time_window**: The hour(s) during which the data are recorded.
- **area_id:** The tile name. In the raster form, this represents a given raster pixel on the map which can be spatially aggregated to be interoperable with other data sets. In the administrative form, the area_id represents the administrative boundary name of an area that can be joined with other administrative datasets (e.g. census data).
- **n_baseline, density_baseline: T**he average number of people in the same area during the same time window, but averaged over the previous three weeks. This estimates how many people we expect to be in each area during the specified time.
- **n_crisis, density_crisis:** The number of people observed in the tile during the time period *t*.
- **n_diff**: The difference between the population at the time of the crisis and the population during the baseline.
- **percent_change**: The percentage difference between the population at the time of the crisis and the population during the baseline.
- **z_score**: The number of standard deviations by which the crisis population differs from the baseline.

Connecting Health Centers after Cyclone Idai

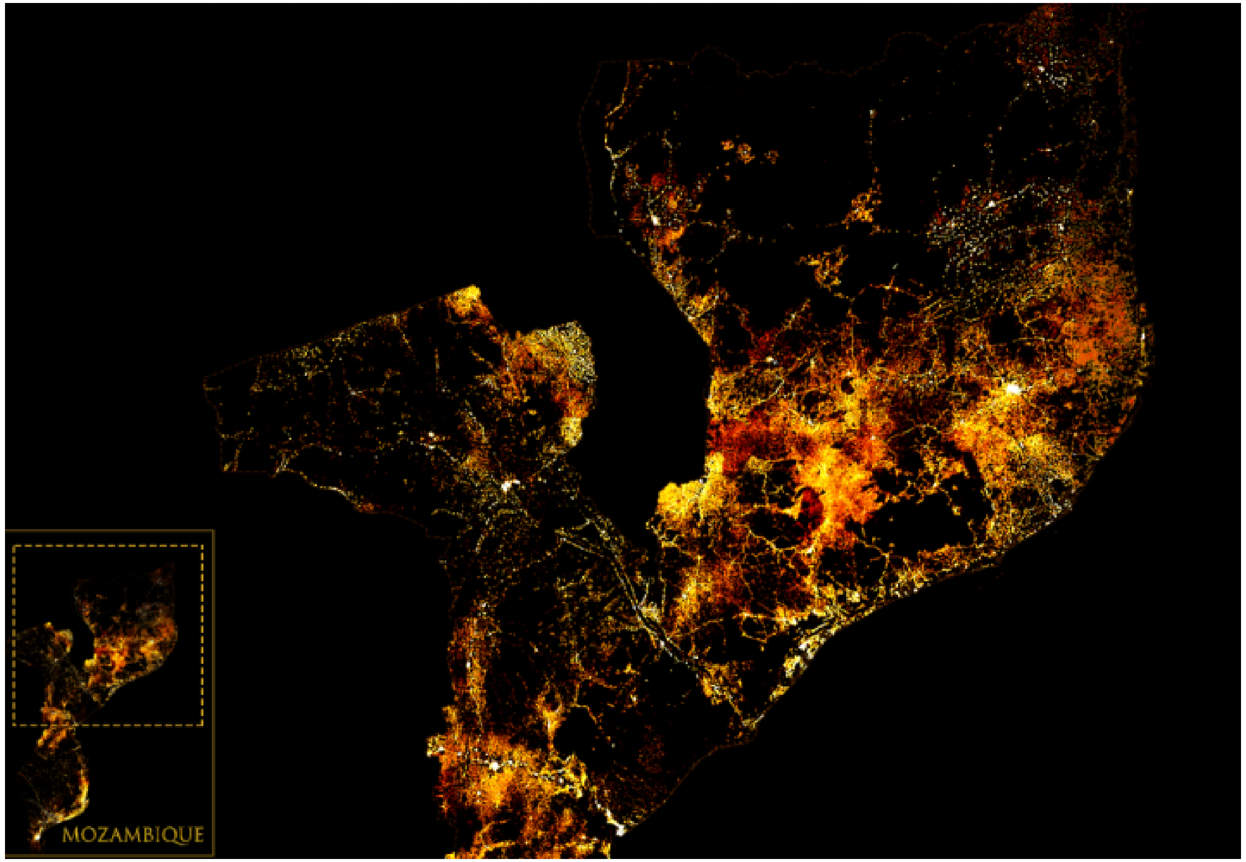
Beira, Mozambique

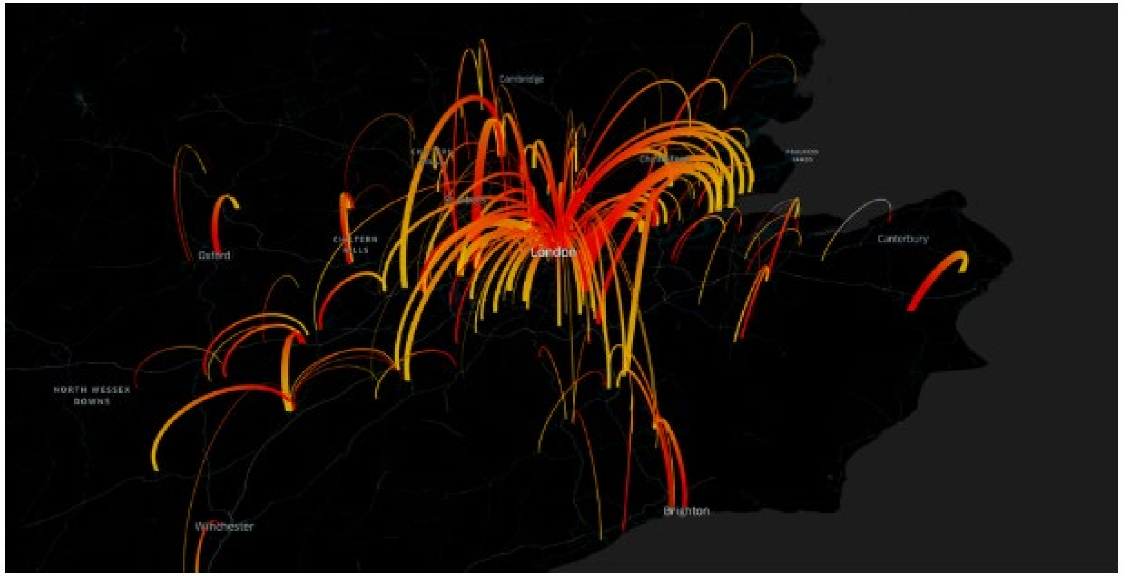
March, 2019


Cyclone Idai Network Coverage, Health Facilities and Settlements
Network Coverage Updated as of March 20, 2019
Legend
Network_2G_PostStorm_0320
Count 2g
> 51
25.5
< 0
Count 2g
> 51
< 0
Mozambique Health Facilities
Mozambique Settlements
Recent Hurricanes
Beira
Buzi
Chibabava
IDAI
Earthstar Geographics | Source: USGS, NGA, NASA, CGIAR, GEBCO,N Robinson,NCEAS,NLS,OS,NMA,Geodatastyrelsen and the GIS User Community | NHC, Esri | Esri, HERE, Garmin
Powered by Esri

May 20, 2019

Helping Organizations Respond to Health Emergencies





