



Norwegian  
Meteorological  
Institute



Atmosphere Monitoring Service

# EMEP for CAMS



Michael Gauss, Anna Benedictow, Alvaro Valdebenito

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# Copernicus

<http://www.copernicus.eu>

- European Earth Observation Programme
- Six thematic areas: land, marine, **atmosphere**, climate change, emergency, security
- **CAMS: Copernicus atmosphere monitoring service**
  - <http://atmosphere.copernicus.eu>
  - One of the CAMS flagship products: Daily chemical weather forecasts
  - EMEP is one of seven operational models to provide these forecasts

# How is the EMEP model performing in CAMS?

Daily verification plots can be found at:

<http://macc-raq-op.meteo.fr/>

Bias, correlation, RMSE, fractional gross error, Taylor diagrams...

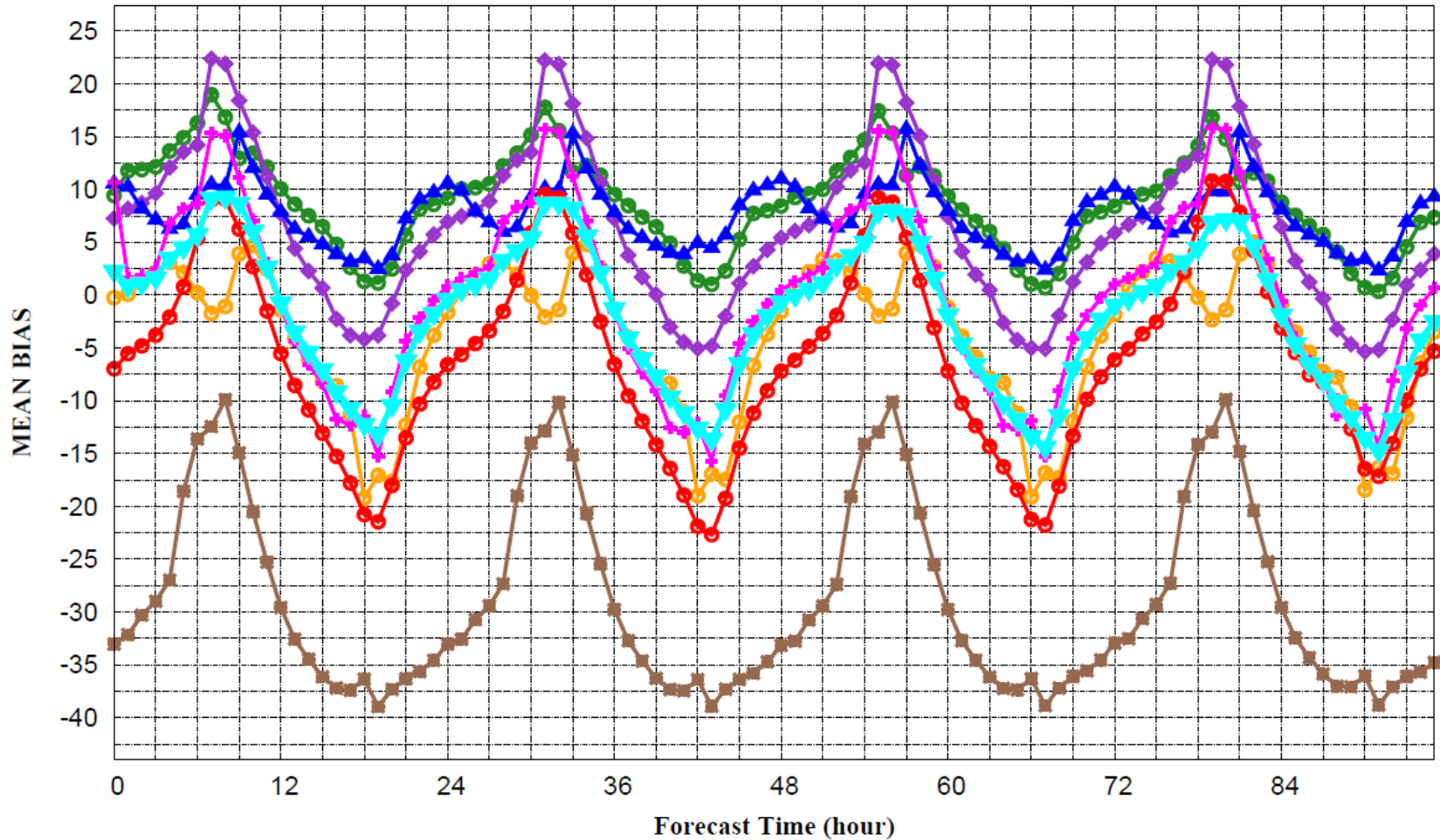
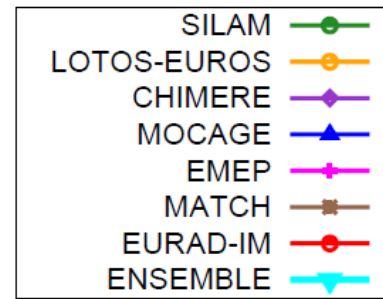


