

# Modelling support for near-surface ozone pollution assessment for 2012 - 2015 – Poland

## Feedback on guidance document and MQO

### Application of Delta Tool for GEM-AQ model evaluation

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Main contractor: Warsaw University of Technology

Sub-contractor: EcoForecast Foundation



# Outline

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- GEM-AQ model
  - Domains
  - Emissions used in assessment
  - DELTA tool evaluation – 3.0 vs 5.4
  - 2014-2015 assessment results
  - Other works
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# GEM-AQ description

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Global Environmental Multiscale – Air Quality model  
built as part of a Canadian consortium  
MAQNet (2001-2008)

- Meteorological model GEM
    - Model developed by RPN
    - Canadian operational weather forecast
    - Grid configuration allows for calculations in variable resolutions
    - Built-in option of limited area domains– LAM (cascade consistent calculation)
    - An extensive library of parameterization of physical processes
-

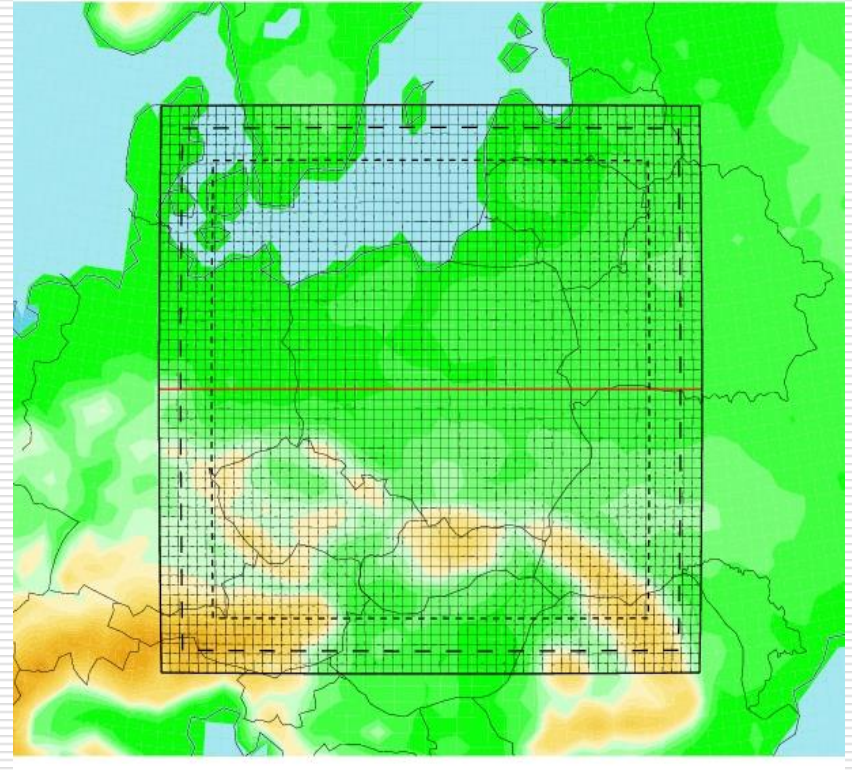
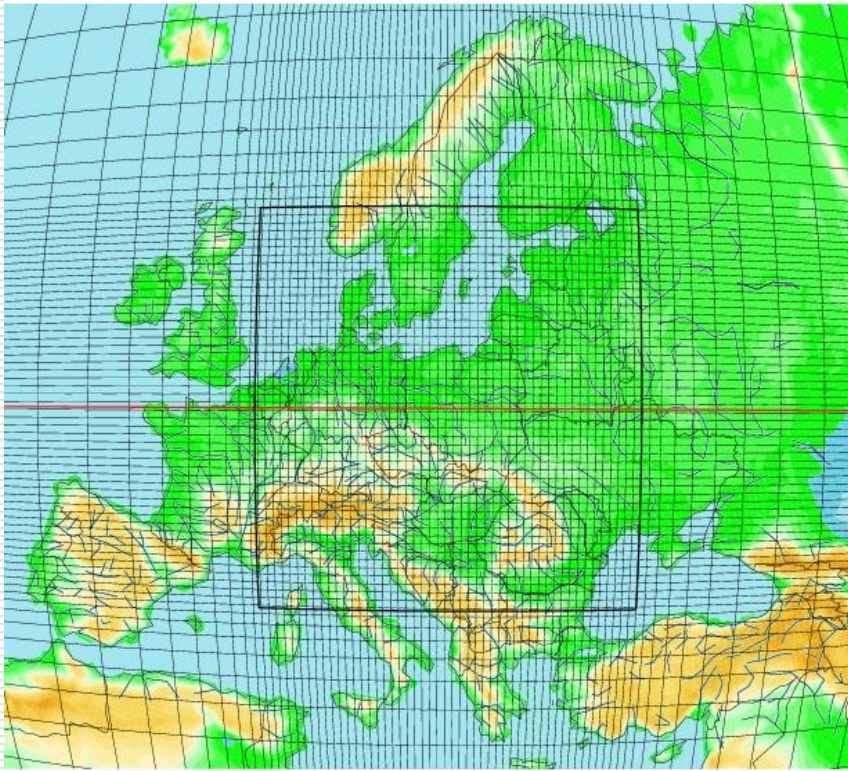
# GEM-AQ description

