

# Actuarial Weather Extreme Series

## Los Angeles County Wildfires – January 2025

**Author:**

Yi Xie, ASA, CERA  
MGIC

### Event Description

The Palisades and Eaton fires started on January 7, 2025, in Los Angeles County, California. They were fueled by extreme Santa Ana winds and dry conditions, burning over 23,713 and 14,117 acres. As of January 20, 2025, the wildfires had damaged or destroyed more than 17,000 structures. Initial insured loss estimates from catastrophe risk modelers are in the range of \$20- \$45 billion which would make the fires the worst since the Camp Fire driven losses in 2018 [1].

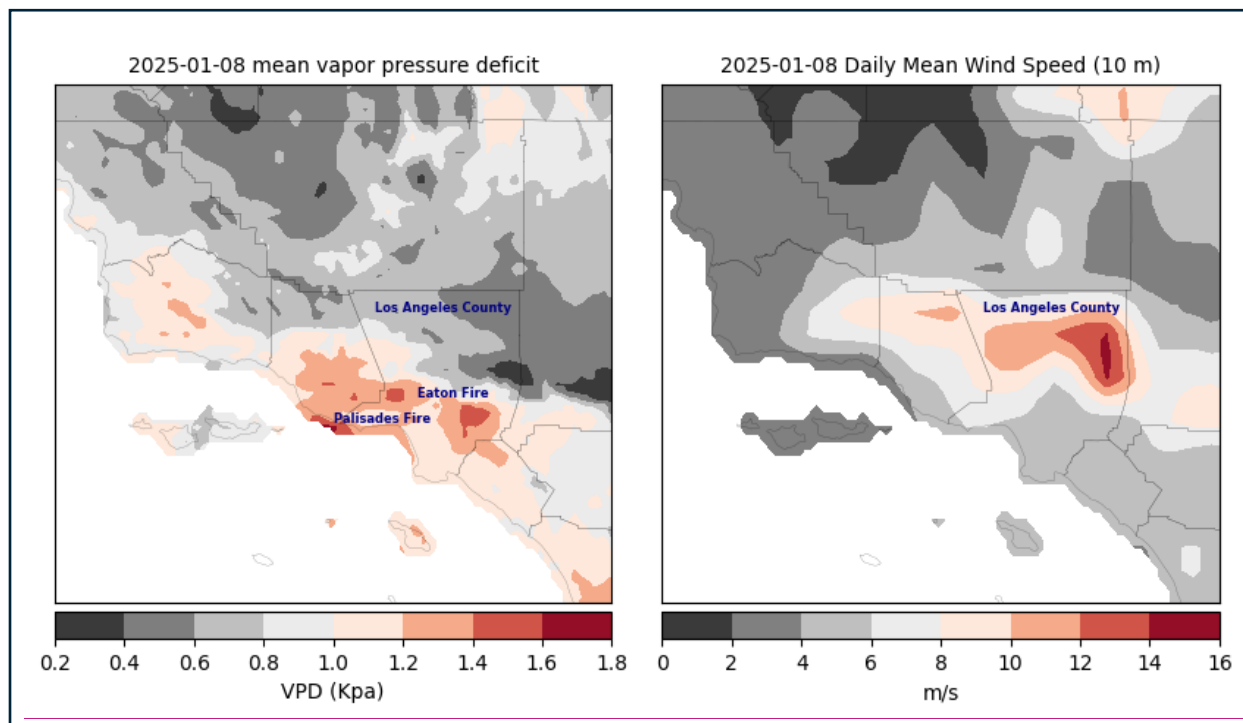
To illustrate this compound event, we examine vapor pressure deficit (VPD) and wind speed using gridMET, a dataset of daily high-spatial resolution (~4-km, 1/24th degree) surface meteorological data covering the contiguous US from 1979-yesterday. Vapor pressure deficit (VPD) is defined as the amount of moisture that is missing from the atmosphere that would lead to saturation. Multiple studies have demonstrated a strong correlation between vapor pressure deficit (VPD) and the area burned [2].

#### Caveat and Disclaimer

The opinions expressed and conclusions reached by the authors are their own and do not represent any official position or opinion of the Society of Actuaries Research Institute, the Society of Actuaries or its members. The Society of Actuaries Research Institute makes no representation or warranty to the accuracy of the information.

