PlanetEye Farm-AI

# SATELLITE-BASED AIR QUALITY INTELLIGENCE MONITORING

Real-time | Scalable | Data-driven Environmental Monitoring

Presented By **PlanetEye Farm AI Ltd**

# Webinar Outline

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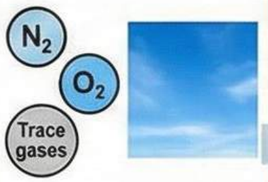
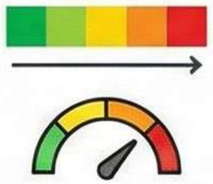


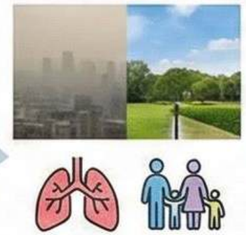

Air & its Composition

2



Understanding AQI

3



Why AQI Monitoring is Critical

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Traditional AQI Monitoring Methods

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Satellite-Based AQI Monitoring

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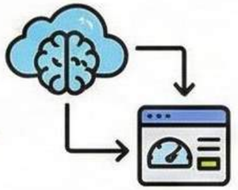

Role of AI & Advanced Analytics

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Use Cases & Applications

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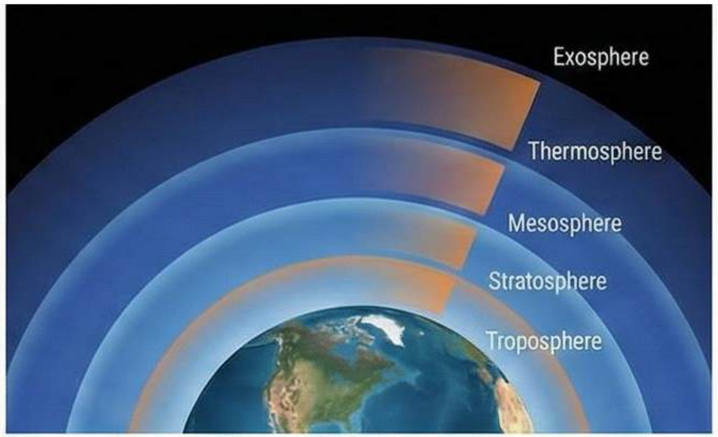
Future of AQI Monitoring

