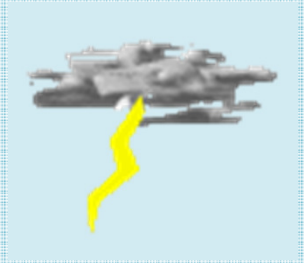
ADM Sensitivity

JESSE THÉ

INTRODUCTION

1. Motivation for the Investigation
2. Impact of Data
3. Case Study 1: Dust Modelling
4. Case Study 2: Real-time and forecast capabilities for offsite impacts.



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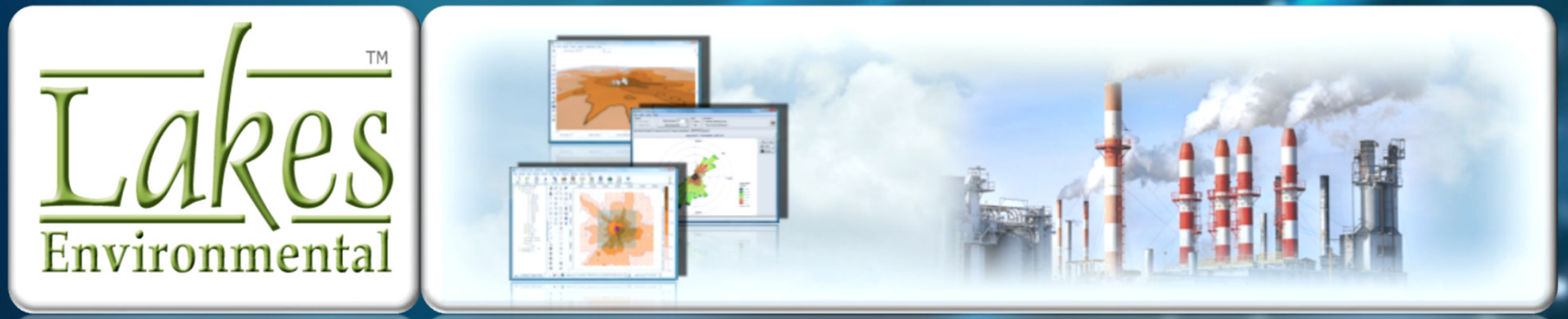

Motivation

CHALLENGES

1. What are Data Quality impacts?
2. Albedo, Bowen Ratio, Surface Roughness?
3. When can I ***schedule*** maintenance, startup, shutdown activities?

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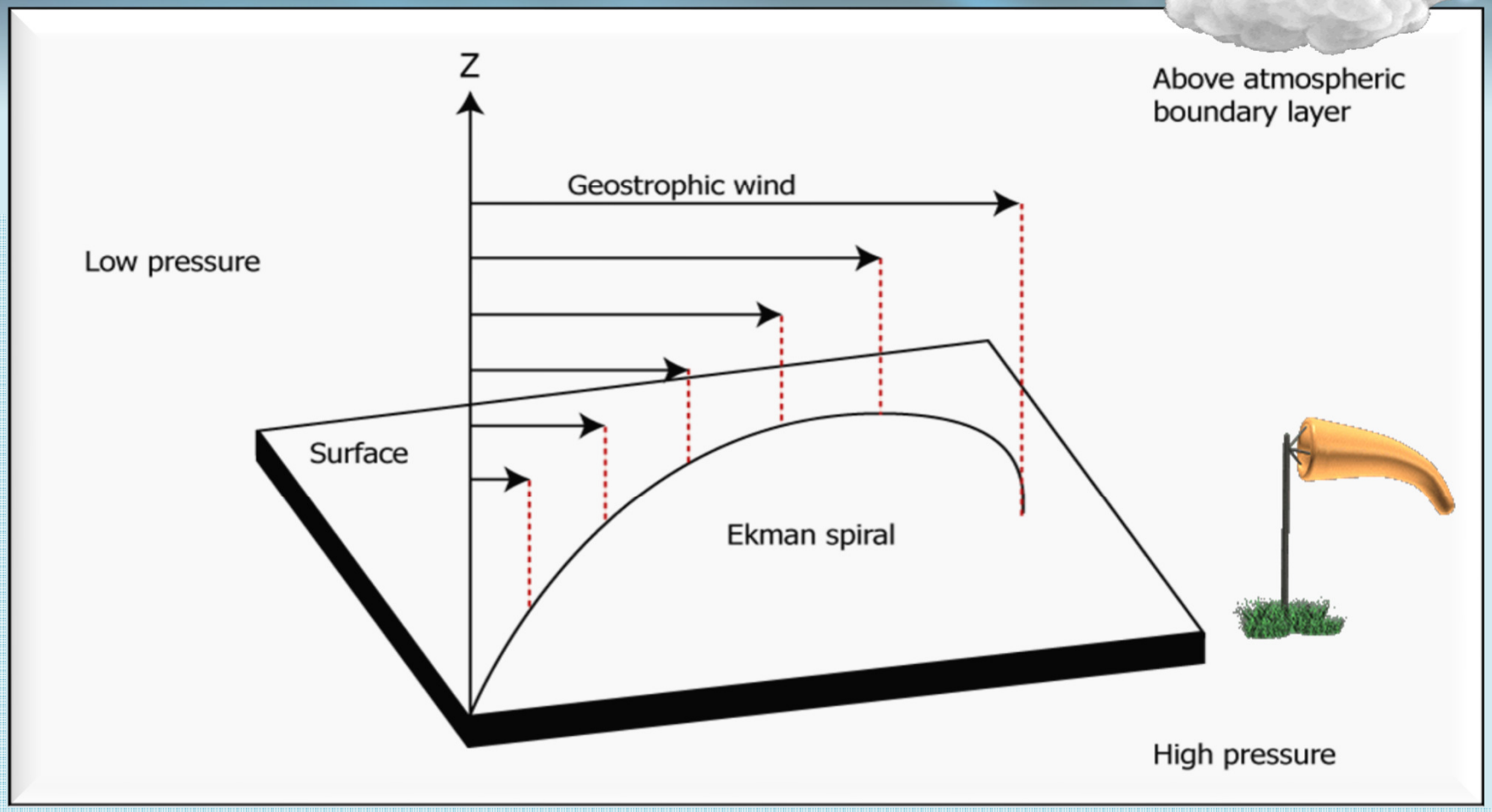
Vertical Profile Limitation



