

A satellite image of Western North America, showing the Pacific Northwest, California, and parts of Mexico. Large, billowing plumes of white and grey smoke are visible rising from the coast and inland areas, indicating active wildfires. Several red outlines are drawn on the landmass, highlighting specific regions affected by fires. The ocean is dark blue, and the land is a mix of brown, tan, and green, representing different vegetation and terrain types.

WESTERN WILDFIRES AND CLIMATE CHANGE

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WINE COUNTRY FIRES

DANGER FAR FROM OVER



Embers still glow at a burned house on Mount Diablo Road in Napa County after flames from the Napa Fire scorched the area. The blaze joined the Northern Fire and consumed nearly 15,000 acres.

Pollution: Smoke spews dangerous toxins across the Bay Area, fouling air, creating health hazards

By Eric Lipton

The air quality in much of the Bay Area this week has at times been comparable — or even worse than — Beijing, one of the most polluted cities in the world, as smoke from the Wine Country wildfires drifts south and settles over the region.

Smoke-choked residents were made to wear masks and stay indoors, and even on BART trains and inside offices, schools kept residents

Death toll: Count hits 31, expected to jump with hundreds still missing

By Kimberly Vickrey, Jill Tucker, Melody Gundersen and Peter Frazier

The death toll from Northern California's monstrous wildfires jumped to 31 on Thursday as the search for missing people in heavily wooded areas continues. Firefighters with cadaver dogs headed into the burn zones of Santa Rita to find the bodies buried under the ash and rubble.

Fires were still consuming residential areas and evacuations were still in effect on the southeast side of Santa Rosa Thursday, but farther north, the emergency response had turned into a grim search for what authorities fear could be dozens, even hundreds, more dead.

"We're moving into a recovery phase,"

Fires continue on A10

Family's tragedy: In pool to escape flames, wife dies in husband's arms

By Eric Lipton

As fire raged all around them and smoke choked their lungs, Carmen and Armando Torres had one choice but trying to save one another while immersed in a swimming pool behind their house on the north edge of Santa Rosa.

They held on through the long hours of the night, until the flames that had destroyed the house on the forested ridge rose finally began to abate, until the heat was no longer unbearable. And just before dawn, just as the worst of the inferno had passed, Carmen Torres stopped breathing. She died in the

Tragedy continues on A10

Changes: Northern part of state becoming more like blaze-prone south

By Martin Alexander

The catastrophic fires that have ravaged Wine Country this week may be unprecedented in scale, but they're hardly the latest in a series of disasters that have blazed through the hills and valleys south of San Francisco in recent years. And the trend is likely to continue.

An unprecedented clash across the West and California's burning vineyards is the latest in a series of increasingly rare weather events, from the massive 2013-14 El Niño to the historic 2015-16 drought, which saw temperatures in the Central Valley rise to record levels.

Climate continues on A10



Smoke continues on A10

source

WINE COUNTRY FIRES

FROM A SPARK TO AN INFERNO

Blazes quickly turned 'unstoppable' as North Bay slept

By Martin Frazier

His crew had just finished putting out a grass fire when Santa Rosa Fire Chief Tony Gonsky's radio crackled at about 10 p.m.

"We've got a fire at Saffari West and it's coming our way," the dispatcher said.

The wildfire preserve set in Sonoma County's thickly wooded hills was just 6 miles away, and Gonsky knew

that it was a uniquely dangerous spot. The winds this Sunday night were stiff, and parched grass and cedar-dry trees filled the valley leading straight to town.

Gonsky drove up a hill to take a look. Off in the distance, as he crested the slope, was an orange glow, angry and wide.

"My God," he thought. "We're in trouble."

Blazes continue on A10



Santa Rosa firefighters keep a close watch on a fire in the Oakmont neighborhood in Santa Rosa, which suffered the greatest damage to homes and businesses.

SONOMA: Hundreds flee as windblown flames ignite homes near town square

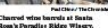
By Catherine Ho, Martin Frazier, Hannah Alexander and Peter Frazier

Embers whirled up by flames Saturday, igniting several homes in the town of Sonoma and forcing the evacuation of thousands of people who, until now, had enjoyed the nearby view of the wildfire that lives in the hills 40 miles and destroyed 1,000 structures in the Wine Country and beyond.

Sonoma County burned just one of the historic towns in Sonoma as the party winds that consumed much of the county this week moved toward town, forcing firefighters to be on hand to keep the flames from spreading.