The above map shows movement between Greater London and surrounding areas by day. These data are useful to public health organizations looking at the spread of infectious diseases, such as the flu.

By Laura McGorman and Alex Pompe, Data for Good

When planning public health campaigns or responding to disease outbreaks, health organizations need information on where intended beneficiaries live, as well as real-time insights from the field. However, in much of the world, information from the most recent census is often out of date and timely insights from remote communities are scarce.

Facebook

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Last updated on May 20, 2019

Facebook's Data for Good program includes tools built from de-identified data on our platform, as well as tools that we develop using satellite imagery and other publicly available sources. When data is shared responsibly with the communities that need it, it can improve wellbeing and save lives.

Datasets | Activity Stream | Stats

Data [53] Search all datasets ... Show filter: Show 25 | 50 | 100 ORDER BY: Last Modified

Refine your search: Clear all

FEATURED:

- CODs [0]
- Sub-national [51]
- Geodata [51]
- Datasets on request(HDX Connect) [0]
- Datasets with Quick Charts [0]
- Datasets with Showcase [0]
- Datasets with HXL tags [0]

LOCATIONS:

- Albania [1]

Zimbabwe: High Resolution Population Density Maps + Demographic Estimates

Facebook

70+ Downloads

Updated May 20, 2019 | Dataset date: Oct 1, 2018

This dataset updates: Every three months

The population of the world, allocated to 1 arcsecond blocks. This refines CIESIN's Gridded Population of the World project, using machine learning models on high-resolution worldwide Digital Globe satellite imagery. More information. There is also a tiled version of this dataset that may be easier to use if you are interested in many countries.