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Met Stations Limitations

1. **Calibration**
2. **Single point in space**
3. **Minimal measurements**
4. **Rare multi-level stations**

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ADM Guidance Limitations

1. **Hourly parameters**
2. **Met versus Site location**
3. **Surface parameter averaging**

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Impact of Data

Surface Roughness

- **Critical for Ground release**

Albedo and Bowen Ratio

- **Critical for Elevated release**

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Cloud Cover

- **Critical Day and Night**

Ceiling Height

- **Not Critical – Neither Day nor Night**

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Wind

1. **Speed: Critical**
2. **Direction:**
   - Not critical for Permitting / Approval
   - Critical for real-time systems

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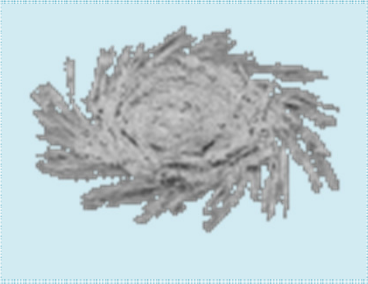
Met Data Acquisition

1. **Met Station**
   - Actual measurement at a point
   - No forecasting
2. **MM5**
   - Compares well with measured data
   - Forecasting
3. **WRF**
   - Winds are too fast



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Air Dispersion Model - Selection

1. AERMOD
   - Steady-State
   - Not ideal for real-time
2. CALPUFF
   - Transient
   - Poor coverage close to sources
3. SCIPUFF
   - Transient
   - Good close and far from sources
   - Handles emergency releases!

Case 1: Dust

Wind Blown Dust

Local Dust Transport and Deposition in the Lake Simcoe Airshed

- L. Weiss[1], B. Gharabaghi[1], J. Thé[2], F. Matamala[2] J.G. Winter[3] and E.A. Stainsby[3]
- [1] University of Guelph, School of Engineering, Guelph, ON
- [2] Lakes Environmental, Waterloo, ON
- [3] Ontario Ministry of the Environment, Etobicoke, ON

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Wind Blown Emissions Estimates

- $F = c_0 u_*^4 \left(1 - \frac{u_{*cr}}{u_*}\right) * CRF * C_m * BMPF$
- u_* = **Friction velocity → Very Critical**