# MACC RAQ - Verification - Europe

Surface Ozone [ $\mu\text{g}/\text{m}^3$ ]

forecasts - Mean Bias

2015-06-08 00UTC to 2015-09-07 00UTC



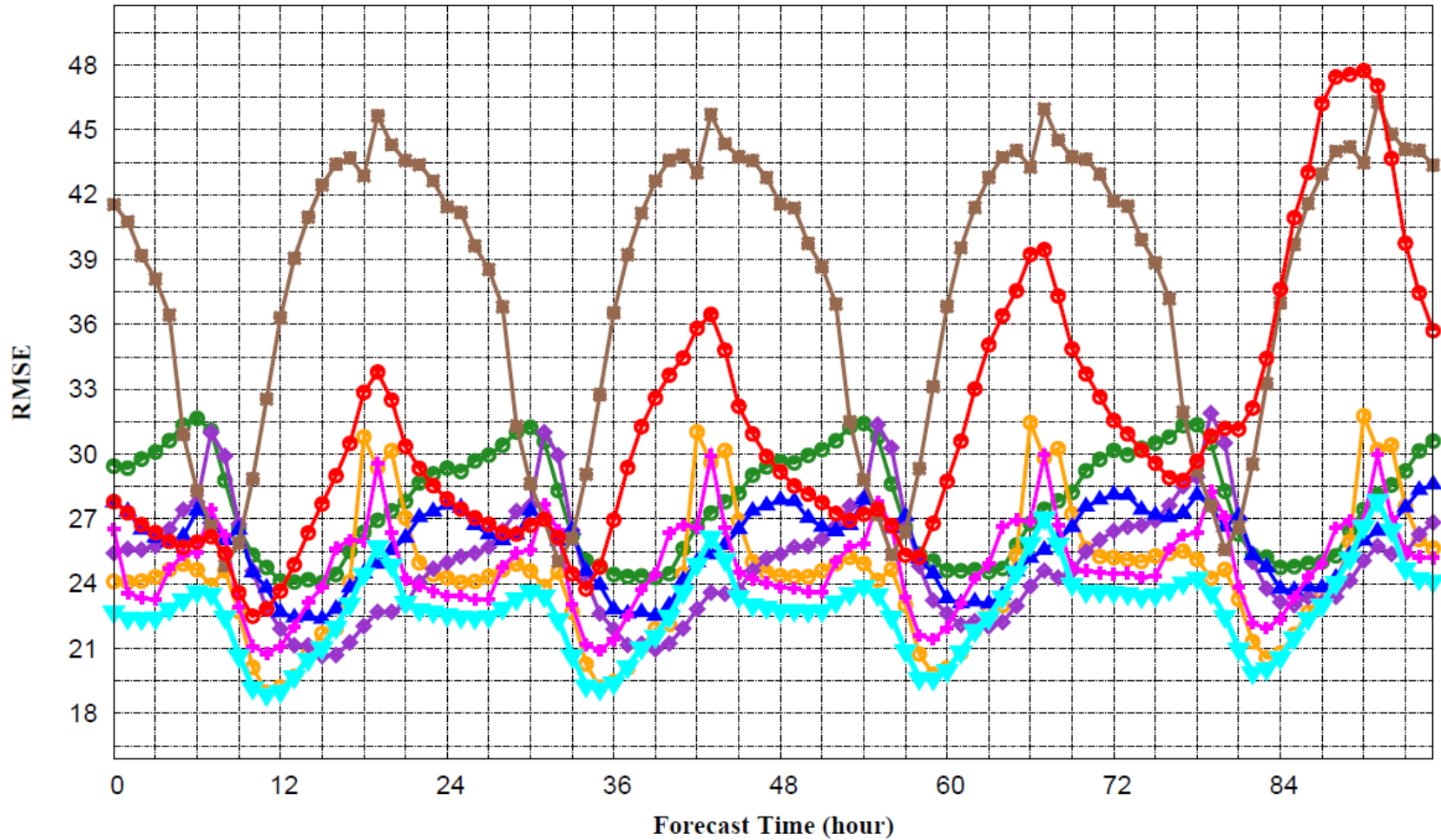
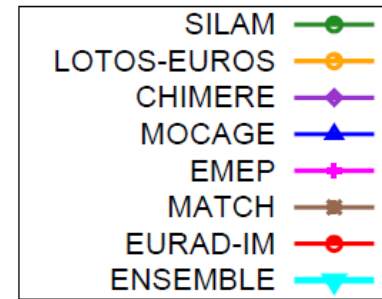
This and all other plots: skill as a function of forecast length (up to 96 hours). Average of all forecasts during the summer season 2015

