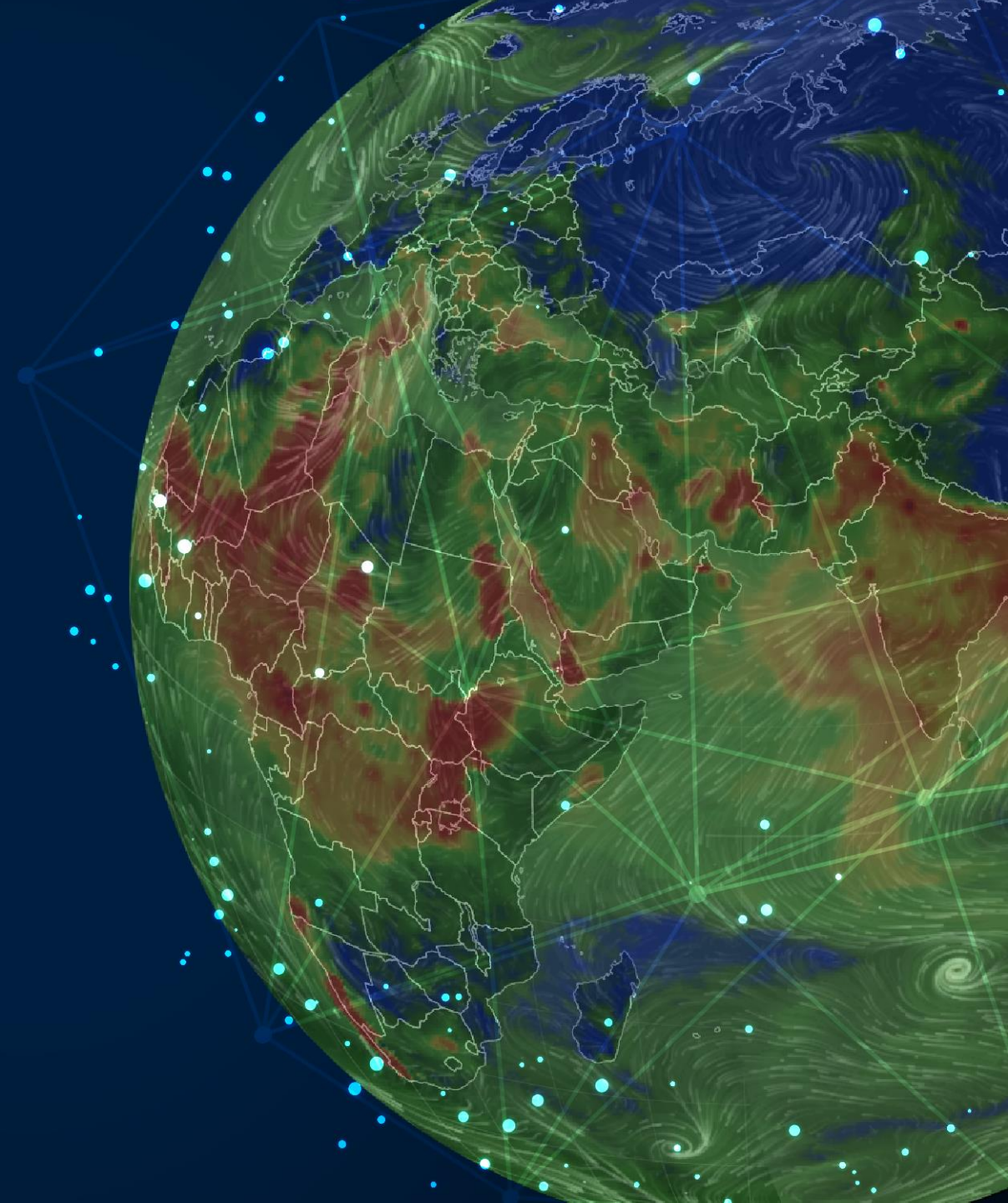


Quality Assurance Procedures in IQAir's AirVisual Platform

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Introduction

IQAir is a sensor manufacturer and aggregator of global, real-time air monitoring data

- Publish data from > 25,000 air monitors
- Cover >15,000 cities, >140 countries and regions
- Covers low-cost sensors from >10 types
- Our customers include individuals, non-governmental organizations, businesses, researchers and governments



Quality Obstacles

Is the data sufficiently complete for its intended use?