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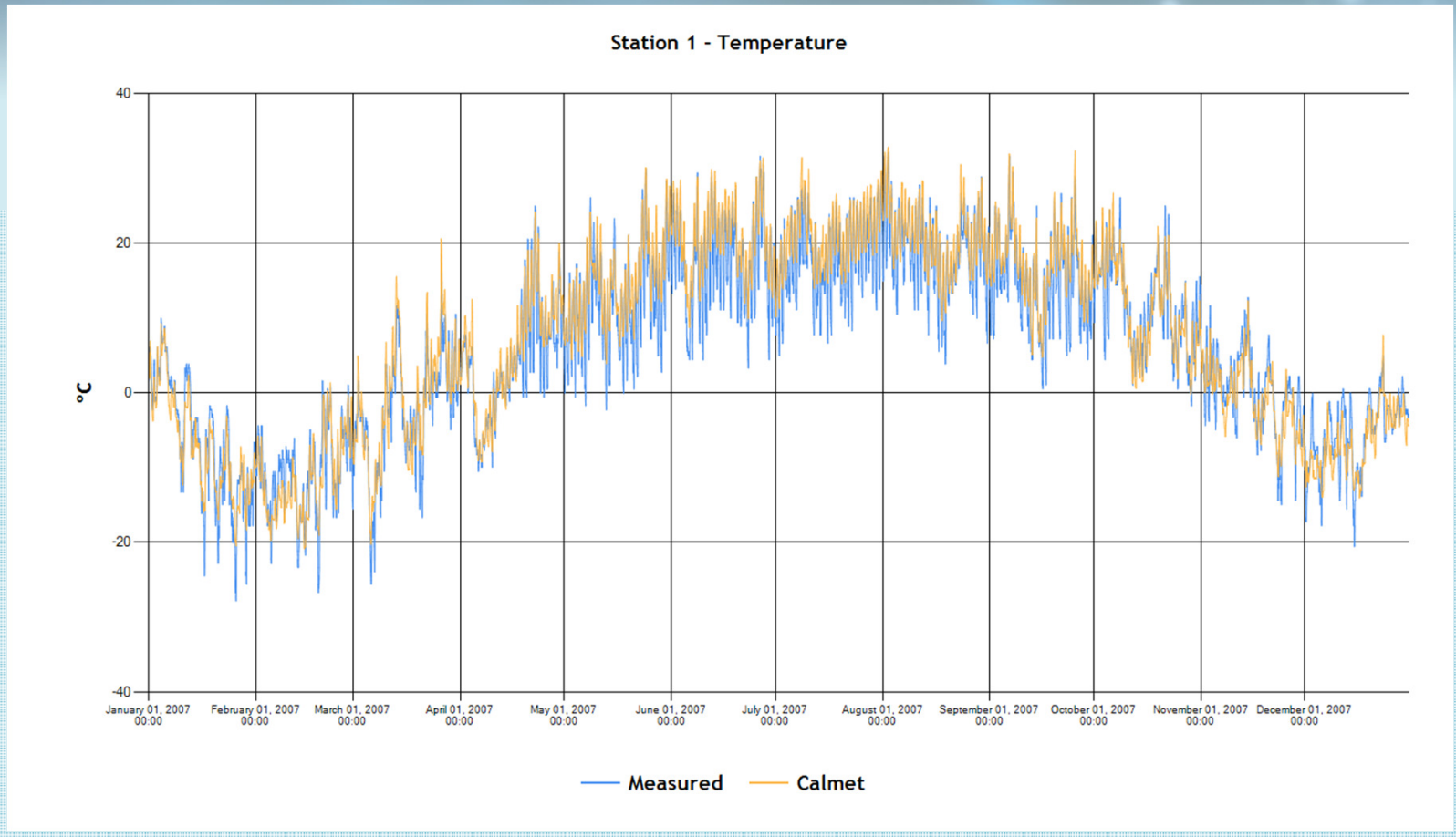
Met Calibration - Temperature