"There's a party and a fight going on in the field right now," said Dave Crawford, the county fire chief, chief of the California Department of Fire Services.

Blazes continue on A10



Wine Country's Wine Country

Wine industry: Vintners optimistic over long term, but big questions remain

By Martin Frazier

Many of the most powerful vintners coming out of the Wine Country fire last week depicted the wine industry as resilient, its future brightened by a generation of winery moguls in flames and reduced to ash. Some, however, were of a grimmer, backlit by a long line of approaching storms.

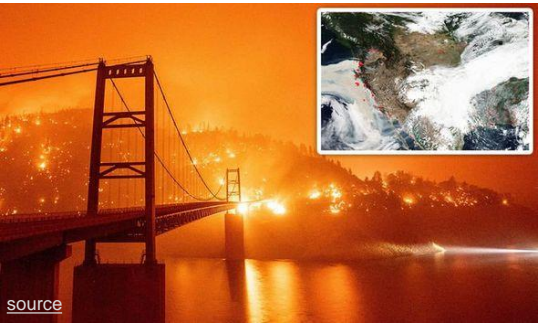
Uncertainty and anxiety grip the wine community. And in the magnitude of the damage because of the fire, the industry is looking for ways to recover and rebuild. The industry is looking for ways to recover and rebuild. The industry is looking for ways to recover and rebuild.

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Wine Country's Wine Country

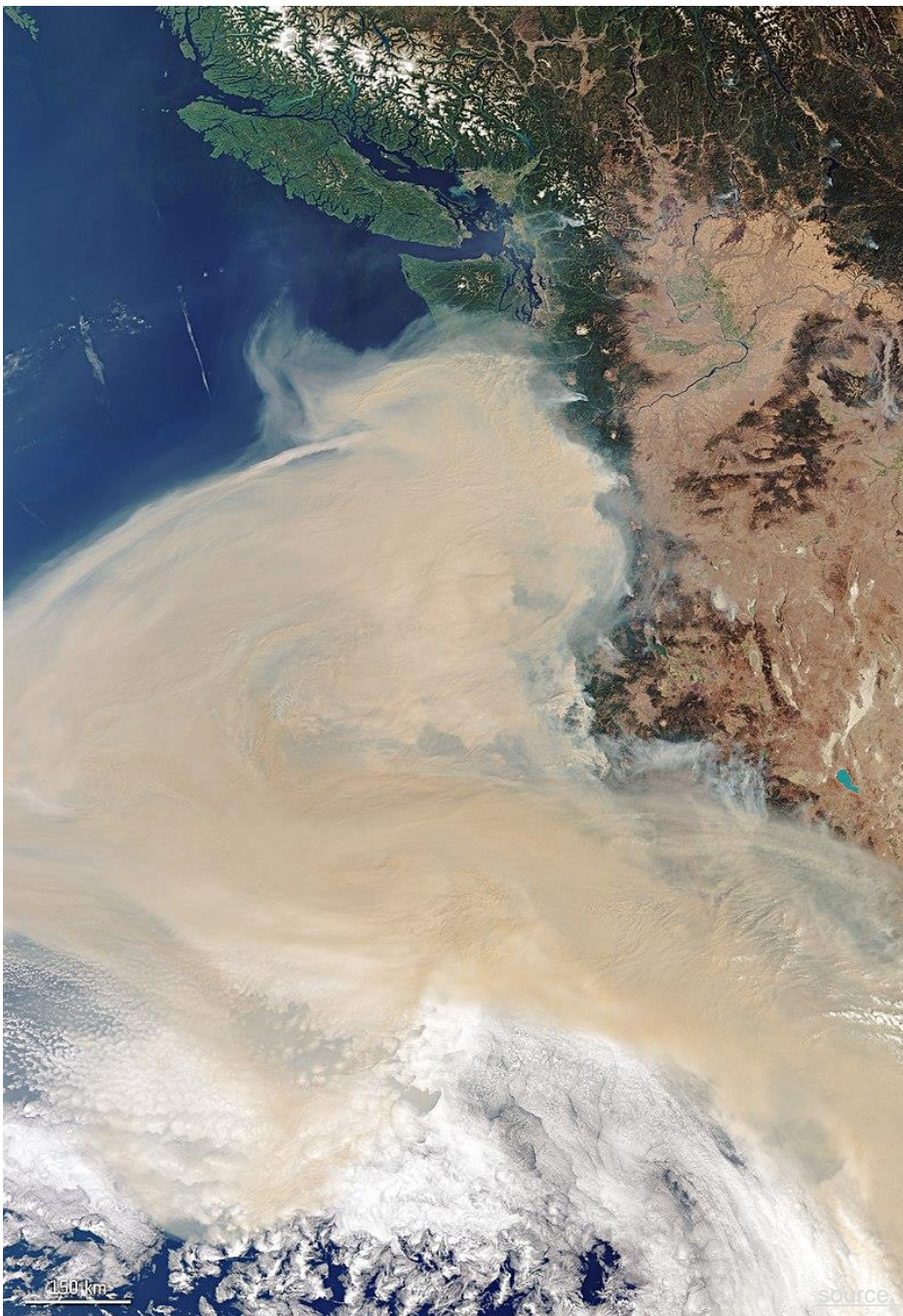
More Wine Country fire coverage on Pages A7-17. Updates at sfchronicle.com/north-bay-fires