# MACC RAQ - Verification - Europe

Surface Ozone [ $\mu\text{g}/\text{m}^3$ ]

forecasts - Root Mean Square Error

2015-06-08 00UTC to 2015-09-07 00UTC



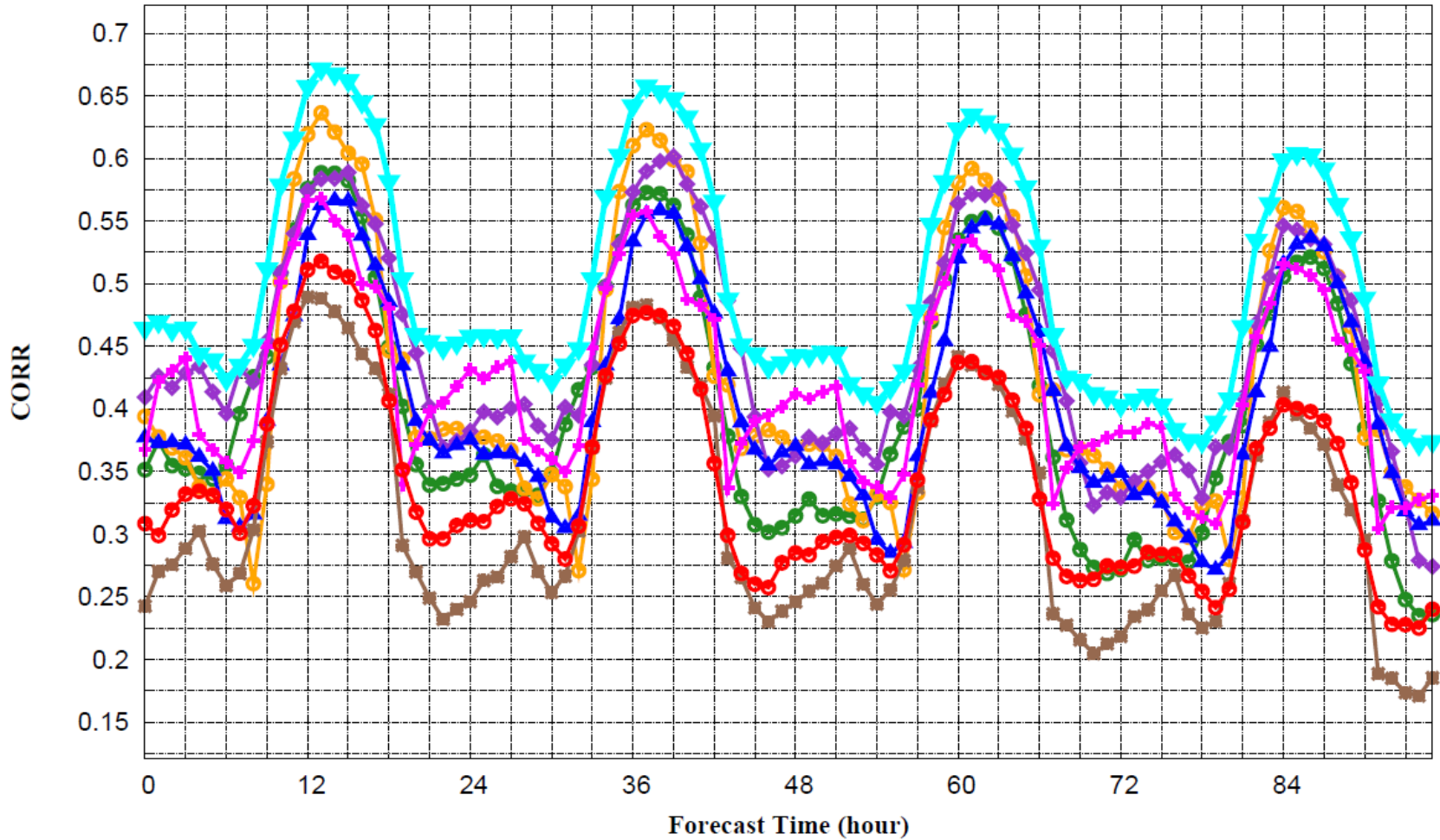
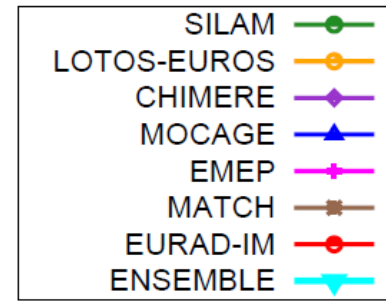


# MACC RAQ - Verification - Europe

Surface Ozone [ $\mu\text{g}/\text{m}^3$ ]