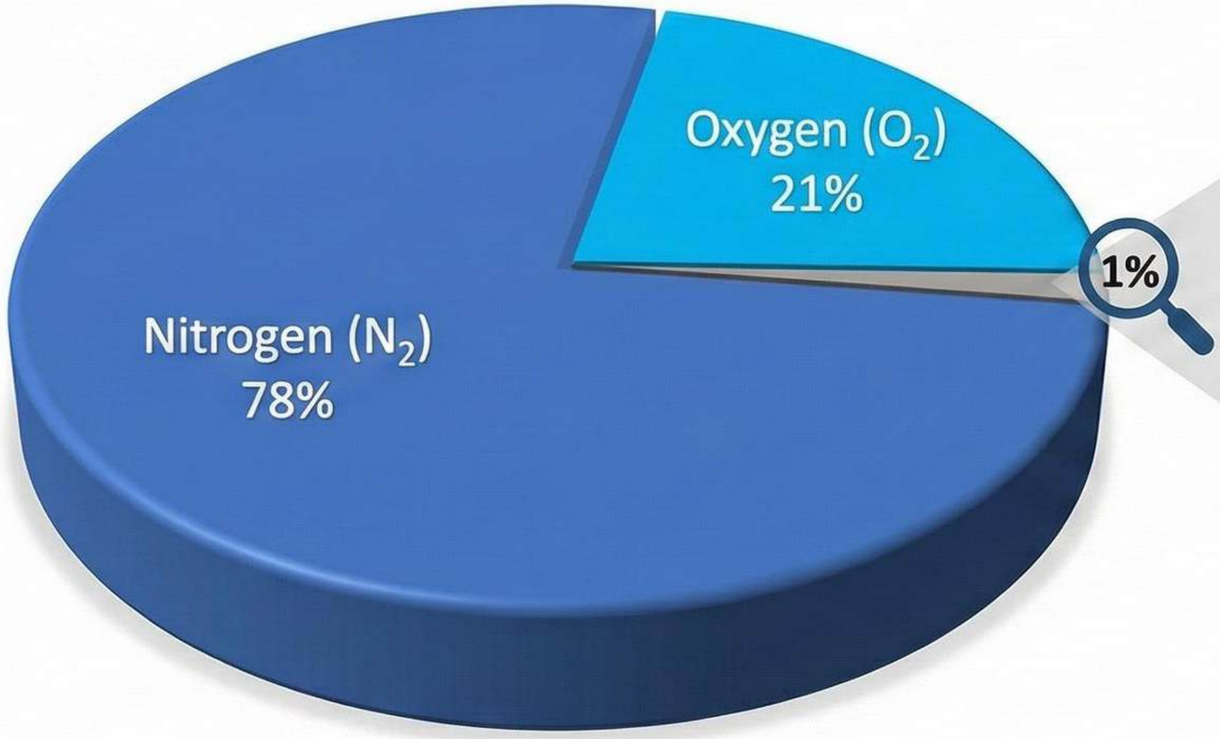
# What is Air

- Air is a **mixture of gases** forming Earth’s atmosphere
- Essential for **life, climate regulation, and ecosystem balance**
- Acts as a medium for **energy transfer, weather, and pollution dispersion**




# Components of Atmospheric Air

## Major Components




**1%**
(Argon, $CO_2$, Trace Gases)

### Trace Gases & Particulates

- Carbon Dioxide ($CO_2$) – ~0.04%
- Ozone ($O_3$)
- Methane ($CH_4$)
- Sulfur Dioxide ($SO_2$)
- Nitrogen Dioxide ($NO_2$)

PM2.5 (Fine) → PM10 (Coarse) → Inhalable Particulate Matter

# What is Air Pollution

## Definition & Sources

Presence of harmful substances in air beyond permissible limits

Can be natural (e.g., wildfires) or man-made (e.g., emissions)

Affects human health, environment, and climate

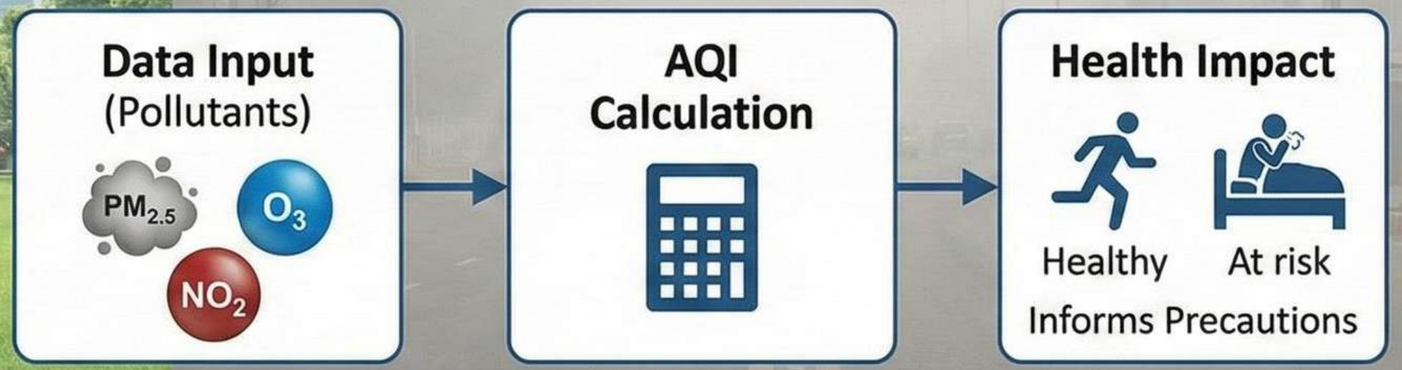
# Introduction to AQI (Air Quality Index)

## What is AQI?

Numerical scale representing **air quality**

**Converts complex pollutant data** into easy-to-understand values

Helps citizens & authorities take **preventive actions**

# Key Pollutants in AQI

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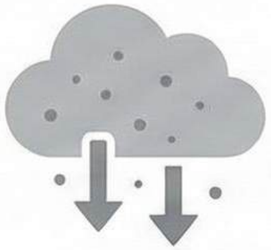
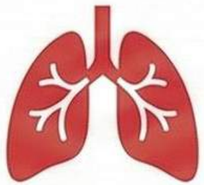
## PM2.5 & PM10