source



source

Is fire season now a year-round reality?



Between 1992 – 2015 more than 1.8 million
wild fires were recorded

Number of fires between 4 – 20 km² is
increasing



By the end of 2020, 9,639 fires had burned
4,397,809 acres – more than 4% of California's
acres of land

DATA STRATEGY

DATA MINING



Fire Program Analysis (FPA)

US wildfires from 1992 - 2015

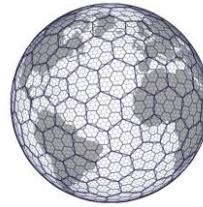


NOAA API

Creating a database of weather and climate data

Temperature | Precipitation
Wind Speed

DATA PROCESSING



H3: Uber's Hexagonal Hierarchical Spatial Index



Time Series Forecasting

MODELING

1

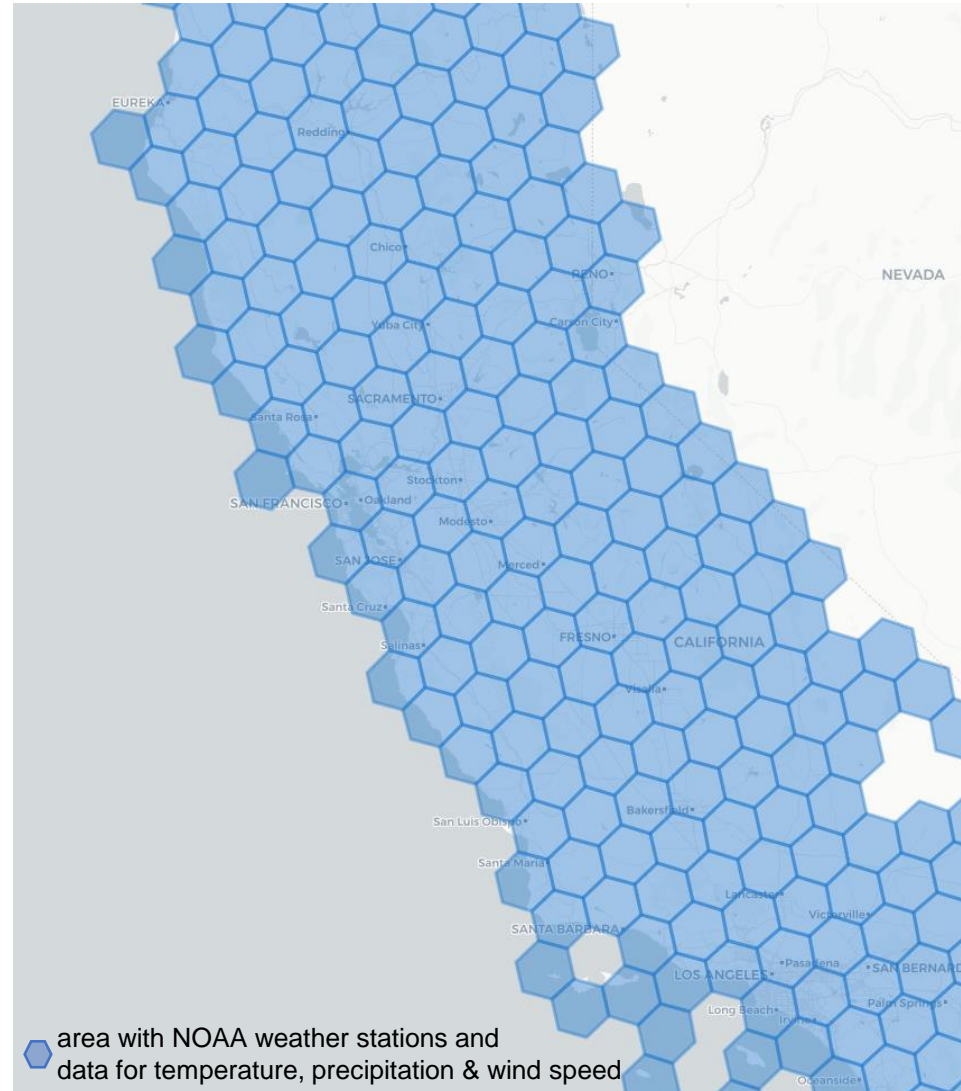
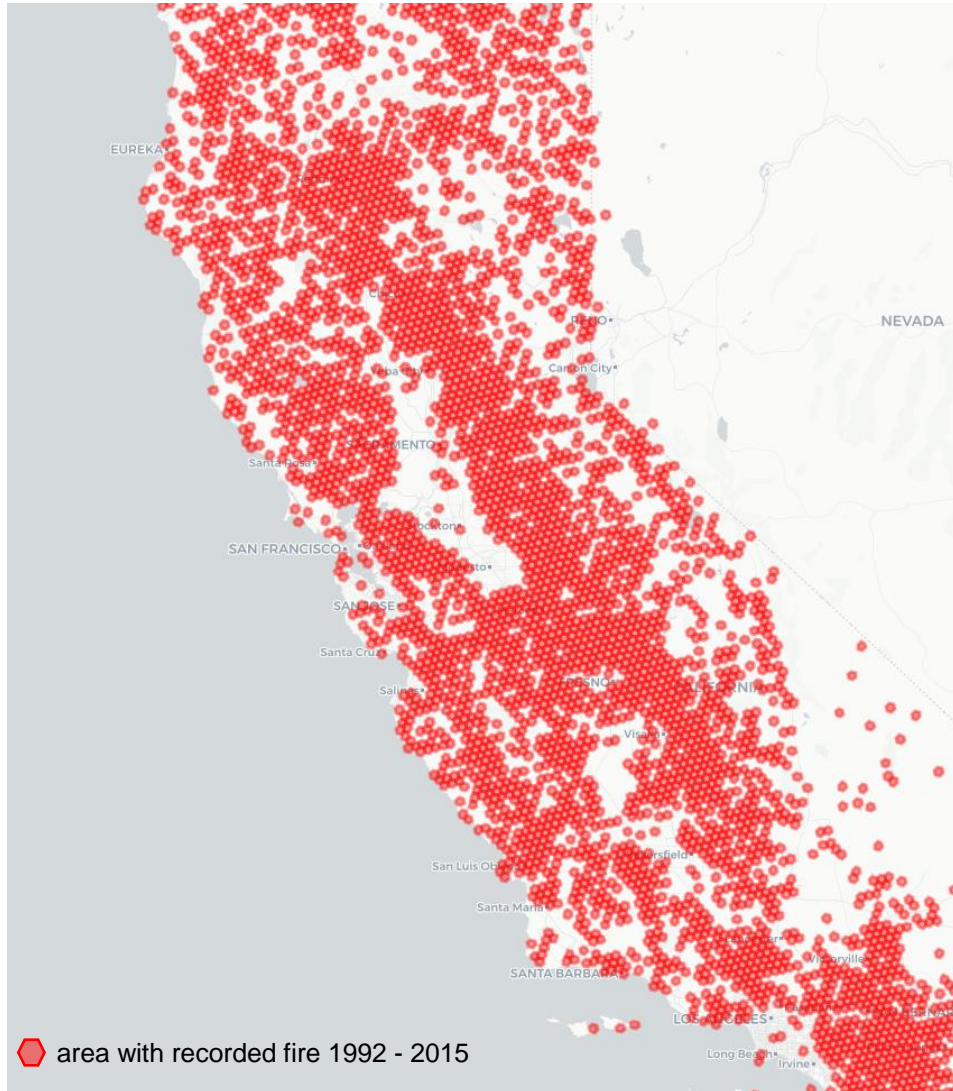
Risk of wildfires in California