forecasts - Correlation

2015-06-08 00UTC to 2015-09-07 00UTC

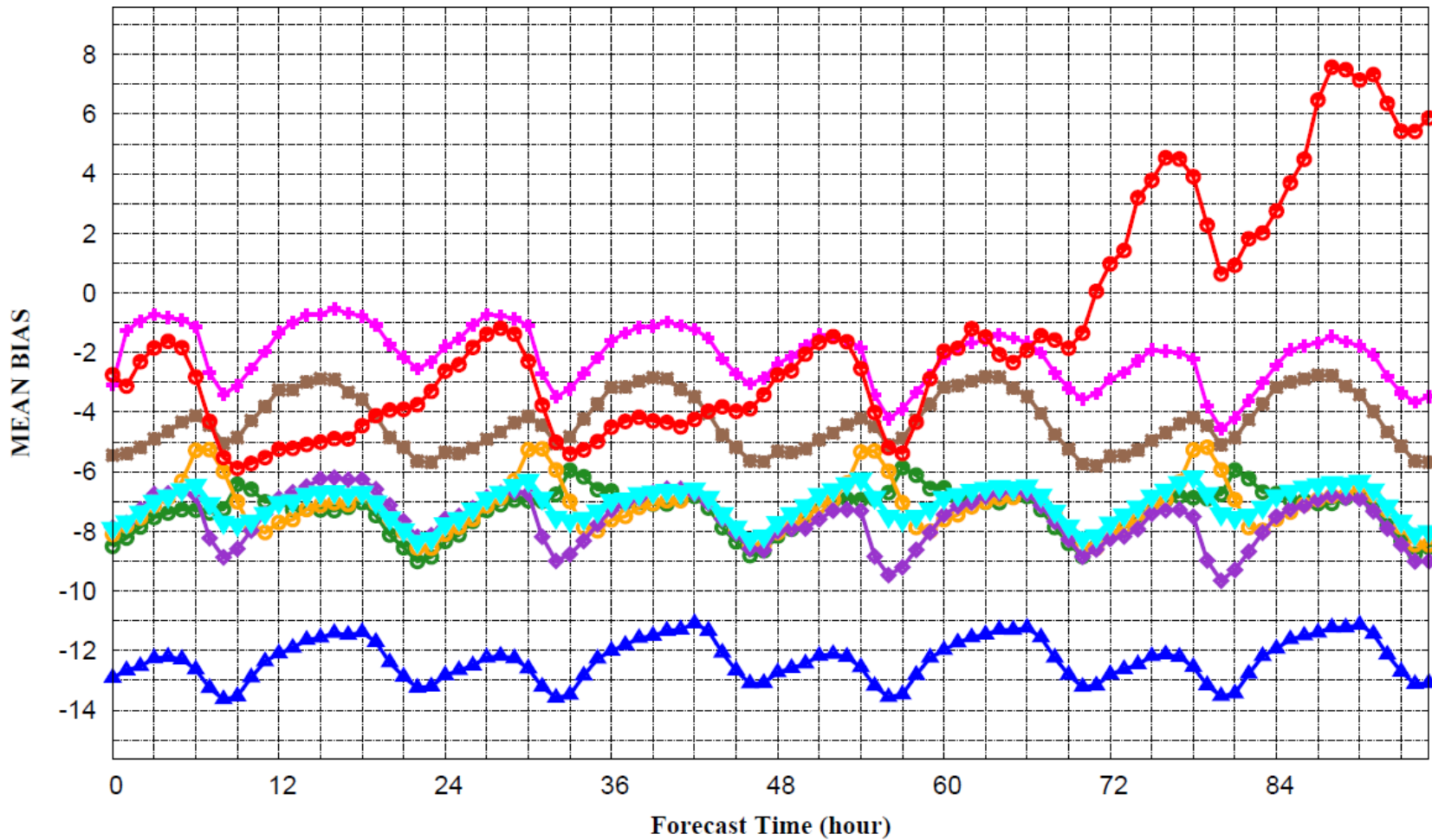
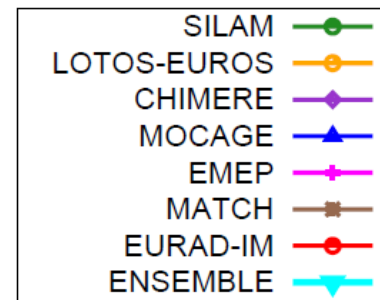