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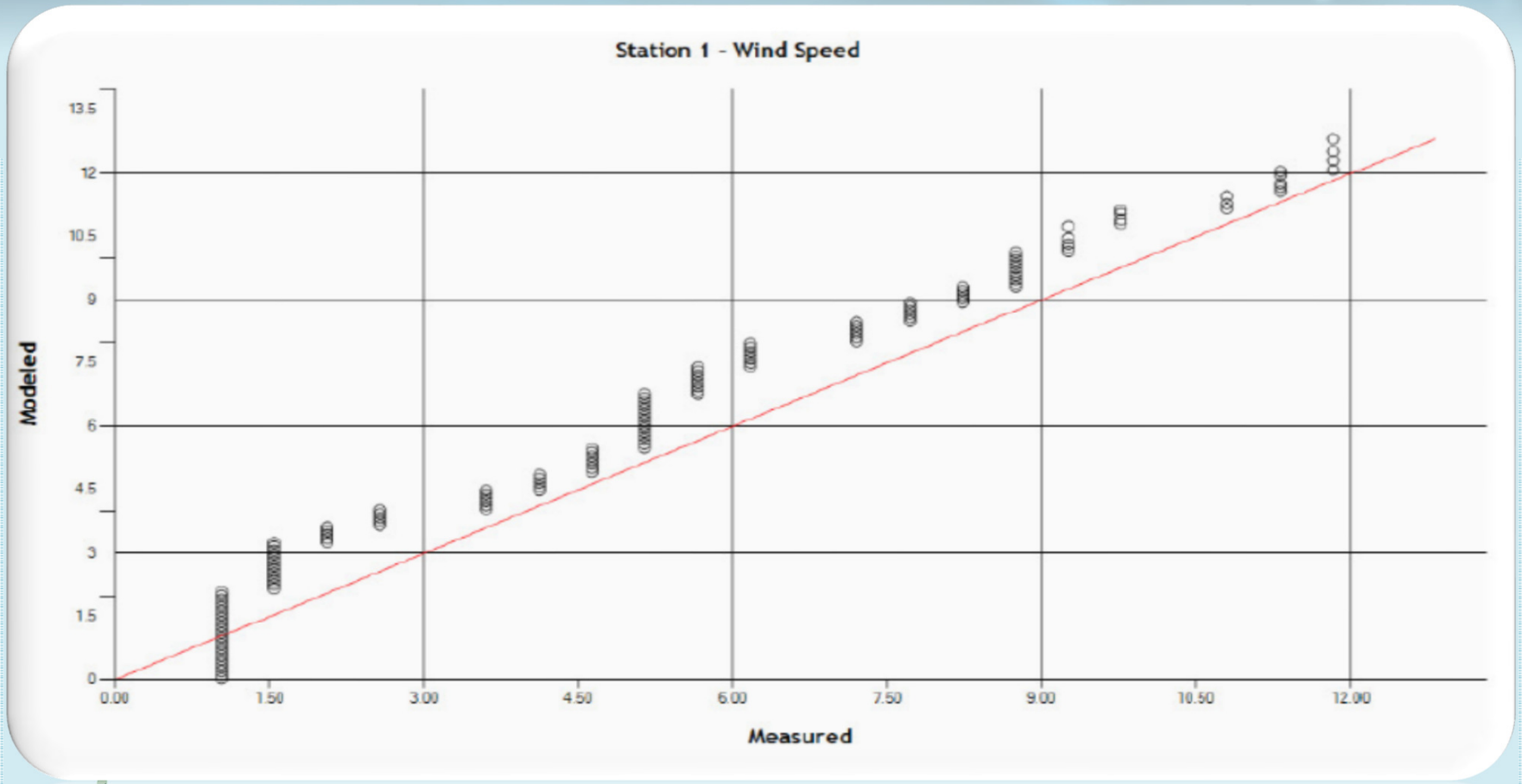
Met Calibration - Wind Speed