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- Chemical module
    - On-line type
    - Tropospheric chemistry(extended ADOM II mechanism)
      - gas-phase chemistry – 50 species
      - Hydrocarbons aggregation(lumped molecular approach)
      - 116 chemical reactions, including 19 photochemical reactions – reaction constants dependent on temperature and pressure
      - chemical transformations typical of the troposphere
    - Dry deposition and washout
    - Aerosols chemistry and physics
    - Biogenic and anthropogenic emissions
-

# Modelling domain

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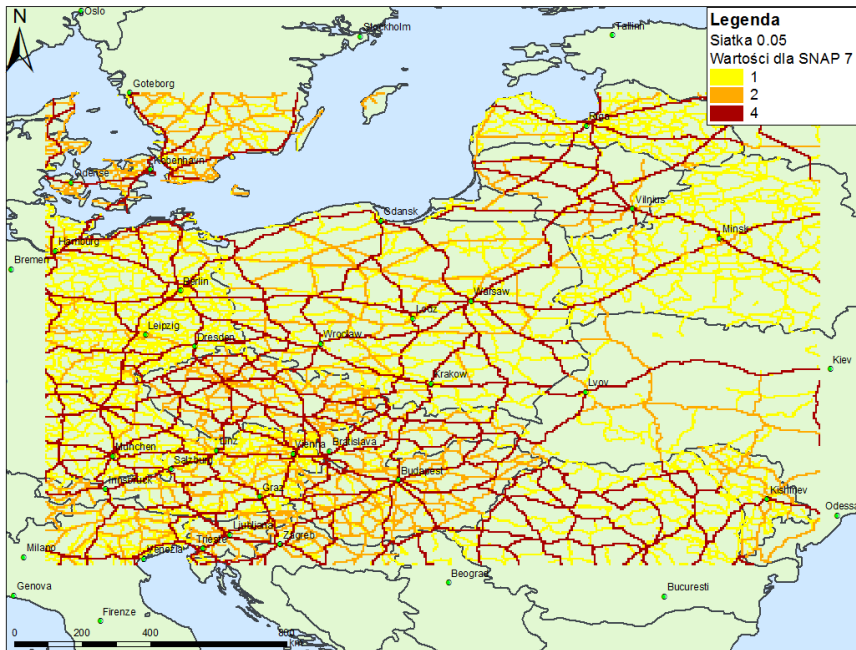
# Emission data