Is the data correct?

Is the data easily accessible by users when needed?

Does the data maintain a consistent format throughout data set?

Data Availability

Variations in station data reporting frequencies

Data gaps

Limitations in monitoring network coverage

Pollutant Data Accuracy and Precision

Device installation

Sensor precision and accuracy

Hardware maintenance

Calibration

Sourced Data Validation

Initial station validation

Station geolocation

Data quarantine criteria

Data validation criteria

Station aggregation into city averages

Timeliness & Accessibility

Late Reporting Stations

Data gaps

Raw data access

Calibrated data access

Consistency

Measurement unit harmonization

Timestamp alignment

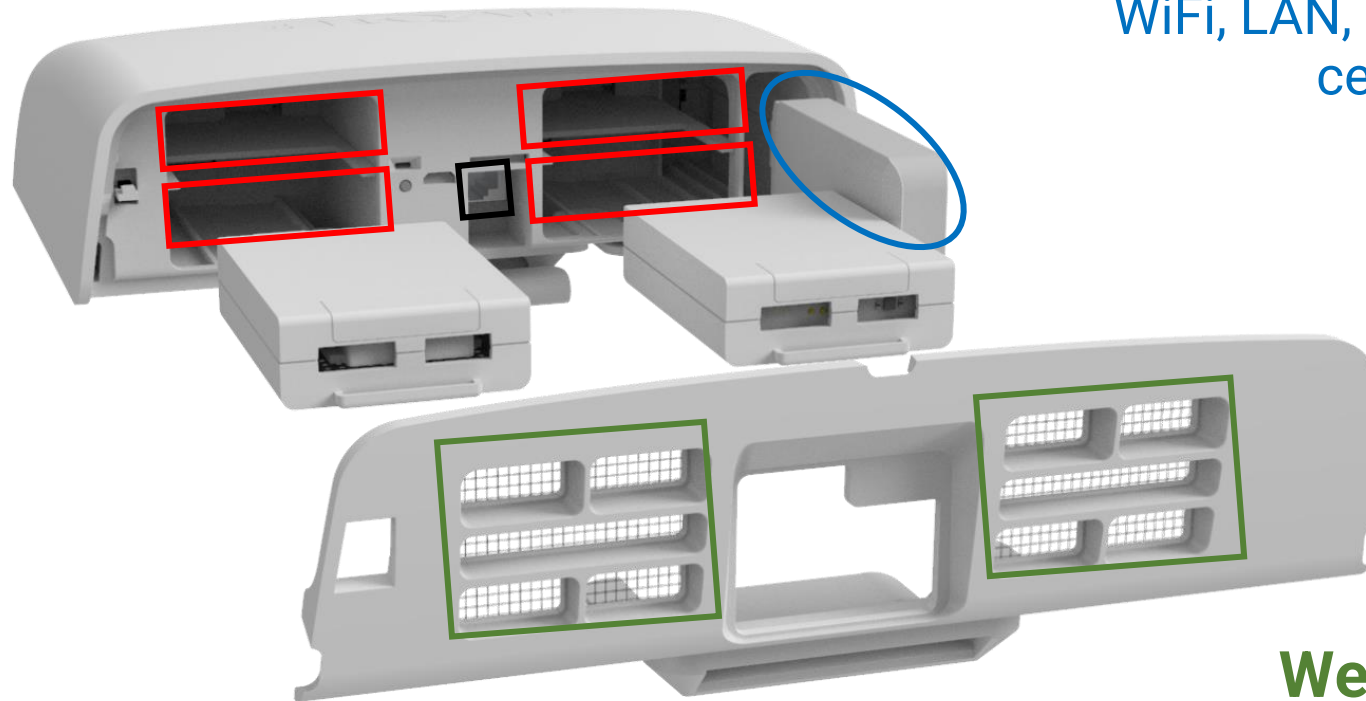
AirVisual Outdoor Monitor Features

Simultaneous replicate measurements

4 sensor slots, field swappable sensor modules

Multiple networking options to maximize data recovery

WiFi, LAN, pre-configured internal cellular modem