# MACC RAQ - Verification - Europe

## Surface Pm10 Aerosol [ $\mu\text{g}/\text{m}^3$ ]

### forecasts - Mean Bias

#### 2015-06-08 00UTC to 2015-09-07 00UTC



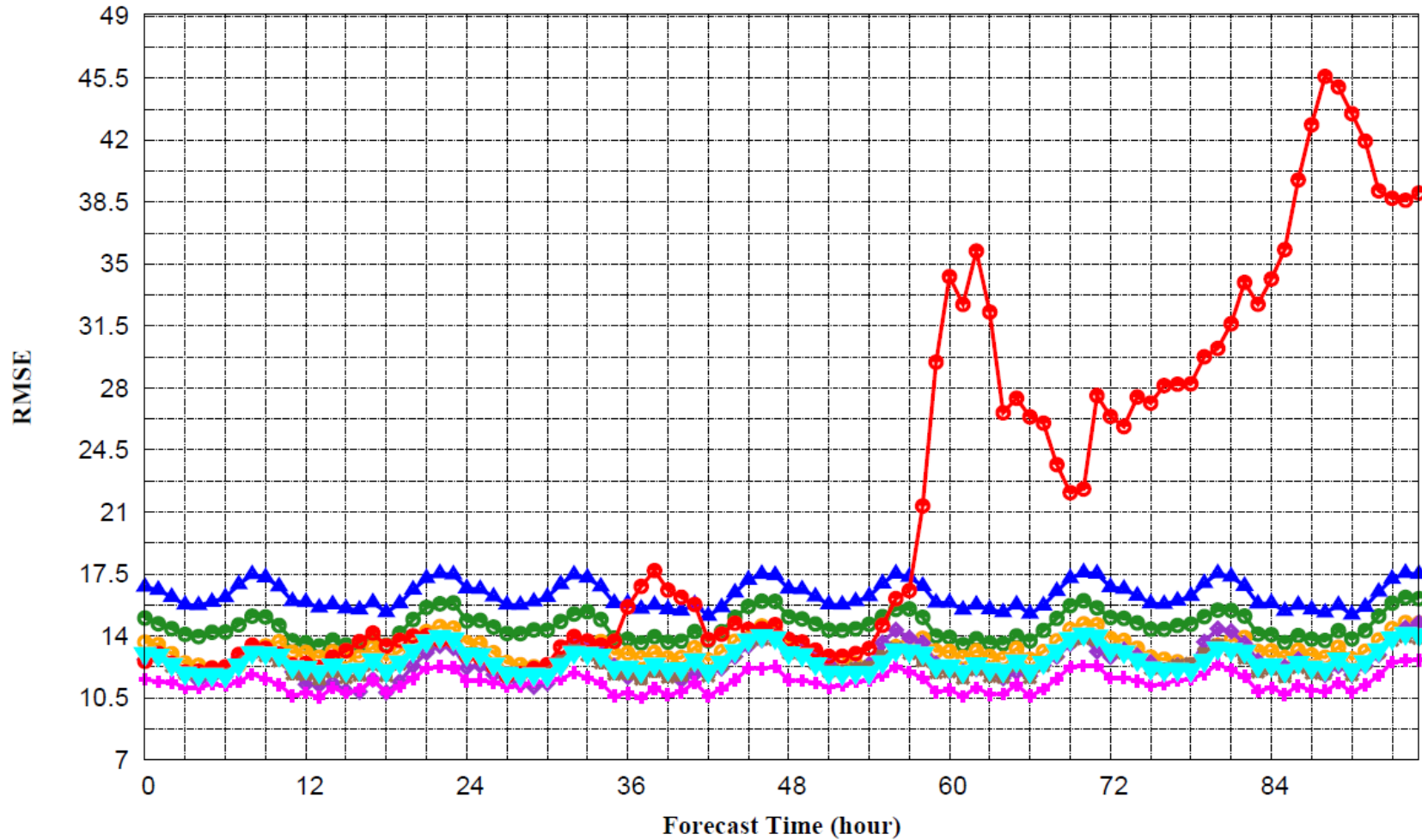
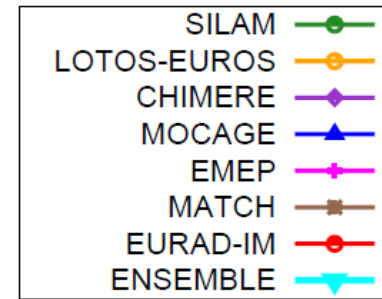
Note: problems with EURAD-IM have been identified and removed

# MACC RAQ - Verification - Europe

## Surface Pm10 Aerosol [ $\mu\text{g}/\text{m}^3$ ]

### forecasts - Root Mean Square Error

#### 2015-06-08 00UTC to 2015-09-07 00UTC



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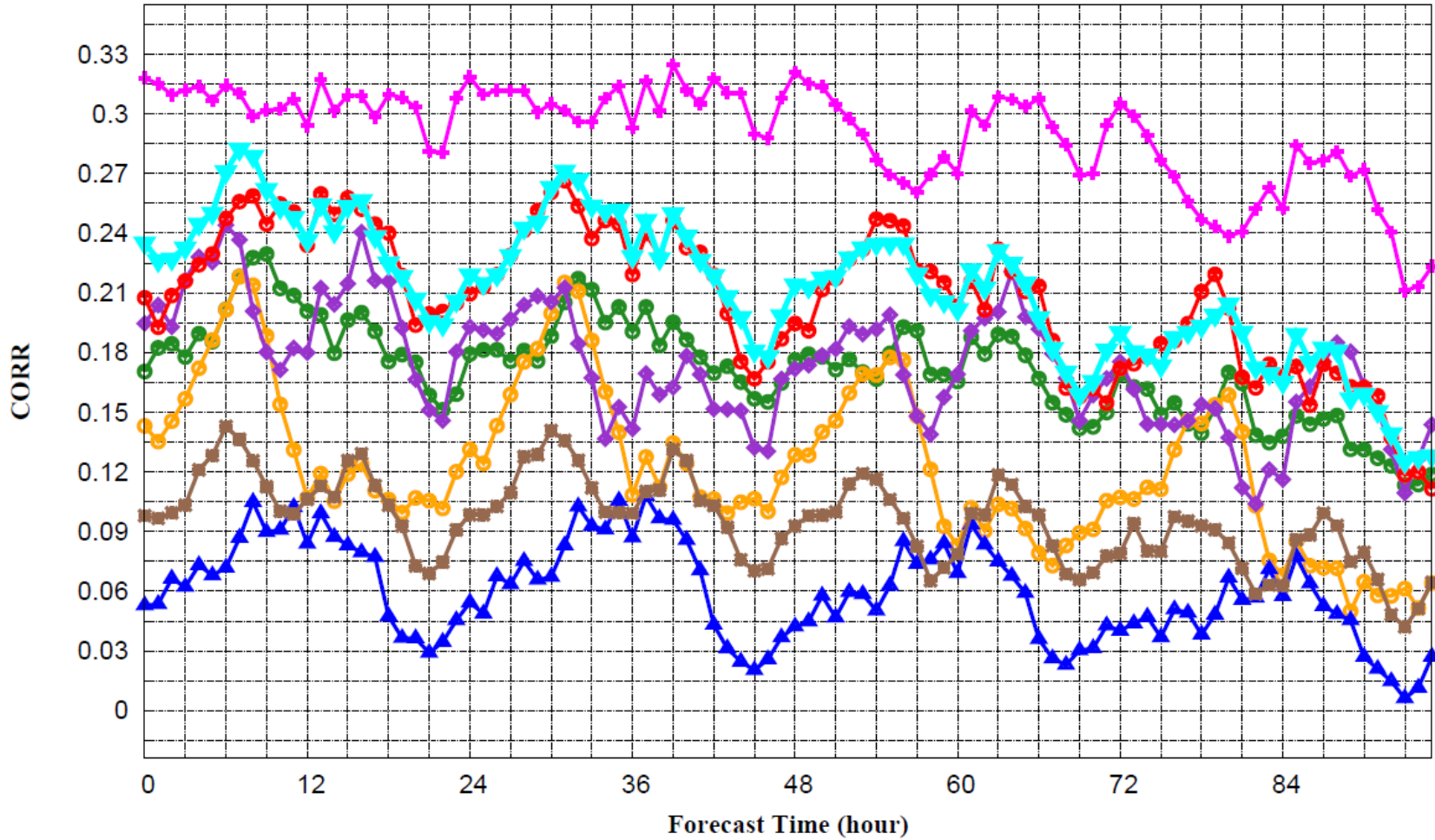
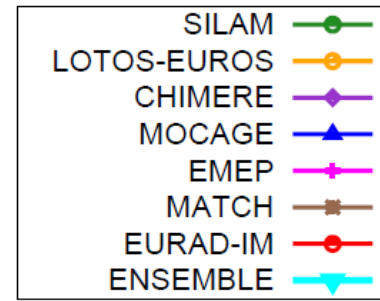