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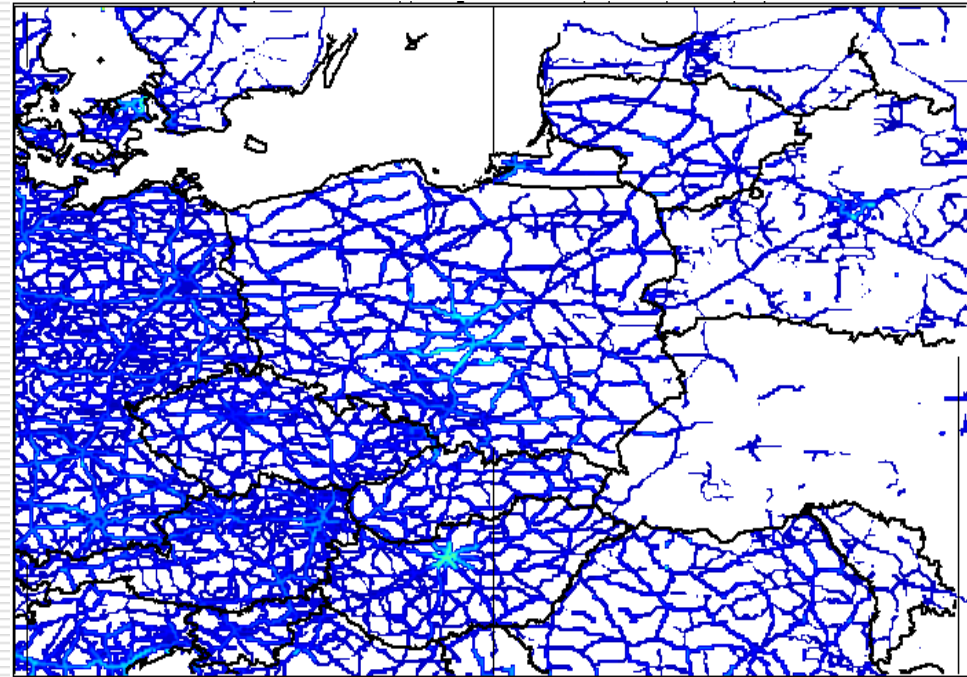
- ❑ EMEP inventory (valid 2010-2013)
  - ❑ Emission 0.5x0.5 Mercator relocated to 0.125x0.125 and 0.05x0.05 based on GIS information
  - ❑ Relocation masks separate for each SNAP category
  - ❑ Temporal variability and vertical distribution for each SNAP category
-



# EMEP inventory - relocation



Relocation mask



Final emission flux

NO<sub>x</sub> SNAP07

# Delta tool application for Poland

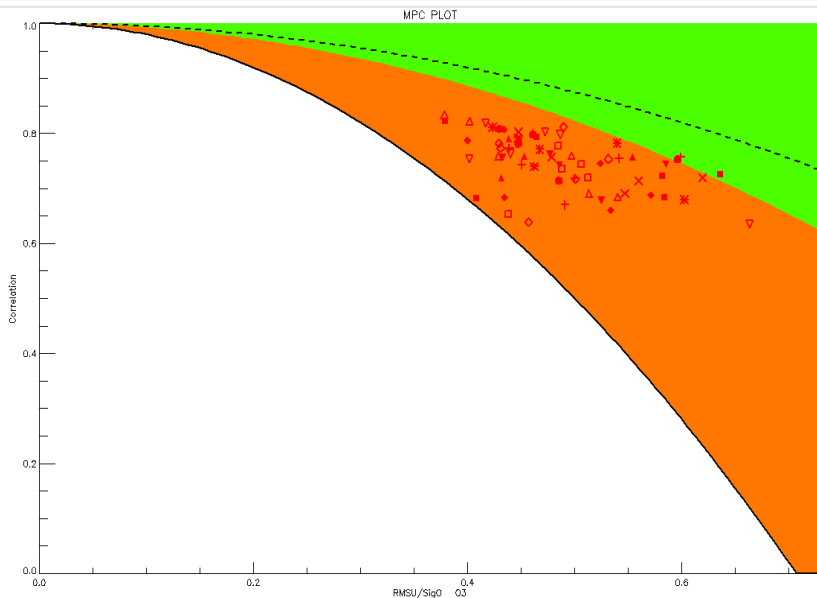
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# MPC – correlation Delta 3.0 vs Delta 5.4 - 2012