2

Expected size of wildfires

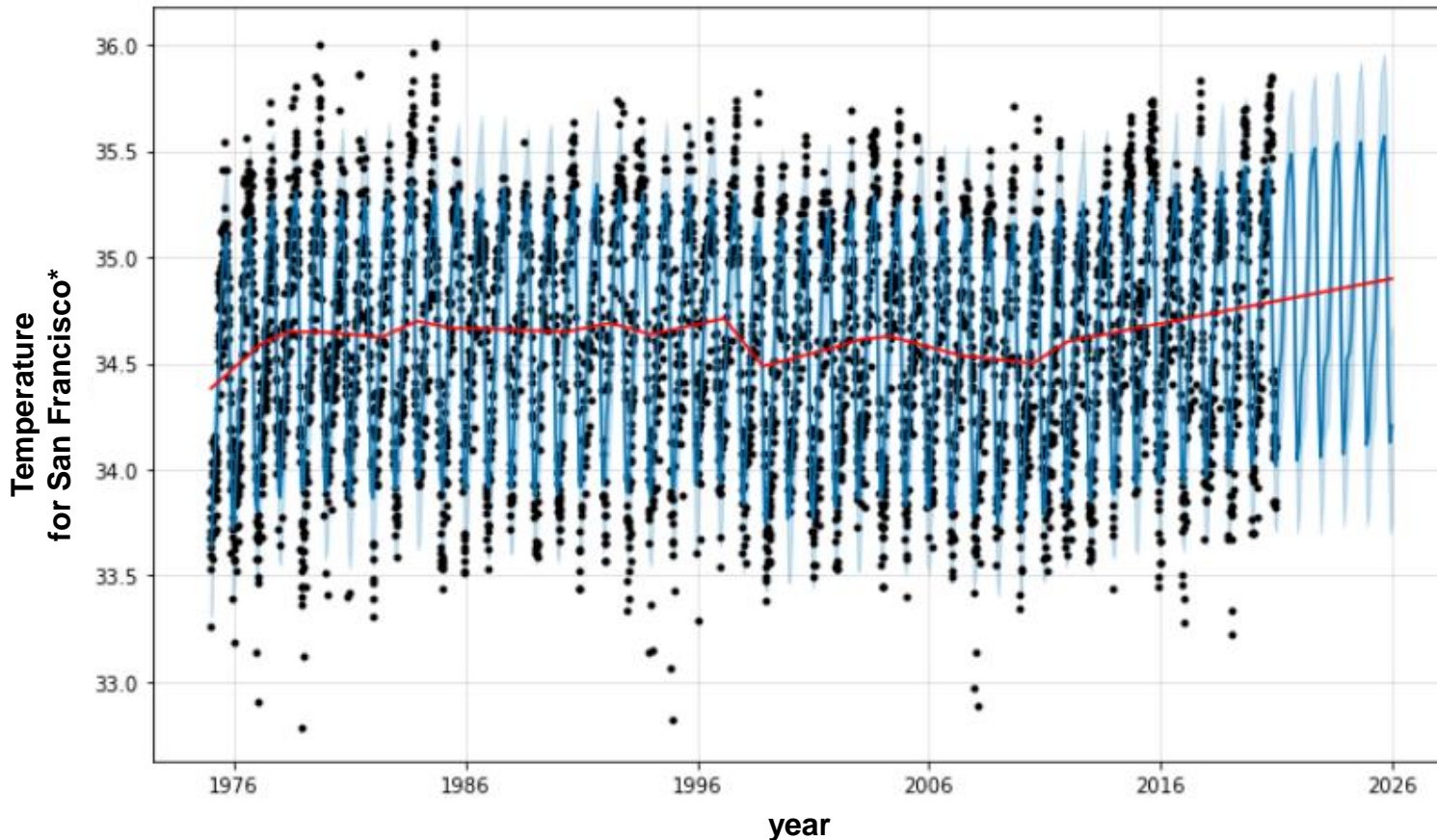
DATA MINING & PROCESSING

Creation of a database with wildfire & climate data



DATA PROCESSING

Impact of climate change on features