# MACC RAQ - Verification - Europe

## Surface Pm10 Aerosol [ $\mu\text{g}/\text{m}^3$ ]

### forecasts - Correlation

#### 2015-06-08 00UTC to 2015-09-07 00UTC

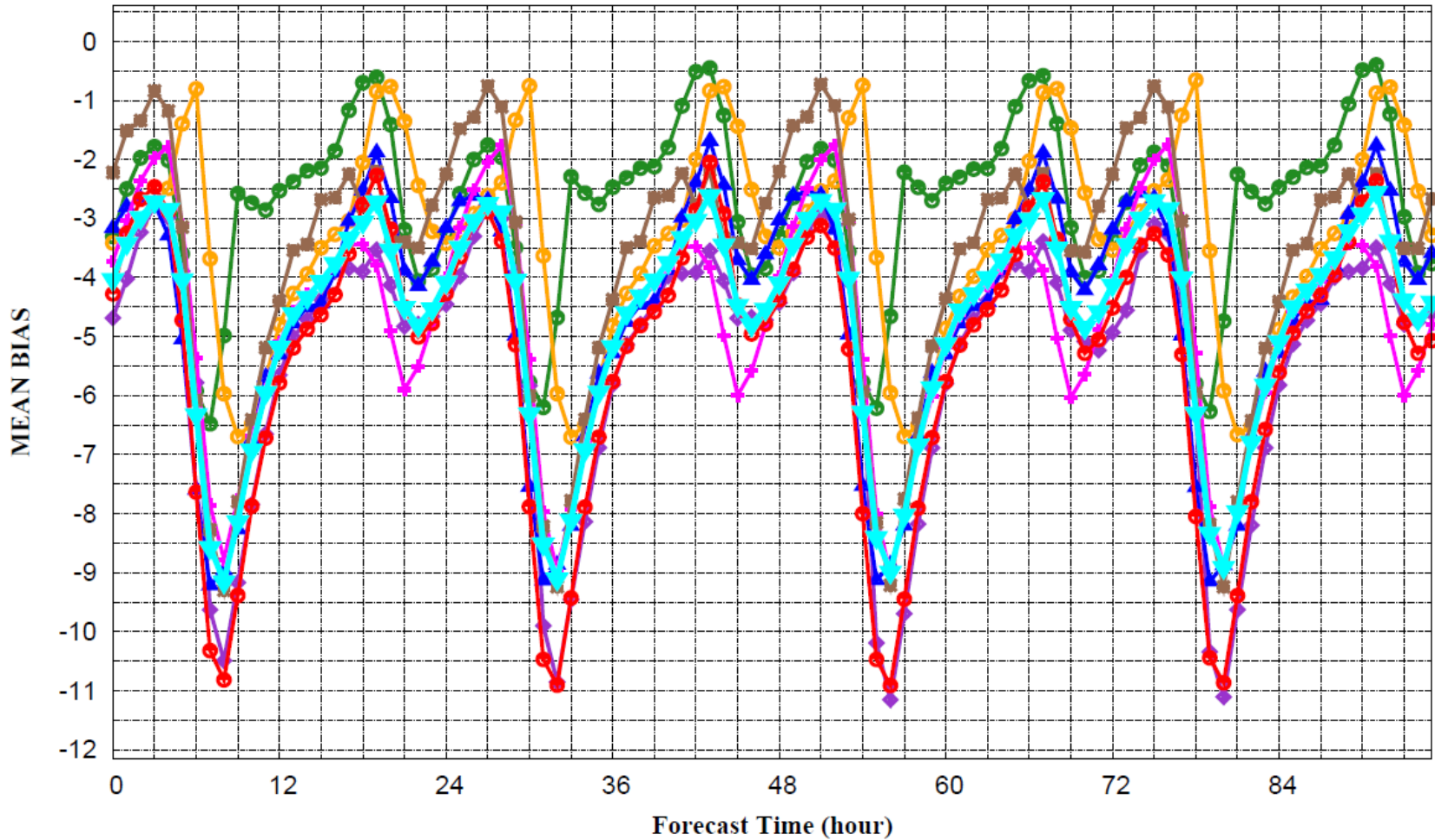
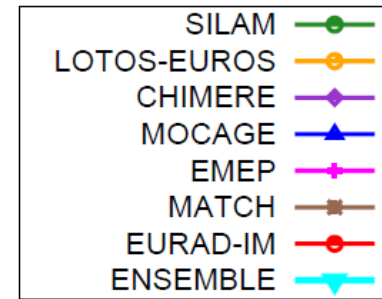