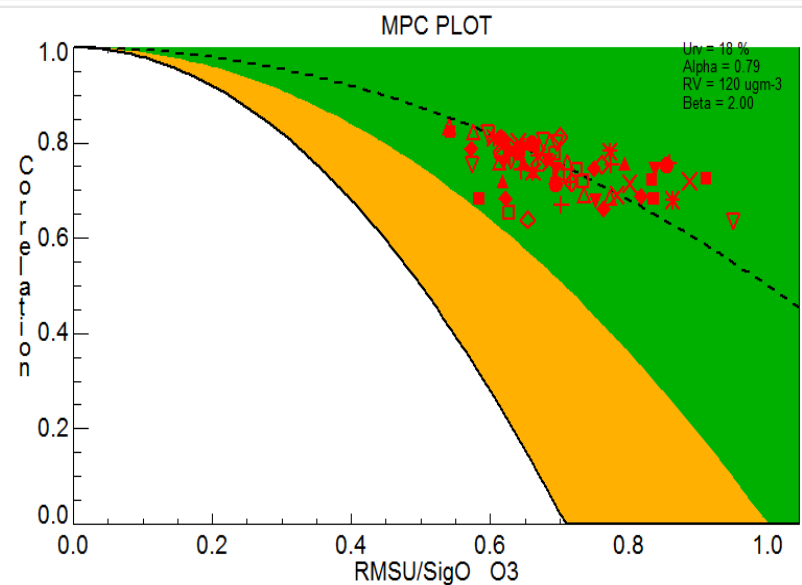
## 3.0



♦ Jarczew	♦ Gdansk-szadol	♦ Pabianice	♦ Olsztyn	♦ Zielona-gora
♦ Puszcza-borec	♦ Gdansk-wrzesz	♦ Parzniewice	♦ Ostroda	♦ Cieszyn
♦ Katowice	♦ Ciechocinek	♦ Szymbark	♦ Widuchowa	♦ Dabrowa-gorni
♦ Warszawa-kruc	♦ Konieczynka	♦ Granica-kpn	♦ Jelenia-gora	♦ Wodzislaw
♦ Belsk-igpan	♦ Radom	♦ Walbrzych	♦ Zabrze	♦ zloty-potok
♦ Czerniawa	♦ Biala-podlask	♦ Warszawa-ursy	♦ Wroclaw-bartn	♦ Krzywzowka
♦ Konin	♦ Gajew	♦ Warszawa-targ	♦ Wroclaw-korze	♦ Szczecin-andr
♦ Warszawa-podl	♦ Lodz-widzew	♦ Bialystok	♦ Gorzow-wlkp	♦ Elblag
♦ Gdynia-pogorz	♦ Legionowo	♦ Borsukowizna	♦ Smolary-byt	

Strt/end Ind: 1-8784  
Model (s): GEM  
Parameter: O3  
Scen: 2012  
Extra Values: No  
Season: Year  
Day hours: All 24h  
Time Average: 8h  
Daily stats: Max

## 5.4



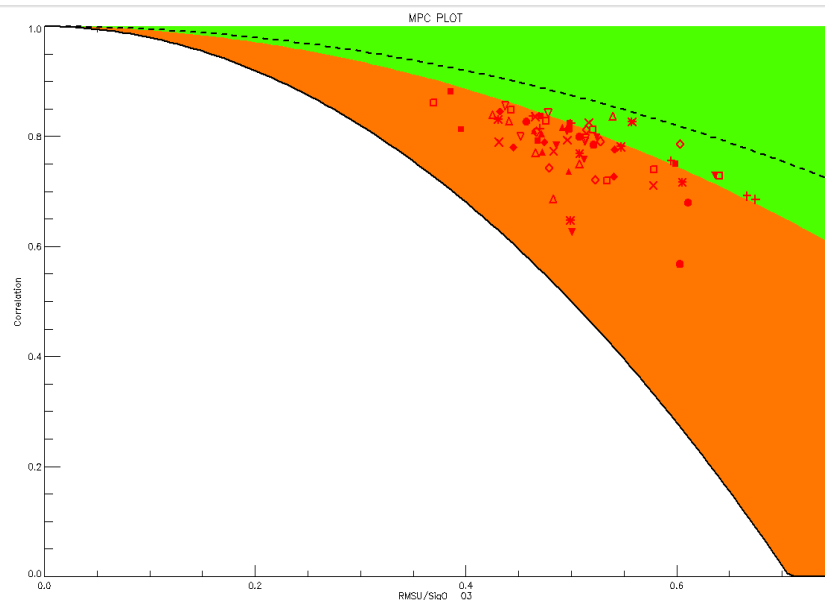
♦ Jarczew	♦ Gdansk-szadol	♦ Pabianice	♦ Olsztyn	♦ Zielona-gora
♦ Puszcza-borec	♦ Gdansk-wrzesz	♦ Parzniewice	♦ Ostroda	♦ Cieszyn
♦ Katowice	♦ Ciechocinek	♦ Szymbark	♦ Widuchowa	♦ Dabrowa-gorni
♦ Warszawa-kruc	♦ Konieczynka	♦ Granica-kpn	♦ Jelenia-gora	♦ Wodzislaw
♦ Belsk-igpan	♦ Radom	♦ Walbrzych	♦ Zabrze	♦ zloty-potok
♦ Czerniawa	♦ Biala-podlask	♦ Warszawa-ursy	♦ Wroclaw-bartn	♦ Krzywzowka
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♦ Gdynia-pogorz	♦ Legionowo	♦ Borsukowizna	♦ Smolary-byt	

