**Smoke-Aware City Forecasting**  
*One-Page Written Summary*

**Problem Statement**  
I set out to address Reno’s air-quality challenges during wildfire season. Fine particulate matter (PM₂.₅) from distant and local fires frequently pushes pollution to unhealthy levels. I wanted a simple, 24‑hour‑ahead forecast using only open data so residents and local health agencies could plan outdoor activities and issue timely advisories.

**Data Sources & Methods**

* **OpenAQ v3 API** for hourly PM₂.₅ readings in Reno (2015–2025)

<https://openaq.org/>

* **NASA MODIS Active Fire Archive** for daily fire-hotspot counts over the Reno area (2021–2025)

<https://firms.modaps.eosdis.nasa.gov/>

My workflow involved:

1. **Data Ingestion & Cleaning** – I downloaded CSVs, parsed timestamps, and filled missing values sensibly.
2. **Exploratory Analysis** – I plotted time series and daily boxplots to visualize pollution peaks and variability.
3. **Baseline Forecast** – I applied a naïve model (tomorrow’s PM₂.₅ = yesterday’s), yielding MAE ≈ 3.91 µg/m³.
4. **Feature Engineering** – I computed daily fire-pixel counts and lagged PM₂.₅ values.
5. **Modeling** – I trained a Random Forest regressor on these two features and evaluated its 30-day hold-out MAE.

**Key Results**

* Baseline MAE: **3.91 µg/m³**
* Random Forest MAE: **1.72 µg/m³**

**Insights & Impact**  
I confirmed that daily satellite fire-pixel counts carry a strong signal for next‑day PM₂.₅ spikes—incorporating this feature halved the forecast error. This lightweight pipeline can provide actionable air‑quality alerts with minimal computational overhead.