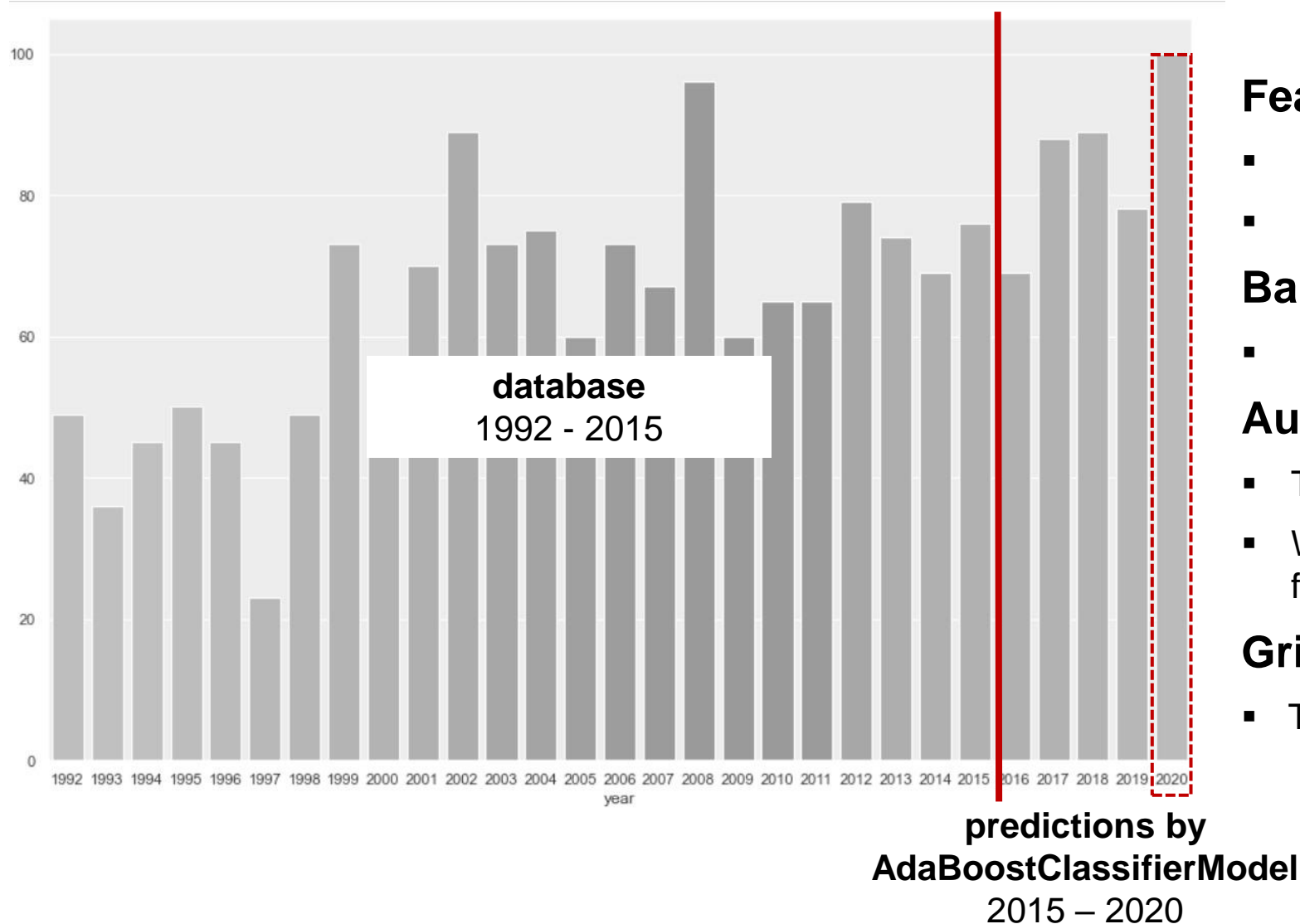
*Available for precipitation and wind speed

Time Series Analysis with PROPHET

Extending the database for California until
2026 to more than 2.0 million data points