**Figure 1**

MEAN VAPOR PRESSURE DEFICIT AND WIND SPEED IN LOS ANGELES COUNTY, CALIFORNIA ON JANUARY 8, 2025



Data source: <https://www.climatologylab.org/gridmet.html>

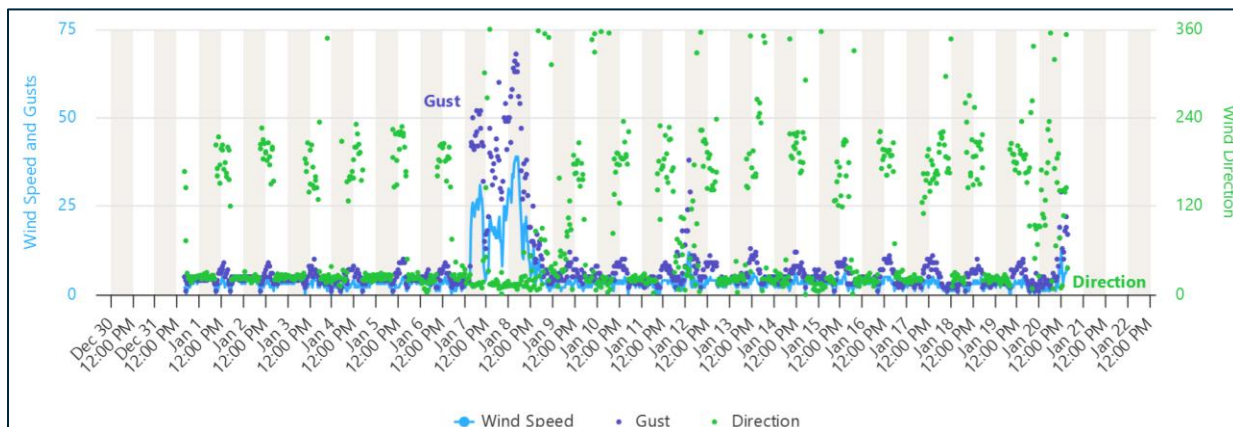
As illustrated in Figure 1 above, on January 8, 2025, we observed VPD > 1.2 near locations of the Palisades and Eaton fires, which is significantly higher than the rest of Los Angeles County. At the same time, we observed much higher wind speeds in the northeastern part of Los Angeles County, near Altadena, with an average wind speed up to 16 m/s (22 mph) measured at a height of 10 meters above the ground, calculated over a 24-hour period. To assess the impacts of sudden, strong winds, we also examined wind gusts in Altadena, California, which reached up to 70 mph, as depicted in Figure 2 below. Unlike most other days, January 7<sup>th</sup> and 8<sup>th</sup> have very little in the 120-240 degree range. The sustained 0-degree wind, blowing from the north and spreading the fire from the mountain to the foothill residential areas, likely contributed to the extensive fire damage in Altadena.

#### Caveat and Disclaimer

The opinions expressed and conclusions reached by the authors are their own and do not represent any official position or opinion of the Society of Actuaries Research Institute, the Society of Actuaries or its members. The Society of Actuaries Research Institute makes no representation or warranty to the accuracy of the information.

**Figure 2**

WIND SPEED AND GUSTS DATA FROM JANUARY 1 TO JANUARY 20, 2025, IN THE CITY OF ALTADENA, CALIFORNIA



Data source: Wind data from NOAA gauge at Altadena, CA:

Image taken from National Weather Service:

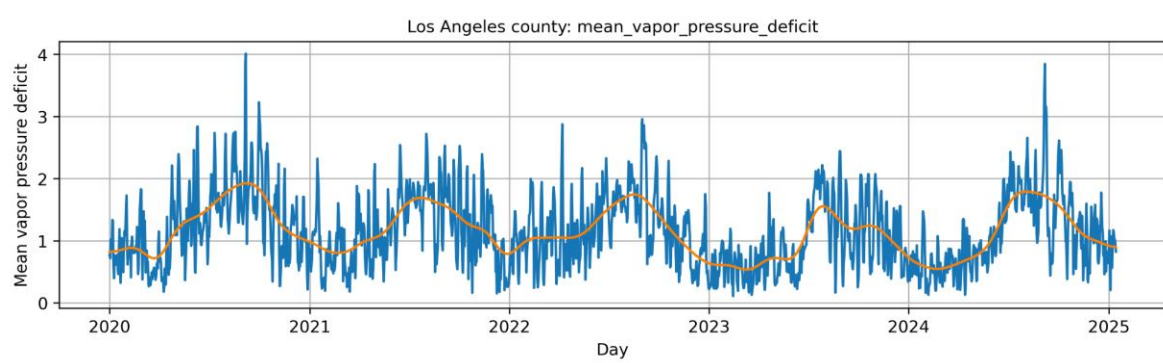
[https://www.weather.gov/wrh/timeseries?site=SE609&hours=72&units=english&chart=on&headers=on&obs=tabular&hourly=false&pvie=full&font=30&history=yes&start=20250101&end=20250120&plot=wind\\_speedgust](https://www.weather.gov/wrh/timeseries?site=SE609&hours=72&units=english&chart=on&headers=on&obs=tabular&hourly=false&pvie=full&font=30&history=yes&start=20250101&end=20250120&plot=wind_speedgust)

To contextualize the VPD value, we calculated mean VPD across Los Angeles County and analyzed the daily values from 2020 to 2025. As expected, VPD peaks in the summer and troughs in the winter since VPD can increase simply by an increase in air temperature as shown in Figure 3 below.

- What's notable here is that winter 2024 exhibited relatively higher VPD values (> 1) compared to previous winters, thereby extending the wildfire season in Los Angeles County.
- The relatively low VPD value in winter indicates that the catastrophic events of the Palisades and Eaton fires were a result of the compounding effects of strong winds and VPD.

**Figure 3**

MEAN VAPOR PRESSURE DEFICIT OF LOS ANGELES COUNTY



Data source: <https://www.climatologylab.org/gridmet.html>

#### Sources

- [1]<https://www.reinsurancene.ws/la-fires-average-insured-claim-estimated-at-1-9m-with-17027-structures-destroyed-or-damaged/>
- [2]<https://www.soa.org/globalassets/assets/files/resources/research-report/2021/climate-change-impacts-to-us-wildfire-risk.pdf>

#### Caveat and Disclaimer

The opinions expressed and conclusions reached by the authors are their own and do not represent any official position or opinion of the Society of Actuaries Research Institute, the Society of Actuaries or its members. The Society of Actuaries Research Institute makes no representation or warranty to the accuracy of the information.