ZIPPED GEOTIFF ZIPPED CSV

Zambia: High Resolution Population Density Maps + Demographic Estimates

Facebook

50+ Downloads

Updated May 20, 2019 | Dataset date: Oct 1, 2018

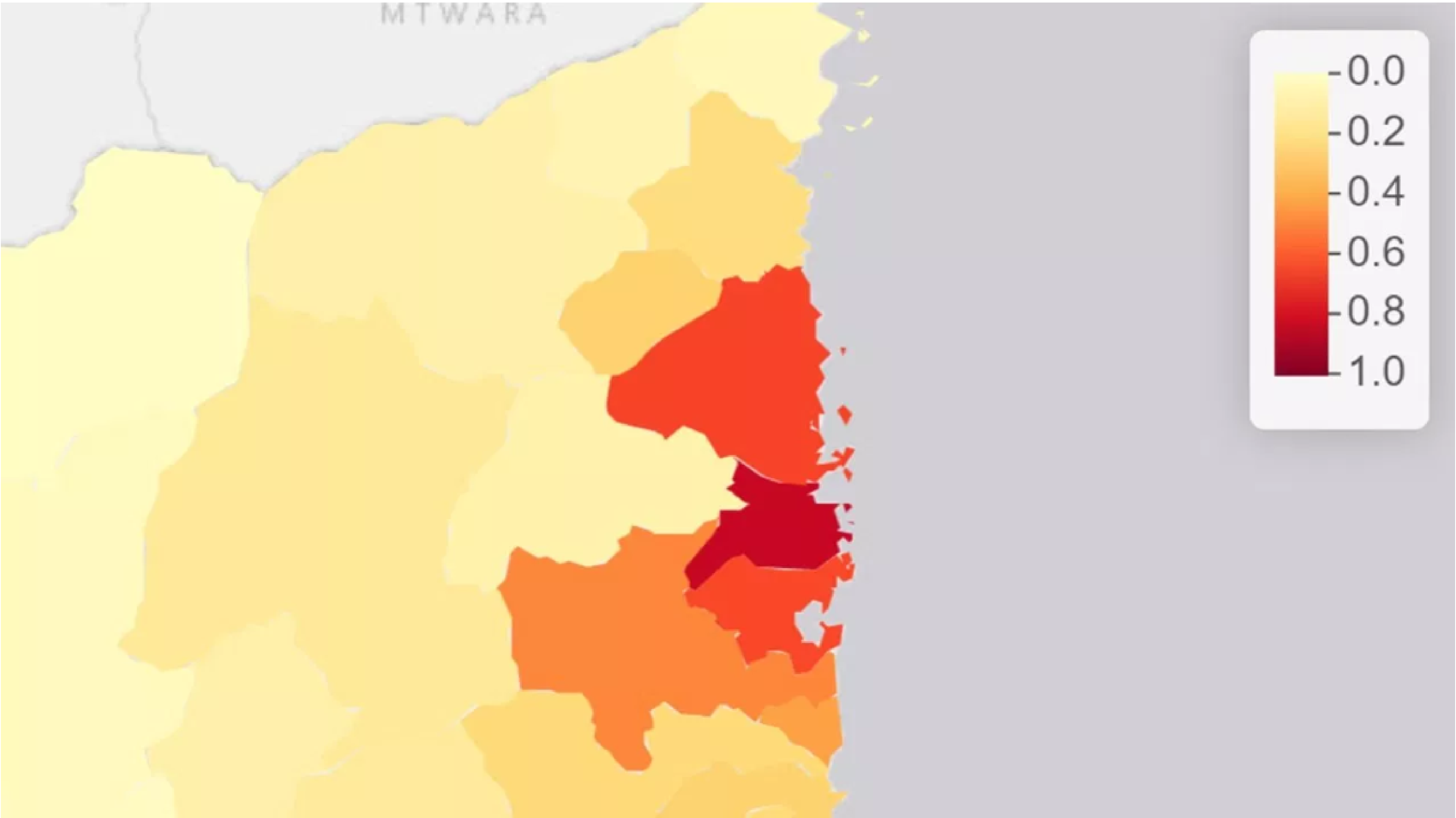
This dataset updates: Every three months

The population of the world, allocated to 1 arcsecond blocks. This refines CIESIN's Gridded Population of the World project, using machine learning models on high-resolution worldwide Digital Globe satellite imagery. More information. There is also a tiled version of this dataset that may be easier to use if you are interested in many countries.

ZIPPED GEOTIFF ZIPPED CSV

Predicting the Spread of Cholera in Mozambique as Case Count Rises

Modeling aims to target vaccination campaigns and protect more people against the disease.

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Thank you

Andrew Schroeder, PhD
Director of Research and Analysis
Direct Relief
Aschroeder@directrelief.org

Questions?