MODELING

Creation & evaluation of the model



Feature Engineering

- Including urban areas
- Computing climate data of quarter & years

Balancing of Data

- Manual balancing between fire size classes

Automated Feature Selection

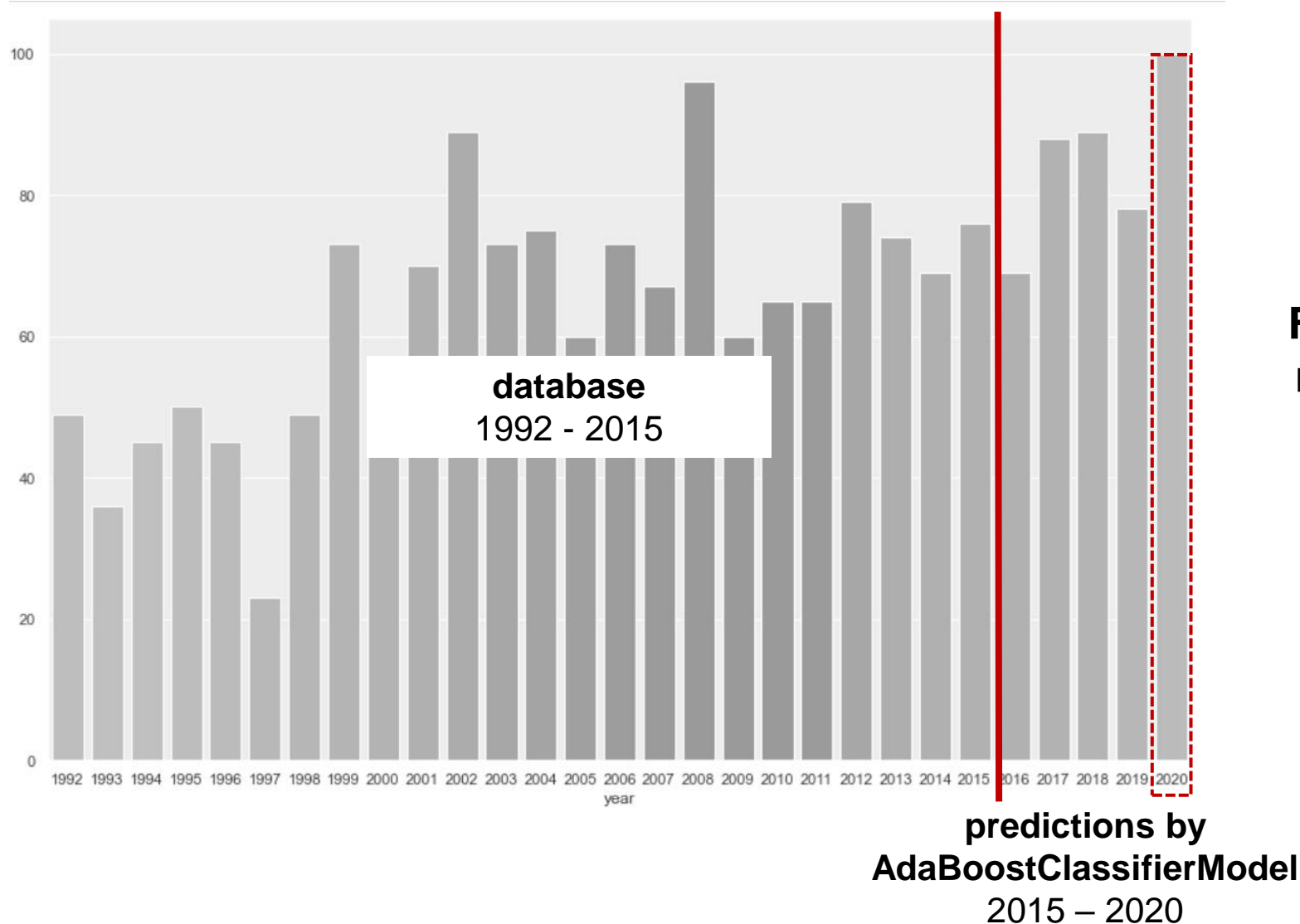
- Tuning down the number of features
- Weather variables identified as main features