Respiratory Risks

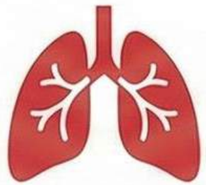


## Carbon Monoxide (CO)


Oxygen Transport

## Nitrogen Dioxide ($NO_2$)

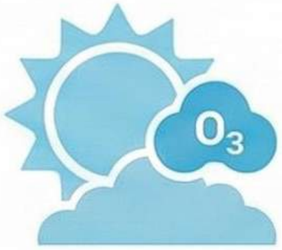

Airway Inflammation



## Sulphur Dioxide ($SO_2$)


Respiratory Irritation

## Ozone ($O_3$)



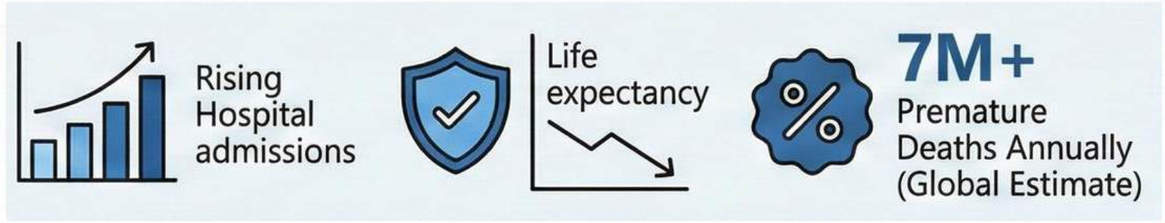

Lung Damage

# Why AQI Monitoring is Necessary

## Key Drivers & Impacts

- Rising urbanization & industrialization
- Increasing respiratory & cardiovascular diseases
- Climate change & extreme weather events
- Policy planning & public awareness
- ESG & environmental compliance

City Pollution Heatmap




Health Impact Statistics

# How AQI is Monitored

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## POLLUTANTS

## MEASUREMENT & METEOROLOGY

## DATA PROCESSING (AQI)


- Measurement of pollutant concentrations
- Meteorological factors influence dispersion
- Data processed into AQI values
- Published for public & administrative use

# Traditional AQI Monitoring Methods

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- Ground-based monitoring stations
- Manual & automated sensors
- Fixed location data points
- High installation & maintenance cost

Typical AQI Monitoring Station

Sensor Equipment Detail

# Limitations of Traditional AQI Monitoring

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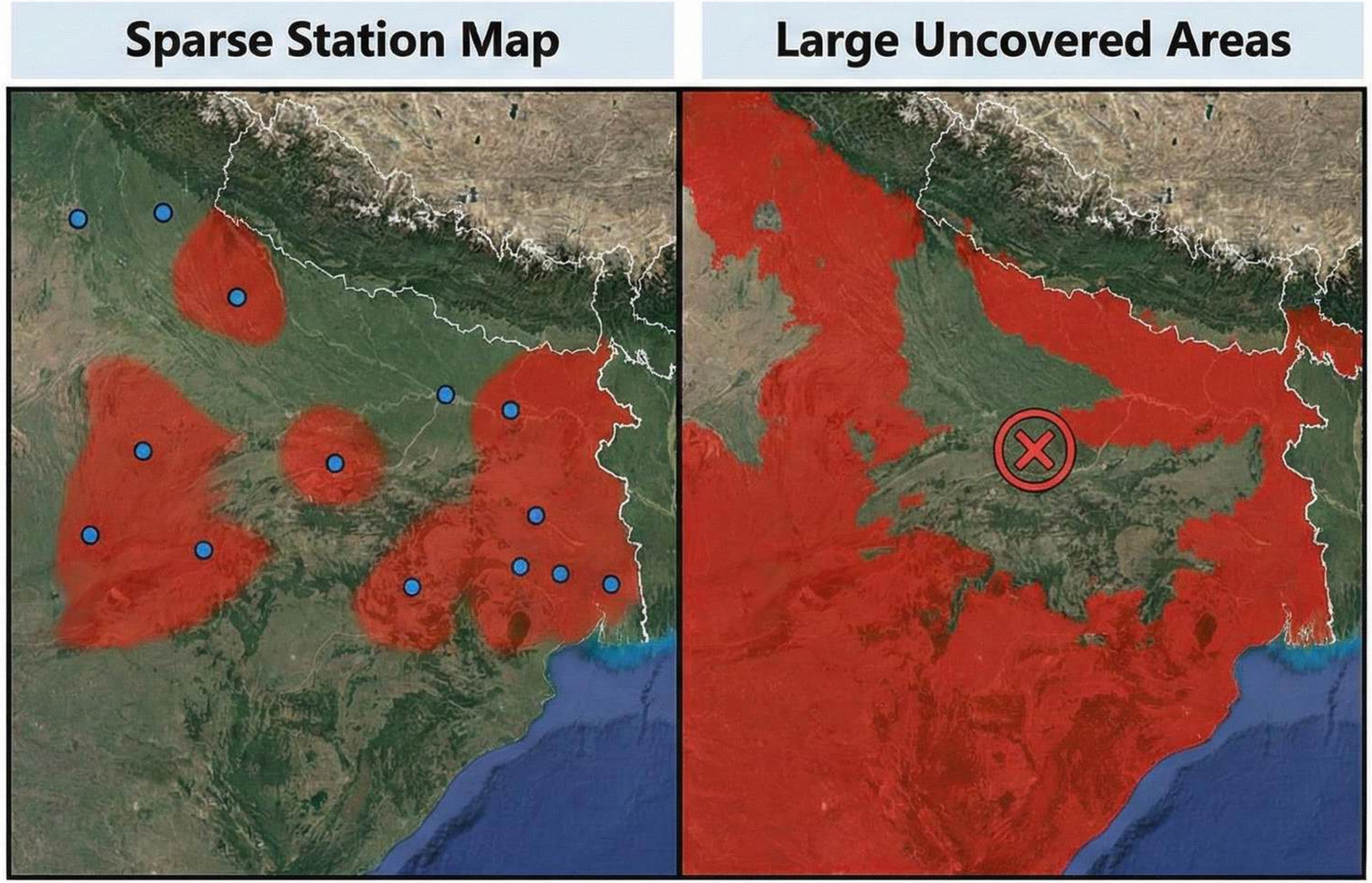
## Key Limitations