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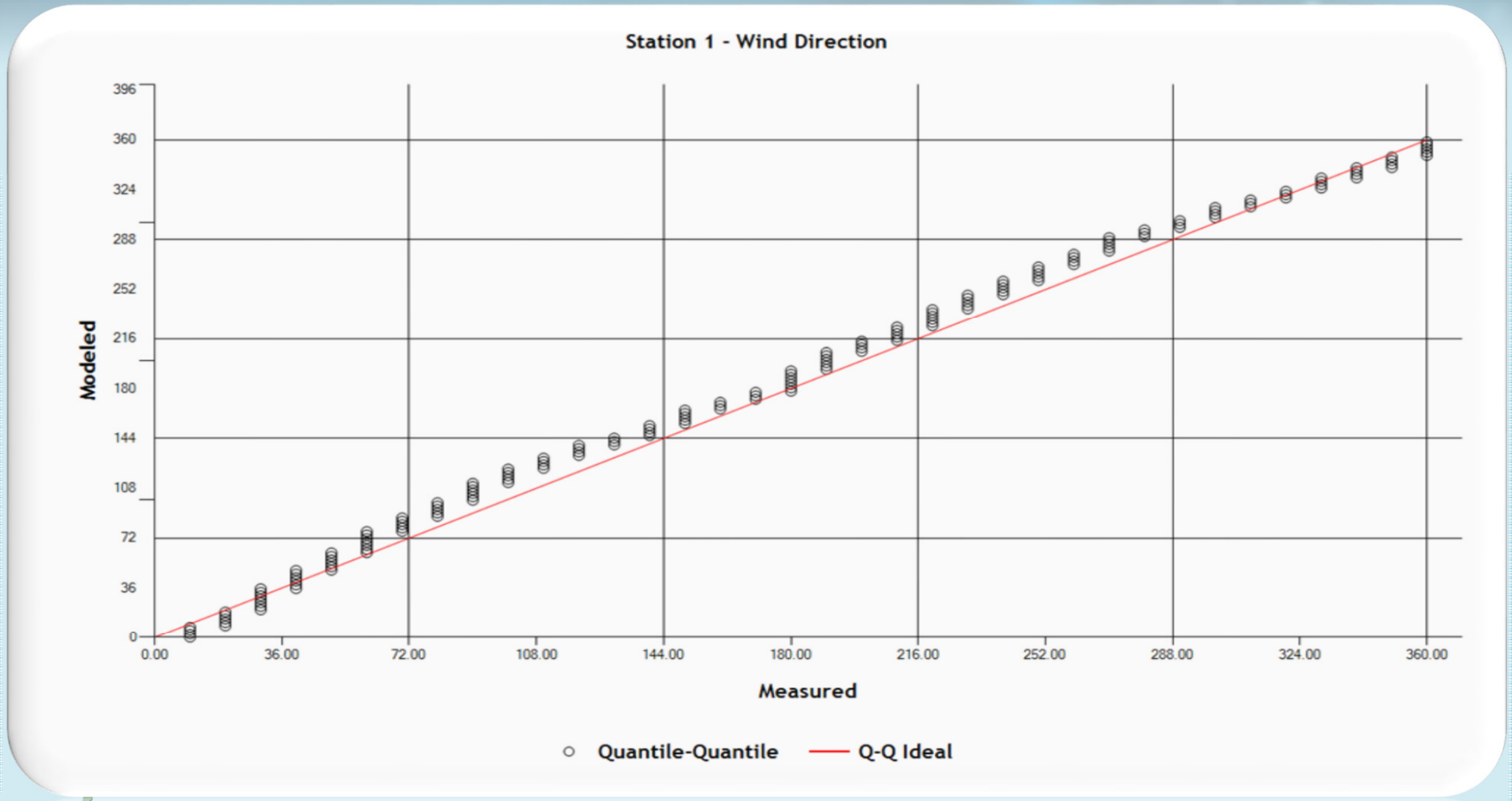