Grid Search for AdaBoostClassifier

- Tuning the hyper-parameters of an estimator

MODELING

Creation & evaluation of the model

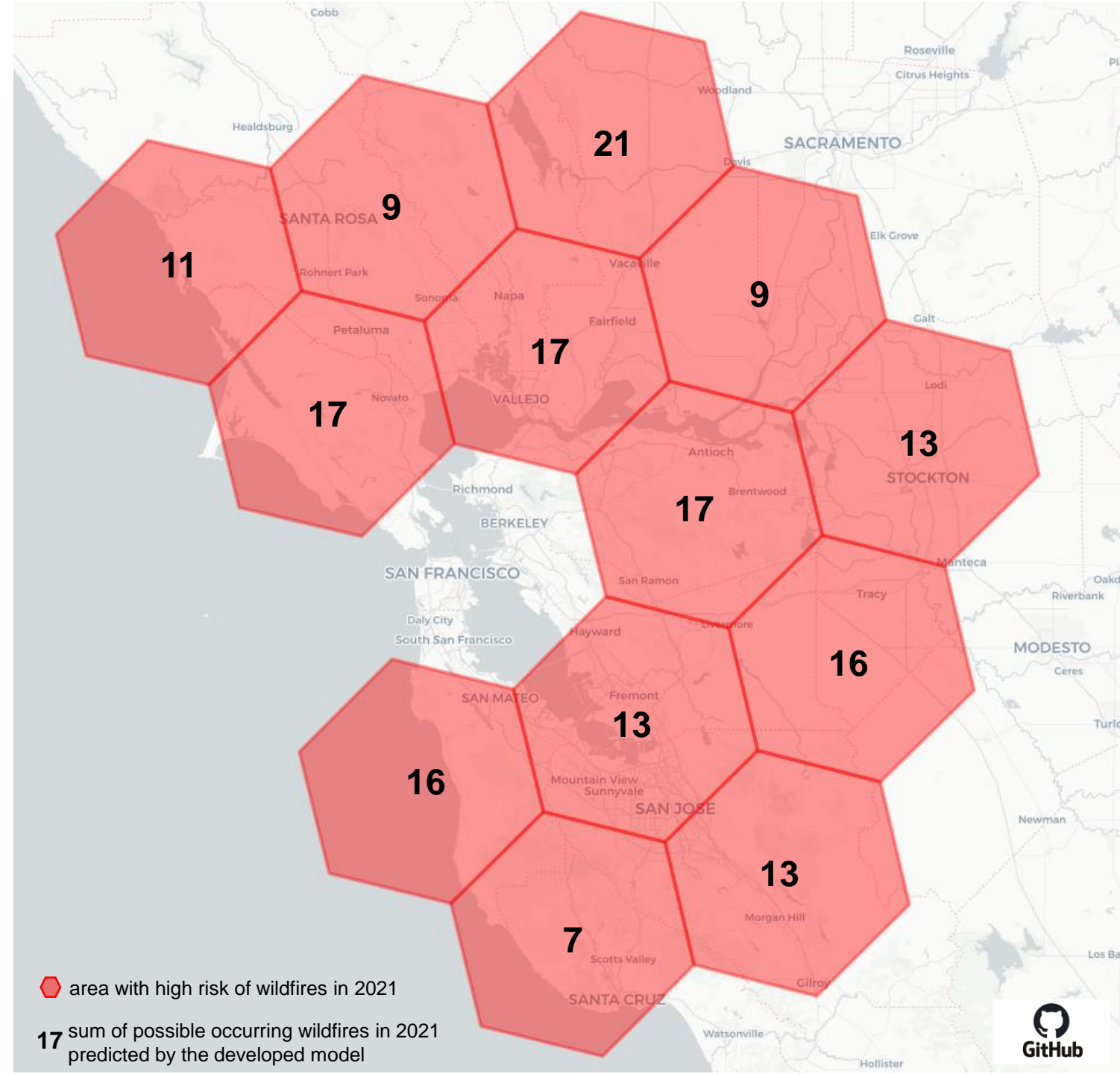


For 2020, the model predicts a record number of fires for the area around San Francisco

MODELING

Wildfire forecast 2021

- Wildfires are increasing and wildfire season is getting longer
- Conditions are primed for wildfires to ignite and spread
- Their emissions worsening global warming



A satellite image of the Middle East region, showing the Mediterranean Sea to the west, the Red Sea to the south, and the Persian Gulf to the east. Several countries are outlined in red, including Syria, Iraq, Jordan, and parts of Turkey and Lebanon. Small red dots are scattered across these countries. The text "THANK YOU" is overlaid on the left side of the image.

THANK YOU

MORE TO READ

https://github.com/caaarov/finalproject_wildfires_CA.git

<https://www.kaggle.com/rtatman/188-million-us-wildfires>

<https://www.ncdc.noaa.gov/cdo-web/webservices/v2>

<https://www.theguardian.com/us-news/2020/dec/30/california-wildfires-north-complex-record>

<https://www.sfchronicle.com/bayarea/article/Warm-days-and-historic-winds-Winter-fire-season-15886169.php>

<https://medium.com/@gpj/getting-started-with-weather-data-ba7749838549>

<https://towardsdatascience.com/mapping-the-uks-traffic-accident-hotspots-632b1129057b>

https://facebook.github.io/prophet/docs/quick_start.html#python-api

<https://eng.uber.com/h3/>