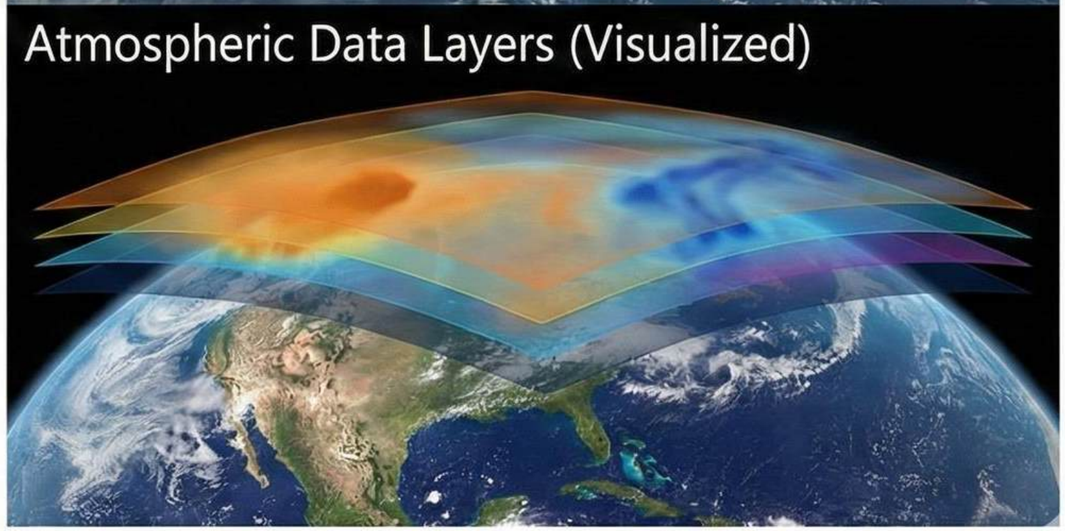
- Limited spatial coverage
- High infrastructure & operational cost
- Data gaps in rural & remote areas
- Not scalable for large regions
- Maintenance & calibration challenges



# Introduction to Satellite-Based AQI Monitoring

## Introduction & Benefits

- Uses Earth observation satellites
- Captures atmospheric composition & aerosols
- Provides large-area & continuous coverage
- Enables near real-time monitoring

# How Satellites Monitor Air Quality

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## 1. Satellite Observation & Measurement

Aerosol Optical Depth (AOD)

Trace Gases ($NO_2$, $SO_2$, $O_3$, CO)