PoE low voltage power supply

Cabled power up to 250 ft*

*Solar option available

Weather-proof, insect-proof, UV resistant enclosure

Hardware QA

Installation photos

- 2 photos required demonstrating installation height, location, device positioning

Data review

- Stable power and network connection ≥ 3 days with consistent data
- Reasonable correlation with surrounding stations
- Anomalies

Location check

- GPS coordinates vs. user provided location

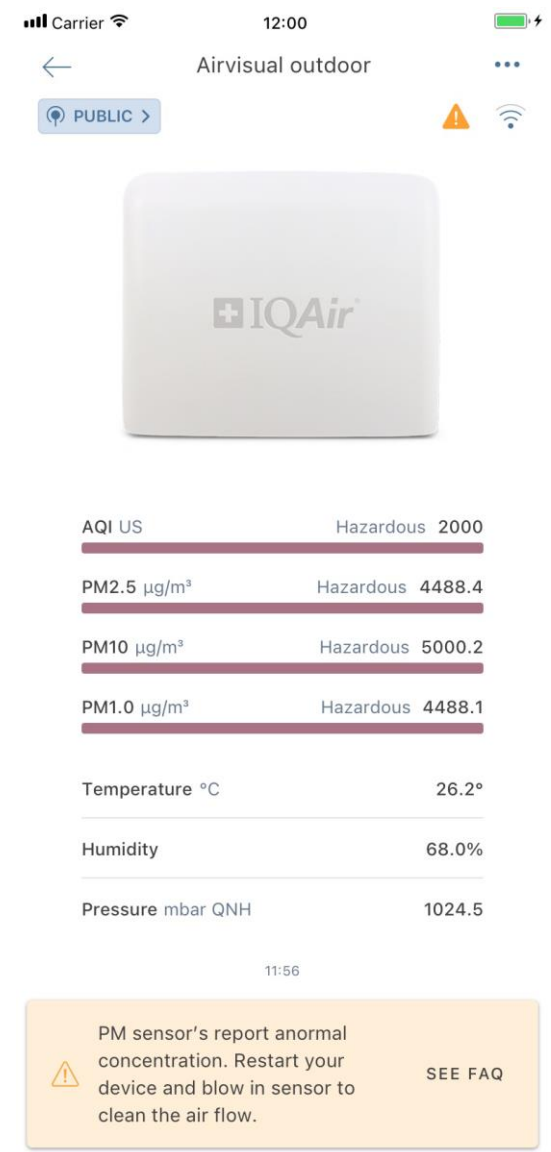
Customer communication and interaction



Software QA

Maintenance alert system

- Sensor errors reported to customer via in-app notifications
- Offline notifications
- Customizable alerts
- Publication error alerts
- Sensor maintenance and troubleshooting guidance



Monitor has stopped updating
 A problem has been detected on your monitor "Garden".
 1d
[DETAIL](#)

Change required
 Your submission for publishing data of "Garden" has been rejected. Check your email for feedback.
 1d

