Wildfire Footprints: Mapping Two Decades of Fire Intensity Across the U.S.

Leveraging NASA MODIS Data (2003, 2013, 2023)

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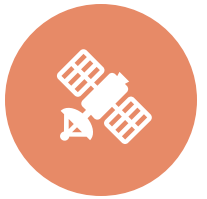
Project Scope & Motivation

Scope:

Analyze wildfire activity (intensity, frequency, distribution) in the U.S.



Use satellite data to examine two decades of trends (2003–2023).

Motivation:

Need for data-driven insight into wildfire progression and climate impacts.

Support more informed decisions about wildfire management.

Data Sources & Key Variables

Primary Data Source: NASA FIRMS (Fire Information for Resource Management System)

MODIS measurements from Terra & Aqua satellites

Data includes FRP (Fire Radiative Power), brightness, latitude/longitude, confidence, etc.

Years Considered: 2003, 2013, 2023

Data Format & Volume: ~100K records per year, stored as CSV/JSON files in Amazon S3.

Features & Expected Outcomes

Features:	Aggregations & trend analysis (monthly, quarterly).	Comparisons (Aqua vs. Terra satellite readings).	Visualization of hotspots (geospatial plotting).
Expected Outcomes:	Identify the most fire-prone months, regions, and years.	Correlate wildfire intensity with brightness and temperature.	Provide a clear foundation for further climate-related analysis and decision-making.

AWS Setup (S3-Centric)

Amazon S3 Bucket:

- Raw Data: MODIS fire detection files uploaded directly.
- Processed Data: Cleaned/aggregated files saved back to the same or a different S3 folder.
- No Additional Services (e.g., RDS or EC2) used for final storage – S3 is the sole storage location.

Access Management:

- Set proper IAM policies to restrict upload/download permissions.
- Server-side encryption for data at rest (optional, if required).
- (If you have a simple diagram, show S3 as the central repository, with arrows to/from your local/analytics environment.)

Data Flow (Using Only S3)

Data Collection:

- Download or receive MODIS CSV/JSON from NASA FIRMS.

Upload to S3:

- Store raw files in a dedicated S3 bucket (e.g., my-wildfire-data-bucket/raw).

Local / Notebook Analysis:

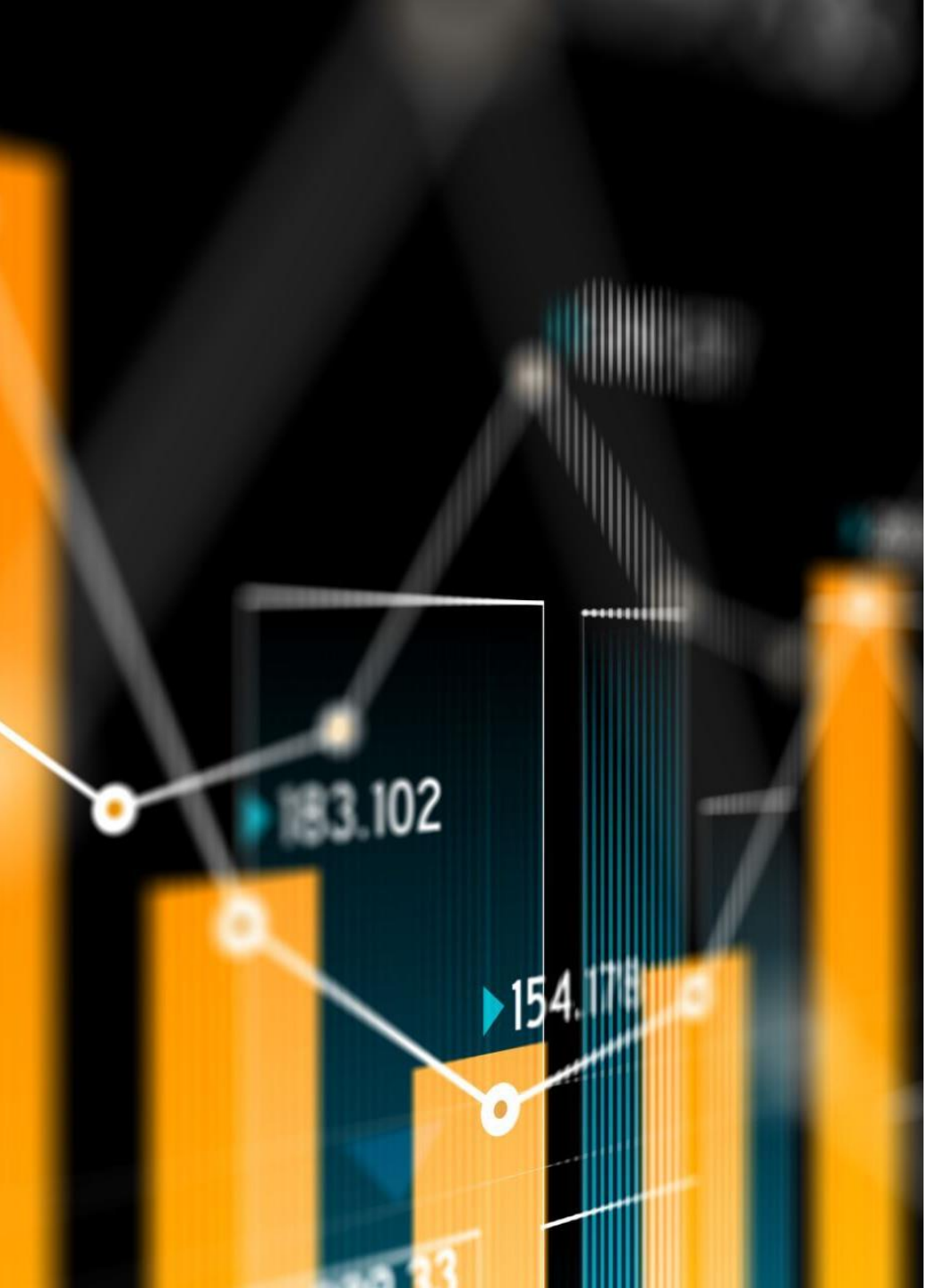
- Pull data from S3 onto your local environment (or ephemeral cloud compute) for cleaning and aggregation.
- Filter out low-confidence records, convert brightness to Fahrenheit, etc.

Save Processed Data:

- Upload cleaned/merged files back to S3 (e.g., my-wildfire-data-bucket/processed).

Visualization:

- Use local tools (Tableau Desktop, Python, etc.) or any external BI tool that can read directly from S3.



Conclusions & Q&A

Conclusions:

- S3 provides a simple, scalable repository for large satellite datasets.
- The analysis confirms seasonal wildfire peaks and highlights regions with consistently high FRP.

Next Steps:

- Integrate additional datasets (e.g., VIIRS).
- Extend analysis to predictive modeling of wildfire risk.
- Potentially automate ingestion with AWS Lambda or other workflows.
- Questions?