Strt/end Ind: 1-8784  
Model (s): GEM  
Parameter: O3  
Scen: 2012  
Extra Values: No  
Season: Year  
Day hours: All 24h  
Time Average: 8h  
Daily stats: Max

# MPC – correlation

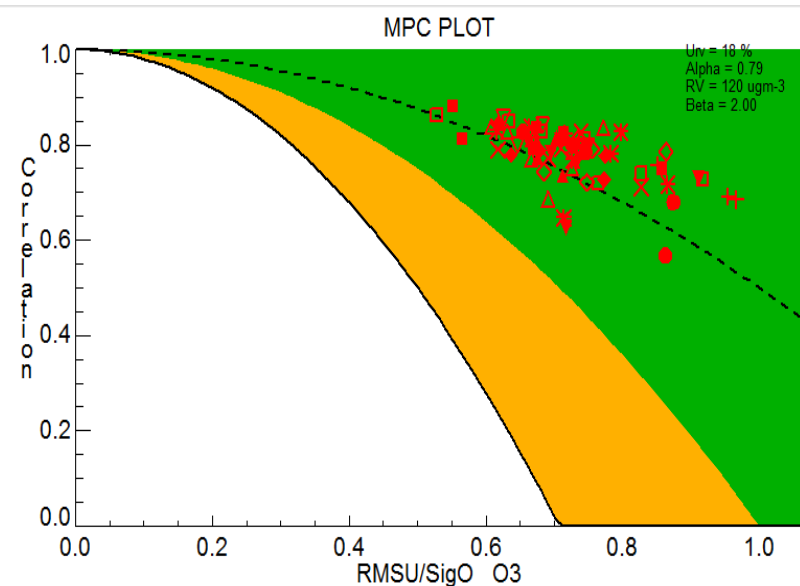
## Delta 3.0 vs Delta 5.4 – 2013

### 3.0



♦ Jarczew	♦ Ciechocinek	♦ Symbark	♦ Widuchowa	♦ Rybnik	Sit/End Ind: 1-8760 Model (s): GEM Parameter: O3 Scen: 2013 Extra Values: No Season: Year Day hours: All 24h Time Average: 8h Daily stats: Max
♦ Katowice	♦ Konieczynka	♦ Granica-kpn	♦ Jelenia-gora	♦ Wodzislaw	
♦ Warszawa-kruc	♦ Zielonka	♦ Radom	♦ Walbrzych	♦ Zabrze	
♦ Belsk-igpan	♦ Biala-podlask	♦ Warszawa-ursy	♦ Wroclaw-korze	♦ Zloty-potok	
♦ Konin	♦ Gajew	♦ Warszawa-targ	♦ Gorzow-wlkp	♦ Krzywzowka	
♦ Warszawa-podl	♦ Lodz-widzew	♦ Bialystok	♦ Smolary-byt	♦ Szczecin-andr	
♦ Gdynia-pogorz	♦ Legionowo	♦ Borsukowizna	♦ Zielona-gora	♦ Kielce	
♦ Gdansk-szadol	♦ Pabianice	♦ Olszyn	♦ Cieszyn	♦ Elblag	
♦ Gdansk-wieszcz	♦ Parzniewice	♦ Ostroda	♦ Dabrowa-gorni	♦ Mragowo	