# MACC RAQ - Verification - Europe

## Surface Nitrogen Dioxide [ $\mu\text{g}/\text{m}^3$ ]

### forecasts - Mean Bias

### 2015-06-08 00UTC to 2015-09-07 00UTC

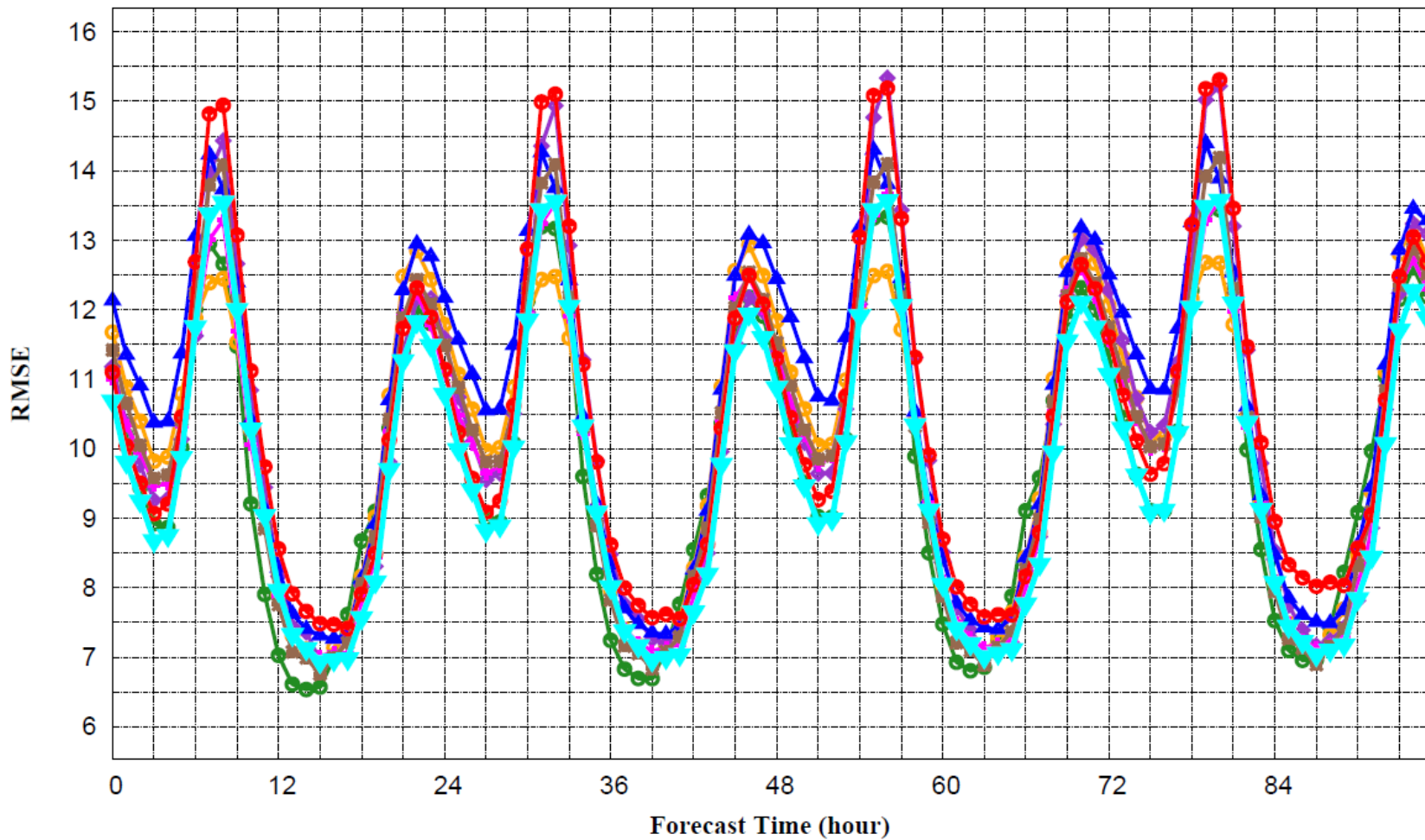
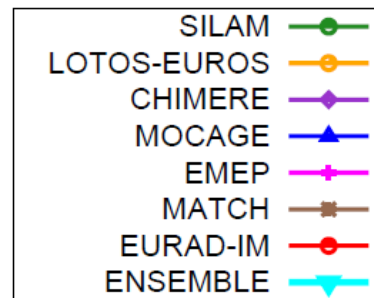