## 2. Data Integration & Processing

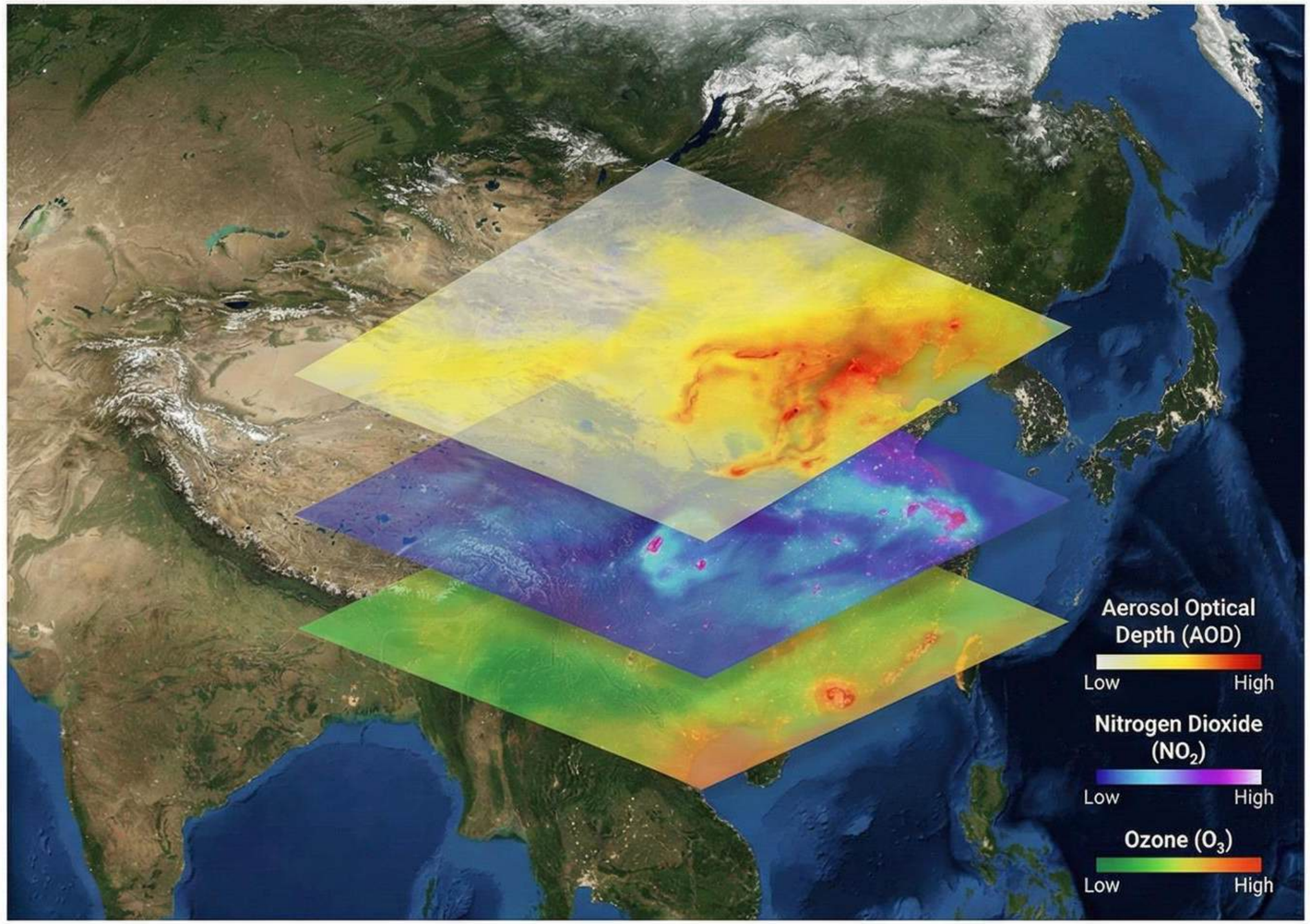
Satellite Data

Meteorological Data (Wind, Temp, etc.)

Combine with meteorological data

## 3. Spatial Mapping & Output

Generate spatial air quality maps




Layered Satellite Data to Generate Air Quality Heatmaps

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# Satellite vs Traditional AQI Monitoring

| Parameter | Traditional Methods | Satellite-Based Monitoring |
|---|---|---|
| Coverage | Limited ✗ | Regional to Global ✓ |
| Cost | High ✗ | Cost-effective ✓ |
| Scalability | Low ✗ | High ✓ |
| Data Gaps | Yes ✗ | Minimal ✓ |
| Real-time | Limited ✗ | Near real-time ✓ |