### 5.4

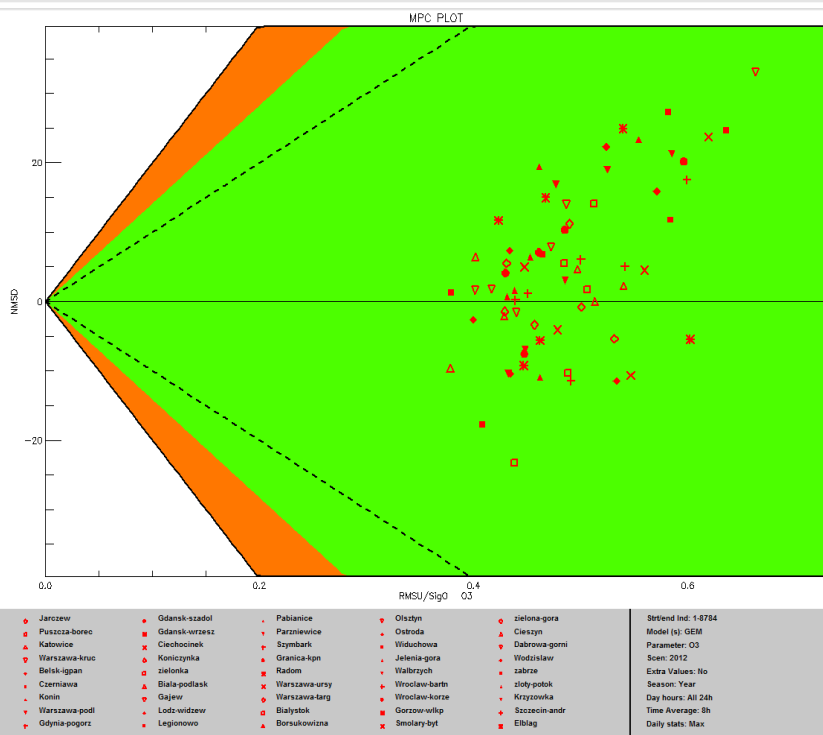


♦ Jarczew	♦ Ciechocinek	♦ Symbark	♦ Widuchowa	♦ Rybnik	Sit/End Ind: 1-8760 Model (s): GEM Parameter: O3 Scen: 2013 Extra Values: No Season: Year Day hours: All 24h Time Average: 8h Daily stats: Max
♦ Katowice	♦ Konieczynka	♦ Granica-kpn	♦ Jelenia-gora	♦ Wodzislaw	
♦ Warszawa-kruc	♦ Zielonka	♦ Radom	♦ Walbrzych	♦ Zabrze	
♦ Belsk-igpan	♦ Biala-podlask	♦ Warszawa-ursy	♦ Wroclaw-korze	♦ Zloty-potok	
♦ Konin	♦ Gajew	♦ Warszawa-targ	♦ Gorzow-wlkp	♦ Krzywzowka	
♦ Warszawa-podl	♦ Lodz-widzew	♦ Bialystok	♦ Smolary-byt	♦ Szczecin-andr	
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♦ Gdansk-szadol	♦ Pabianice	♦ Olszyn	♦ Cieszyn	♦ Elblag	
♦ Gdansk-wieszcz	♦ Parzniewice	♦ Ostroda	♦ Dabrowa-gorni	♦ Mragowo	