# MACC RAQ - Verification - Europe

## Surface Nitrogen Dioxide [ $\mu\text{g}/\text{m}^3$ ]

### forecasts - Root Mean Square Error

#### 2015-06-08 00UTC to 2015-09-07 00UTC

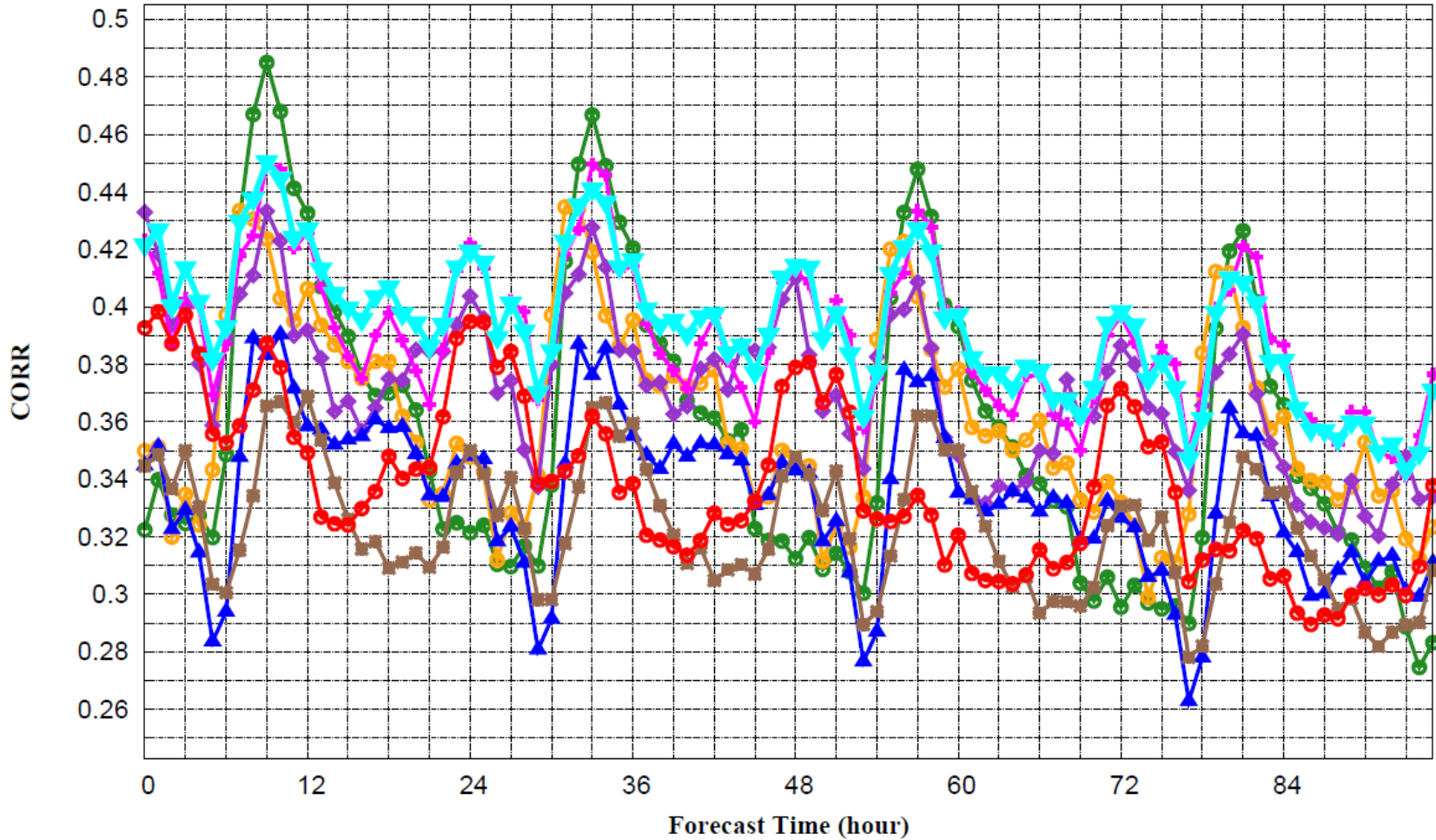
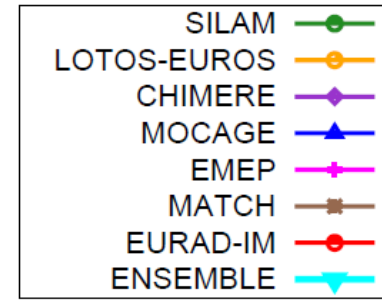


# MACC RAQ - Verification - Europe

## Surface Nitrogen Dioxide [ $\mu\text{g}/\text{m}^3$ ]

### forecasts - Correlation

#### 2015-06-08 00UTC to 2015-09-07 00UTC



# QC-QA EMEP model

- Long-term funding for model development (decades)
- Main goal: Right answers for the right reasons
- Continuous multi-species evaluation, publicly available
- There is no such thing as a perfect model  
... but the EMEP model is a safe choice!