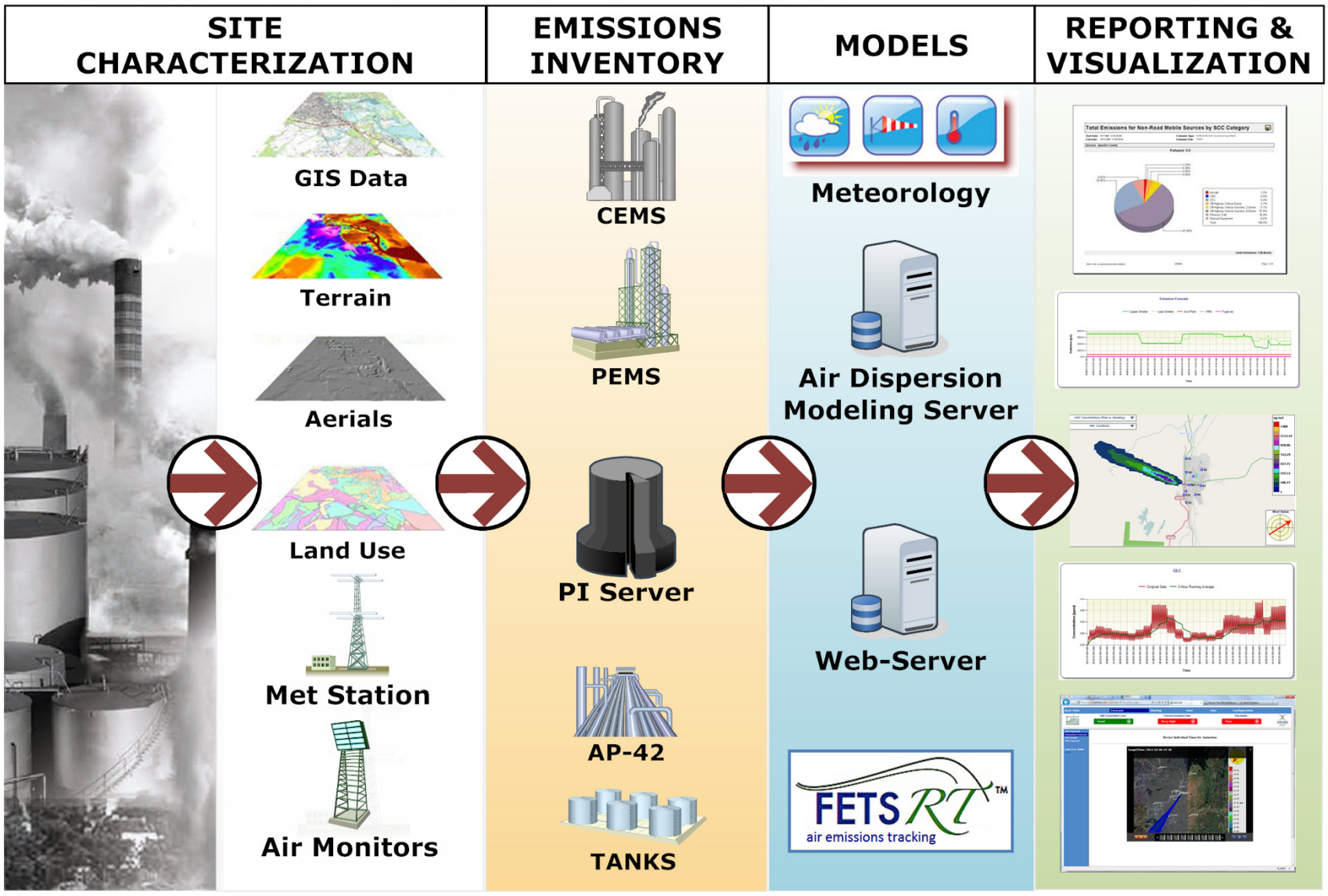
Met Calibration – Wind Direction