Create a new alert ✕

Name of the notification

Alert Status

Send a notification to
 +Add new destination e-mail address

When

of

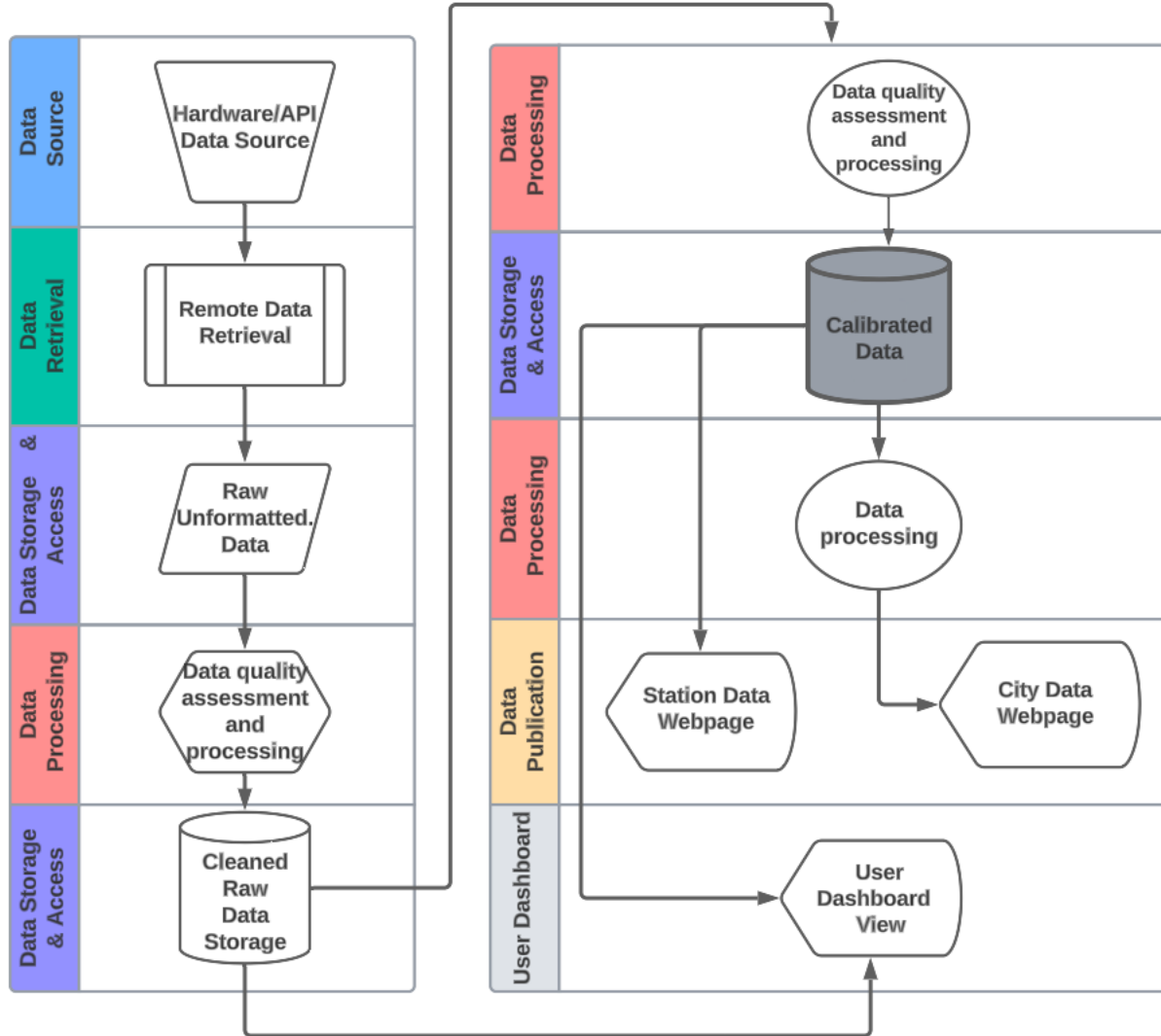
is

for at least

during

Message

AirVisual Data Platform

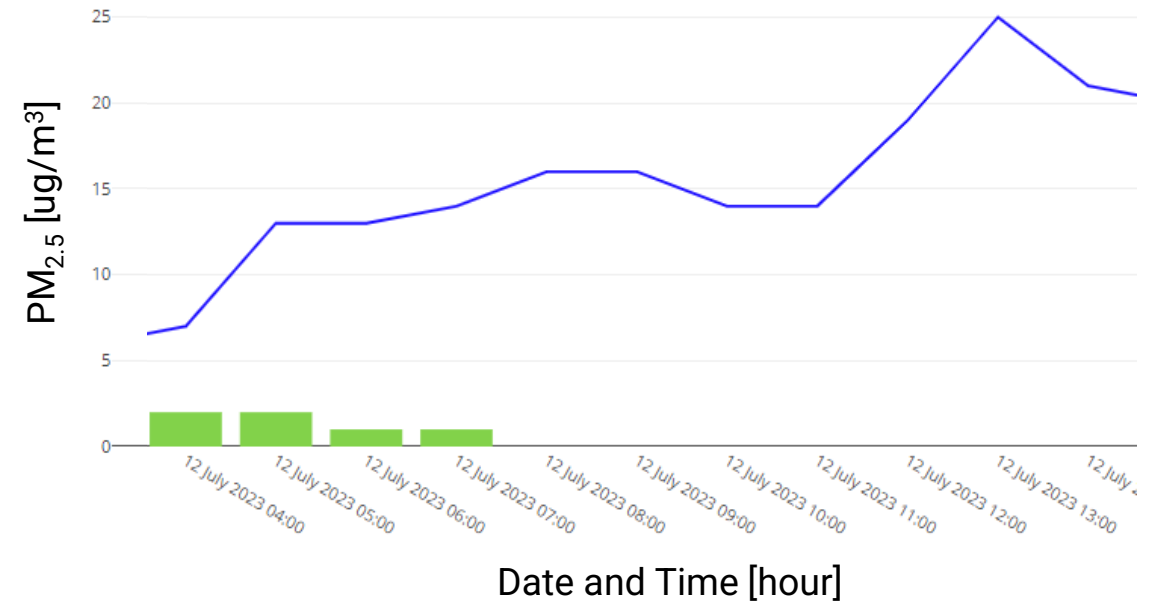


- Inclusion of multiple data sources requires significant QA expansion
- Multiple layers of data cleaning, storage, and access → complex functionality and data architecture

Mathematical QA of individual data points

Evaluation criteria triggering data quarantine/**station unpublishing**

1. Station has reported < 5 hours of historical data
2. Data point exceeds pollutant specific designated concentration threshold
3. Data outlier detection
 - Probability Exponentially Weighted Moving Average
 - Median Absolute Deviation
4. **Station reports same concentration value for 24 hours.**
5. **Station reports pollutant concentrations of 0 for more than 12 hours.**
6. **Station stops reporting data for > 6 hours**