# Role of AI in AQI Monitoring

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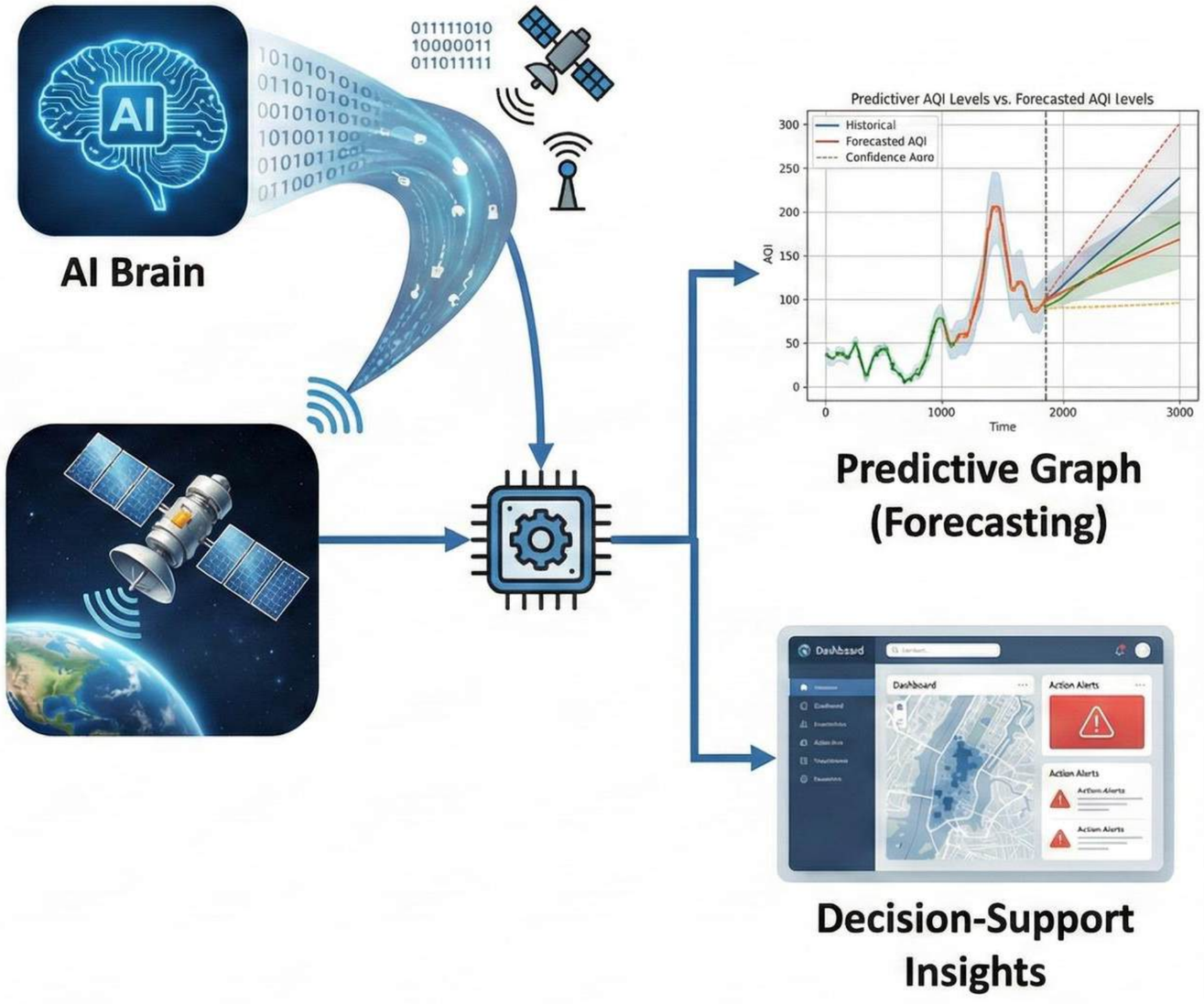
## AI's Key Functions

- Data fusion from multiple sources
- Pollution estimation & gap filling
- Trend analysis & forecasting
- Anomaly detection
- Decision-support insights



