

UC SANTA BARBARA

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Where There's Smoke

The close juxtaposition of the ocean and the mountains in Santa Barbara makes for beautiful views — but when it comes to wildfires, it can also spell danger. In the past decade, the area has experienced seven major fires on both sides of the Santa Ynez Mountains, including the Whittier fire that started July 8.

In fact, say UC Santa Barbara researchers, the region epitomizes one of the worst wildfire hazard scenarios affecting a highly populated area along the West Coast of the United States. A significant portion of the city's population resides in mountain areas near canyons and passes, making them particularly vulnerable to fires during extreme weather conditions such as rapid warming and decreased relative humidity. The accompaniment of frequent gusty downslope winds called sundowners are known to exacerbate wildfires.

To evaluate urban wildfire patterns and resilience strategies, a group from the [Earth Research Institute](#) (ERI) and [Department of Geography](#) has recently been awarded a \$1.5 million National Science Foundation grant.

“The project's main goals are to improve existing fire-weather forecast methods, increase resilience and reduce the socioeconomic impact of wildfires,” explained principal investigator (PI) and ERI researcher Leila Carvalho, a professor in UCSB's Department of Geography. “We will integrate atmospheric, fire-spread and transportation models to enhance the current understanding of extreme fire weather regimes and wildfire behavior in the wildland-urban interface.”

Co-PI Charles Jones has been studying regional climate for nearly two decades. “We know the basic mechanism of the sundowner winds, but they are heavily influenced by topography,” said Jones, a geography professor and an ERI researcher.

“Sometimes you have sundowner winds in Santa Barbara but not in Refugio up the coast, and vice versa. We want to understand these spatial variabilities in high resolution and use what we learn to run fire models and develop statistics of high-potential fire spread.”

Transportation modeling in this project will be conducted by geography professors Rick Church and Alan Murray.

Over the years, many scientists and students have studied various aspects of wildfire regimes, including analyses of before-and-after airborne remote-sensing data from the area’s 2016 Sherpa fire.

That includes Dar Roberts. To his mind, there is no doubt that this most recent spate of fires is the result of California’s 2012-16 drought, which is ongoing in Santa Barbara County and environs. As UCSB PI of the Southern California Wildfire Hazard Center, he develops wildfire fuel maps and maps live fuel moisture using remote sensing.

“Generally Santa Barbara is known for having a fairly low fire frequency,” said Roberts, a professor in the Department of Geography and an ERI researcher. “But the number of fires in the past decade seems anomalously high to me.”

When the Whittier fire began earlier this month, its onset was captured by cameras atop Santa Ynez peak. The five-camera array is the beginning of what will one day become Alert Central Coast, the state’s third such alert system initiated by UC San Diego’s High Performance Wireless Research and Education Network (HPWREN), which began as a communications system for seismic monitoring. Alert Central Coast will be modeled on UCSD’s Alert SoCal and University of Nevada Reno’s Alert Tahoe, two multihazard networks with dozens of cameras spread across multiple peaks.

“We’re not just talking about earthquakes; we’re talking about fire and weather,” said Jamison Steidl, a research seismologist at ERI. “We already had a link from Santa Ynez peak to UCSB’s Sedgwick Reserve, so this location was a logical place to start.”

To further fire research, Carvalho will also be conducting a pilot field campaign that will launch instruments to measure what happens in the atmosphere from the ground up to 15 kilometers from Earth.

“Our ultimate goal with these projects is to create a better understanding that will also help authorities to make their own decisions,” Carvalho said. “That includes better planning for the city, where it’s going to grow and what future evacuation strategies will be.”

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.