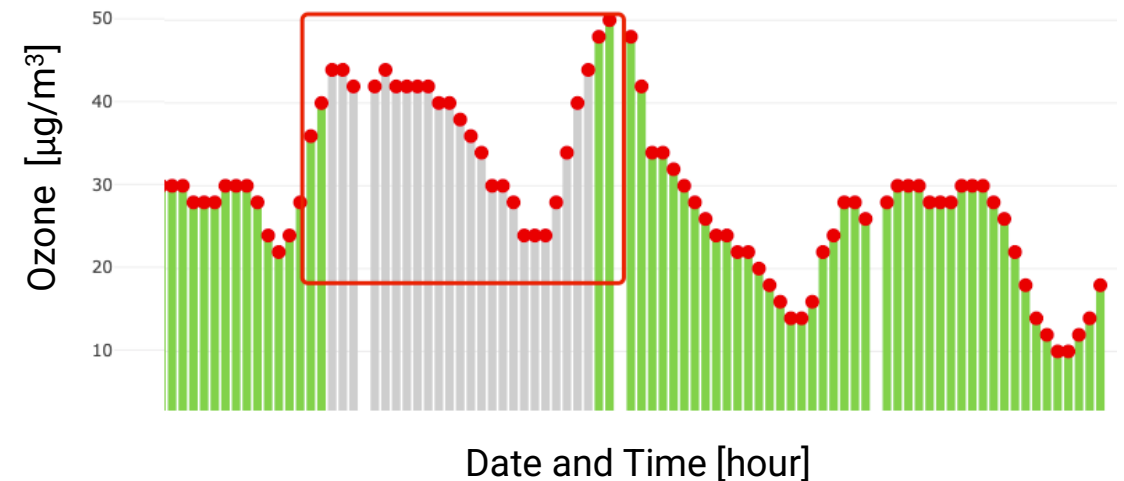
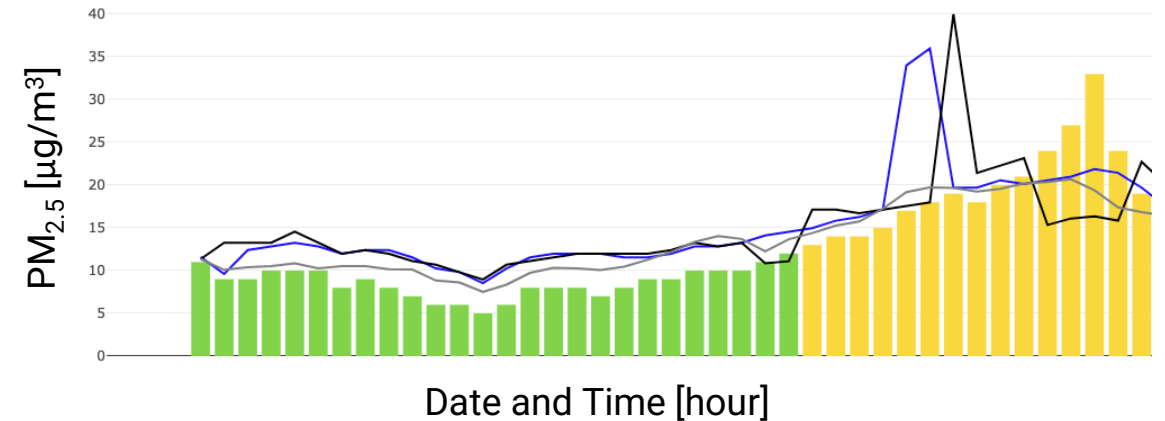


Mathematical QA of individual data points

Flagged data review and release procedures

1. Cross reference concentration spike with nearby stations
2. Evaluate statistical trends using last 12 hours of historical data from nearby stations
 - Correlation
 - Similarity
3. Manual review follows if data continues to be quarantined.

On average ~1% of our stations quarantined.



Summary of QA Procedures

Data Aggregator

Sensor Manufacturer

QA type	✓, X, N/A	Description (required)
Check of individual components	✓*	Batch testing of PM sensors
Other hardware QA	✓*	Installation review, 4 sensor slots, multiple networking options
Sensor software QA	✓*	Sensor error codes, customizable alerts
Lab testing of sensors	✓*	3 rd party testing by Swiss Federal Institute of Metrology (METAS)
Field testing of sensors	✓	Permanent collocation
Mathematical QA of individual data points	✓	Statistical review for outlier flagging
Mathematical QA of individual sensors	✓	Redundant sensor agreement
Mathematical network-wide QA	✓	Sensor specific correction functions applied network-wide
Data fusion QA	✓	Criteria for station inclusion in city average
Mathematical QA using information other than pollutant of interest	✓	Indoor/outdoor classification using temperature, T and RH to apply fog correction factor
Aggregator acceptance criteria	✓	Source specific review criteria, government and LCS
Other?		

✓* = QA as Sensor Manufacturer
 ✓ = QA as Data Aggregator