# Role of Satellite + AI Together

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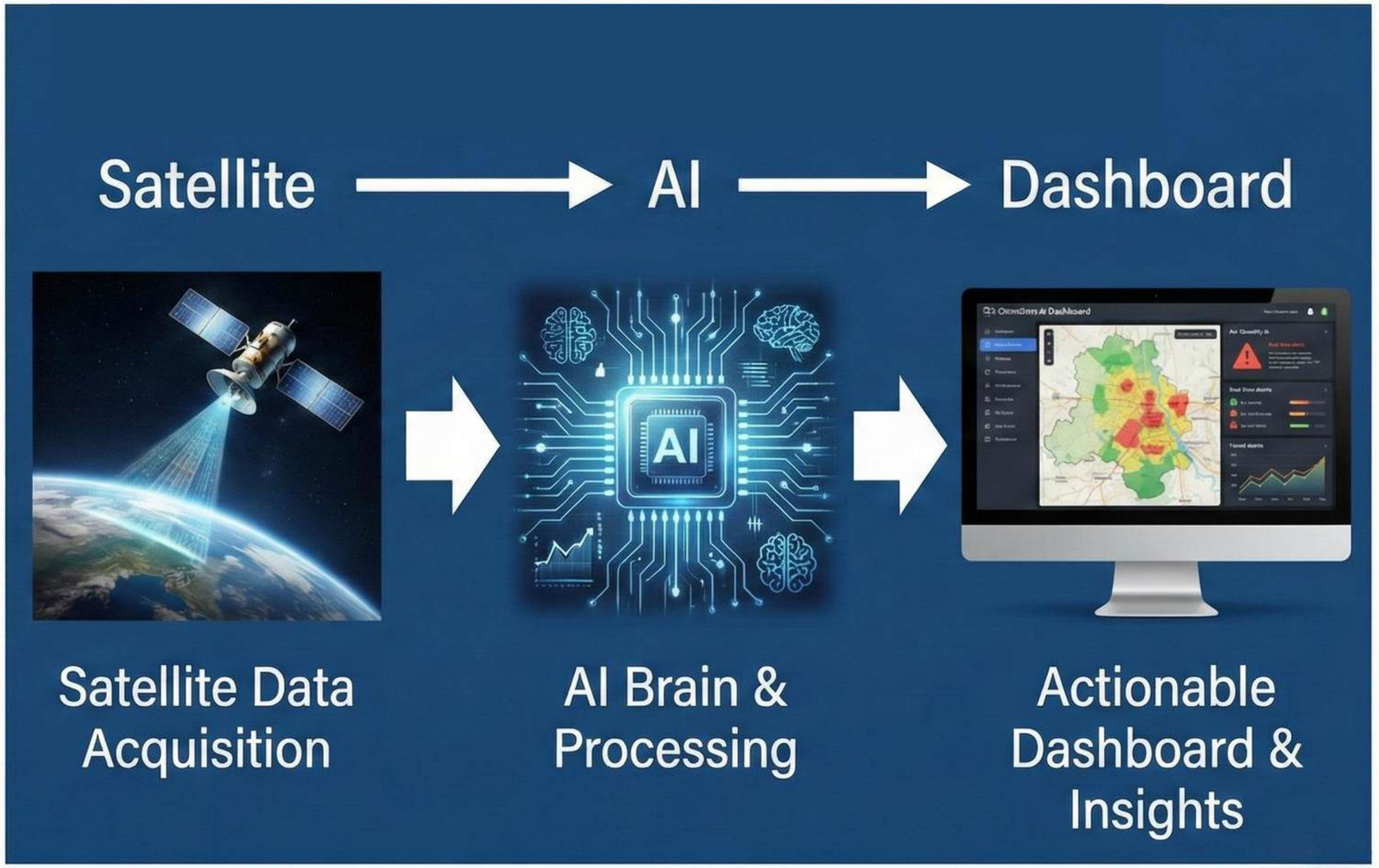
## Integrated Benefits

- Converts raw satellite data into actionable AQI insights
- Enhances accuracy & spatial resolution
- Enables predictive air quality intelligence
- Supports policy & early-warning systems



# Parameters Provided in PlanetEye AQI Product

## Parameter Overview

- AQI Index
- PM2.5 & PM10
- CO, $NO_2$, $SO_2$, $O_3$
- Temperature, Humidity
- Cloud Cover, Precipitation
- UV Index, Visibility
- Wind Gusts