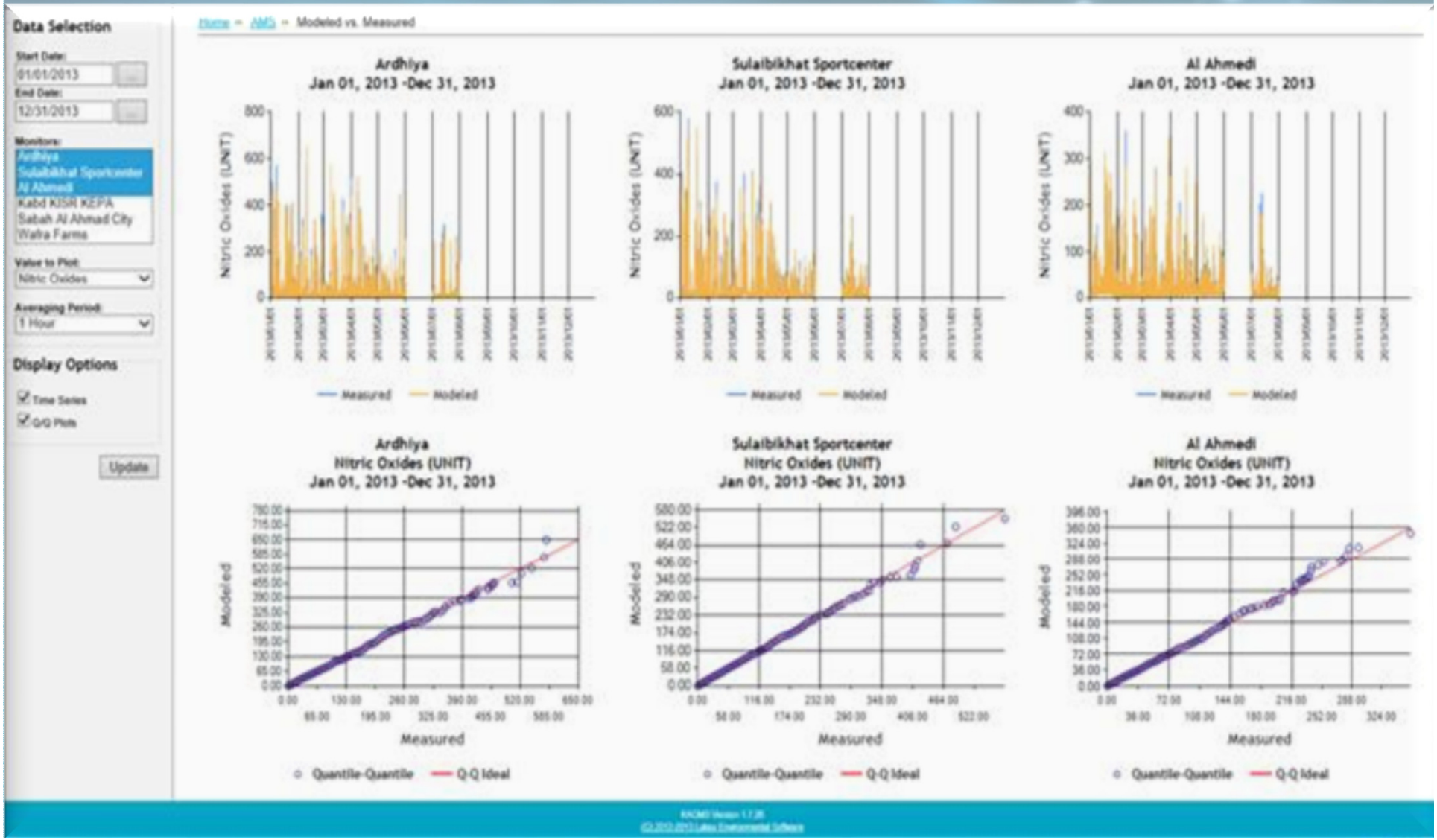


Case 2: Forecasting

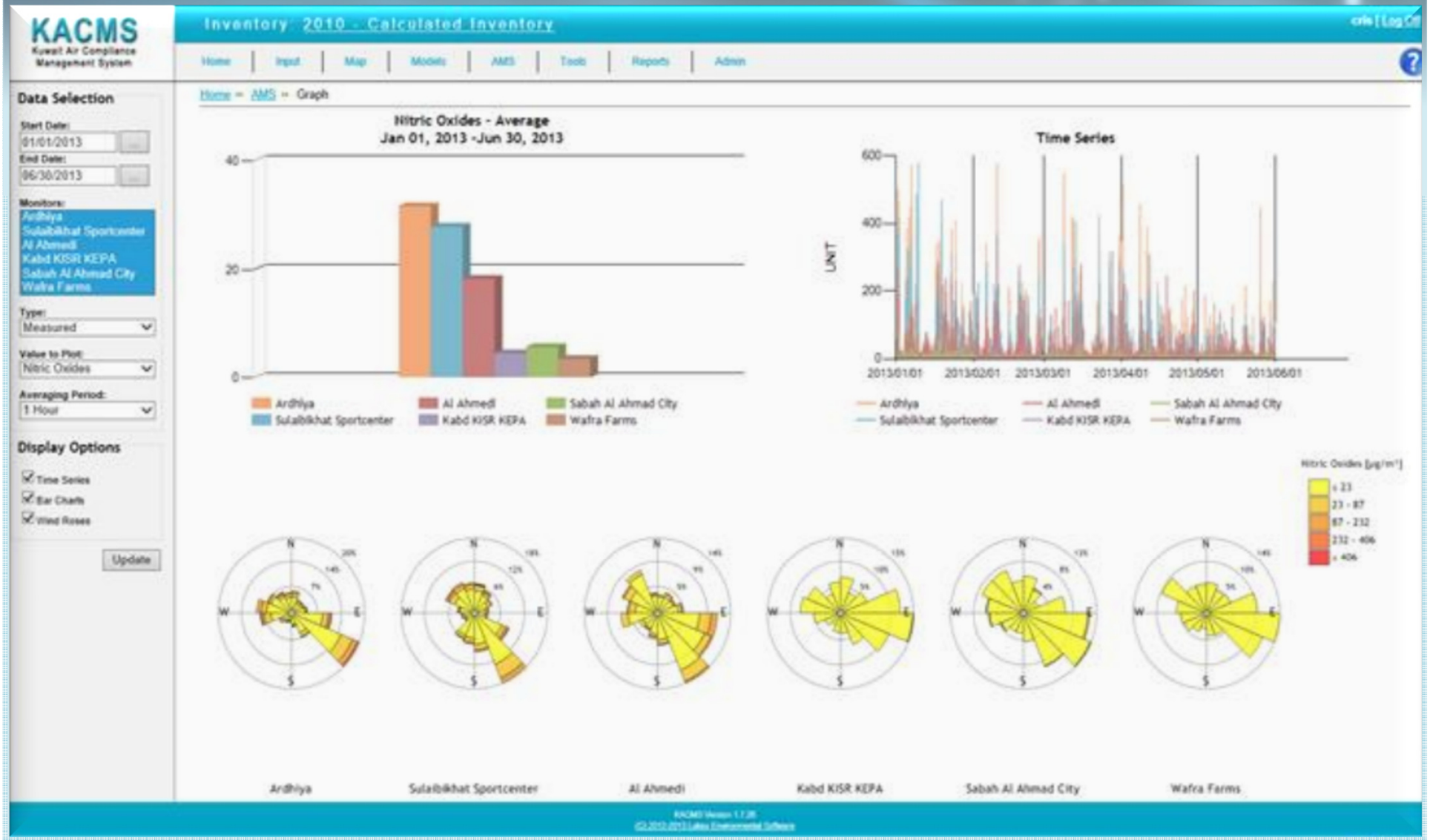
FETS-RT System Integration



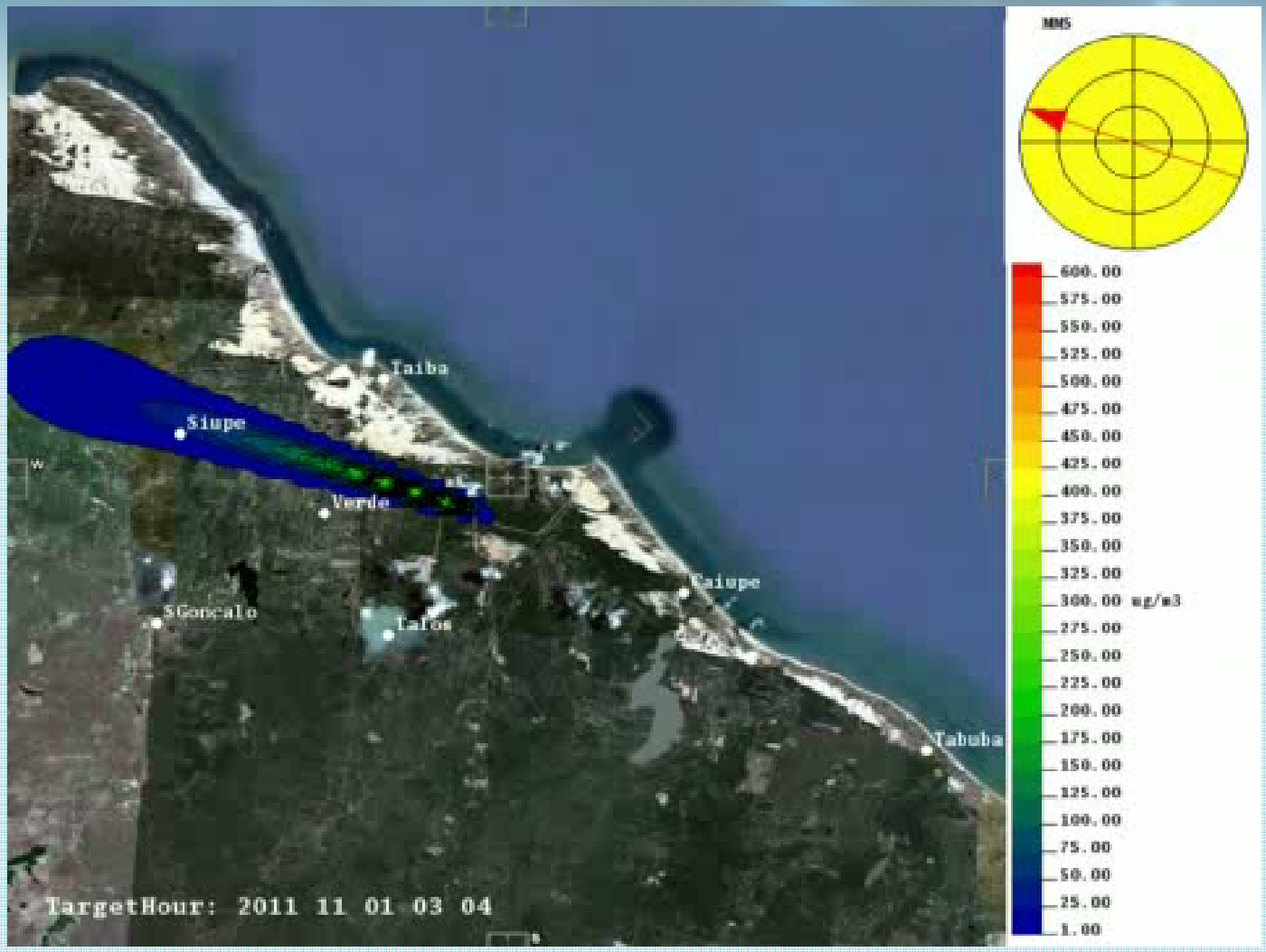
Calibration Module



Monitoring Station Module



Prévisions pour les prochaines 24 h !



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Closure

Questions?

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Contact Information

Thank You All !!!

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