## Dashboard ( Live View )

# Applications & Use Cases

Sensor Data → AI Analytics → Traffic & Green Planning

**Smart Cities & Urban Planning:**
Optimize traffic, plan green zones.

Monitoring Network → Policy Development → Regulation Enforcement

**Government & Pollution Control Boards:**
Enforce regulations, inform policy.

Emission Data → Compliance Check → Sustainability Report

**Industrial ESG Monitoring:** Ensure compliance, improve sustainability.

AQI Data → Health Alert System → Disease Prevention

**Public Health & Research:**
Issue health advisories, study impacts.

Real-time Data → Early Warning → Emergency Response

**Disaster & Smog Episode Management:**
Early warning, coordinated response.

# Future of AQI Monitoring

Futuristic Smart City & Clean Air Concept


Integrated Intelligence

### Fully Satellite-Driven Intelligence

Global, real-time, high-resolution environmental data

### Predictive & Preventive Systems

AI-powered forecasting to prevent pollution episodes

### Integrated Climate & Health Analytics

Linking air quality to climate change & public health outcomes

### Data-Driven Policy & Sustainability

Informed regulations for long-term environmental goals

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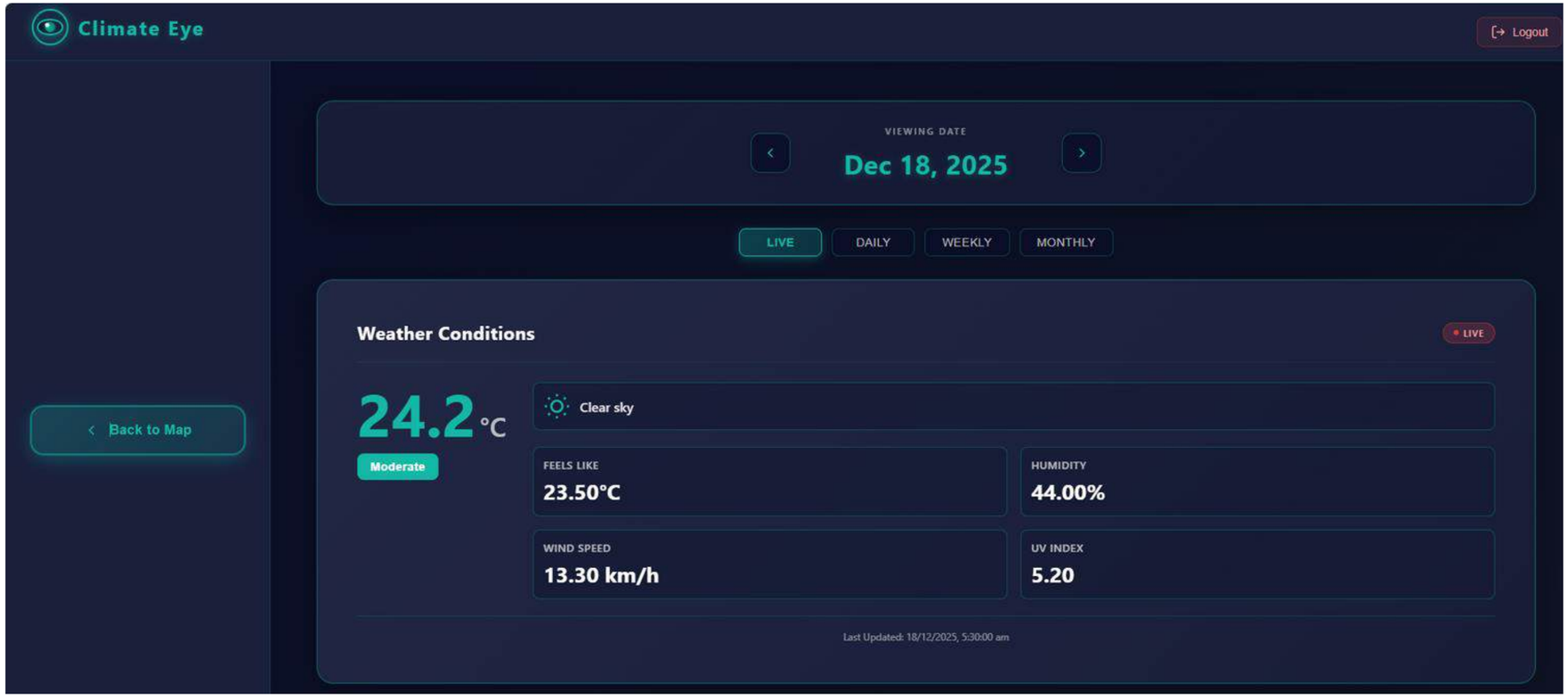



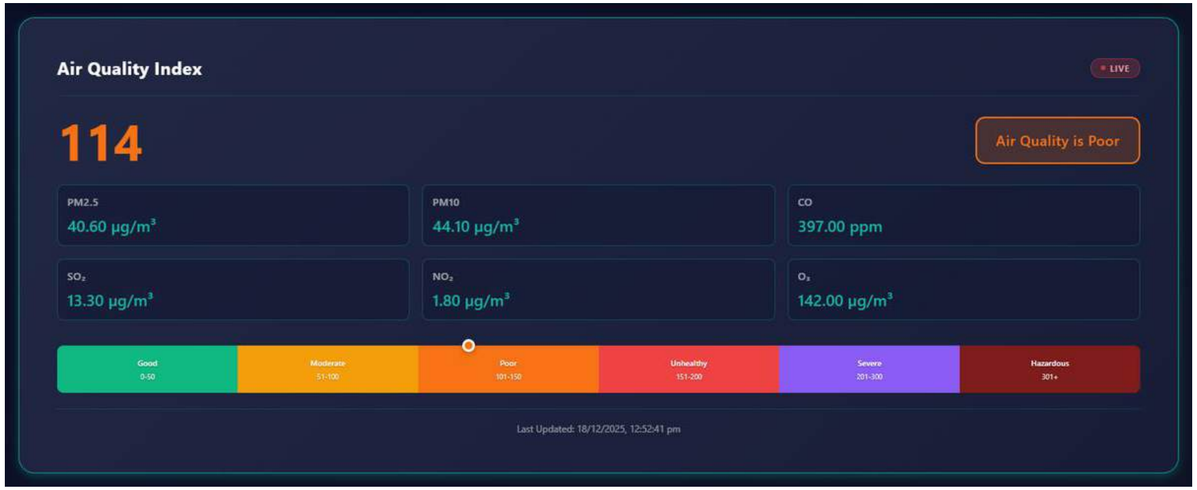

# Thank You for Joining

## PlanetEye FarmAI Ltd

+91 8275830454

sales@planeteyefarm.ai

www.planeteyefarm.ai