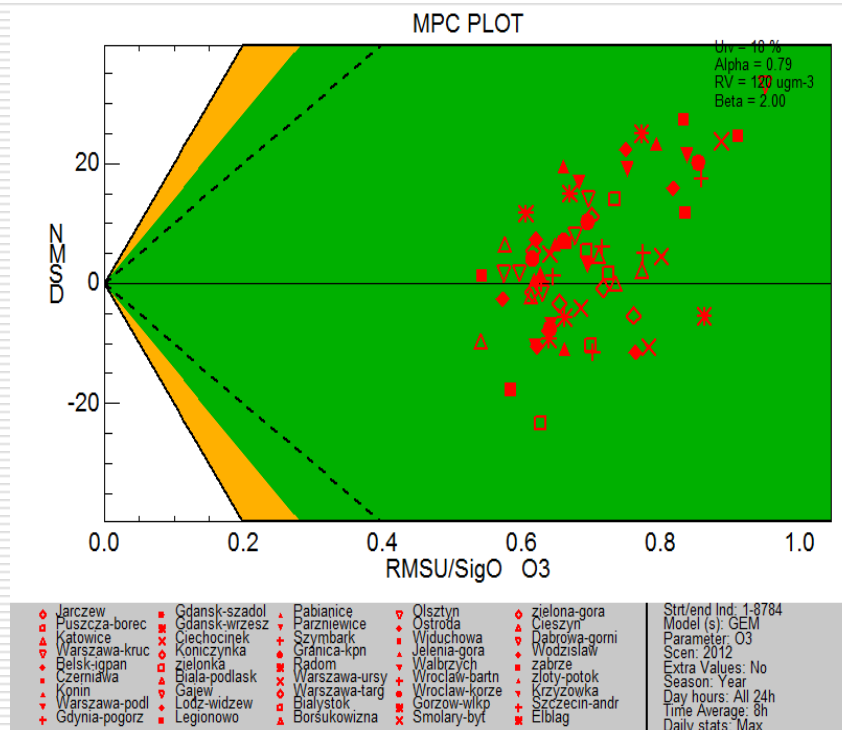
# MPC – standard deviation

## Delta 3.0 vs Delta 5.4 – 2012

### 3.0



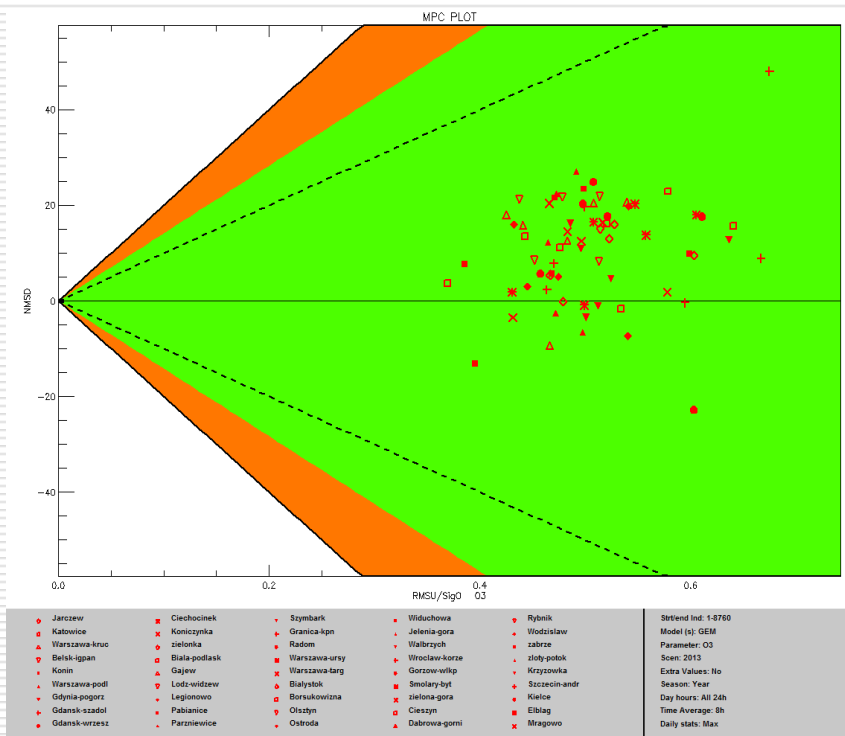
### 5.4



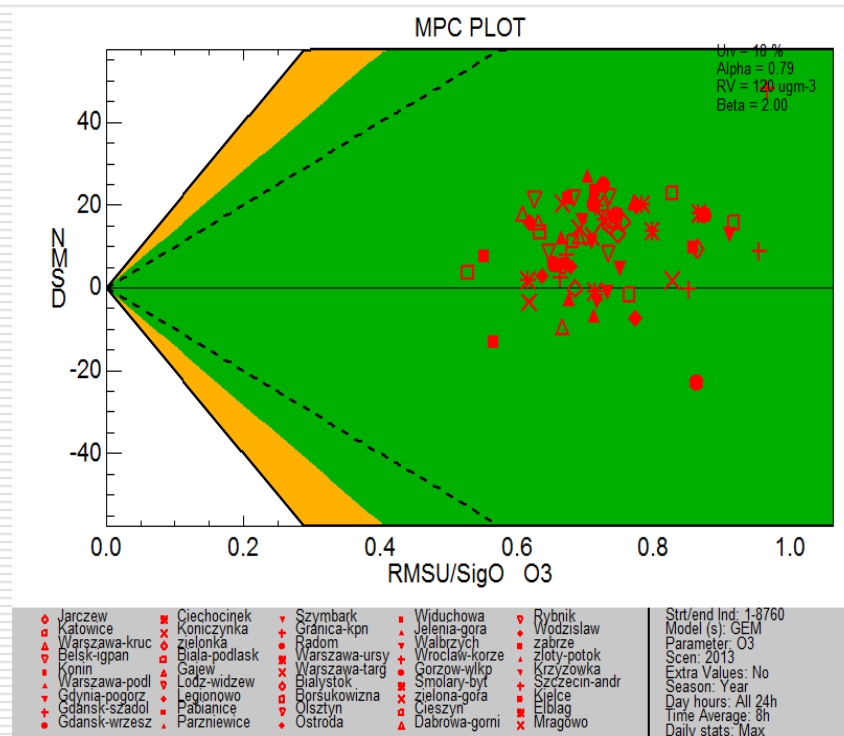
# MPC – standard deviation

## Delta 3.0 vs Delta 5.4 – 2013

### 3.0



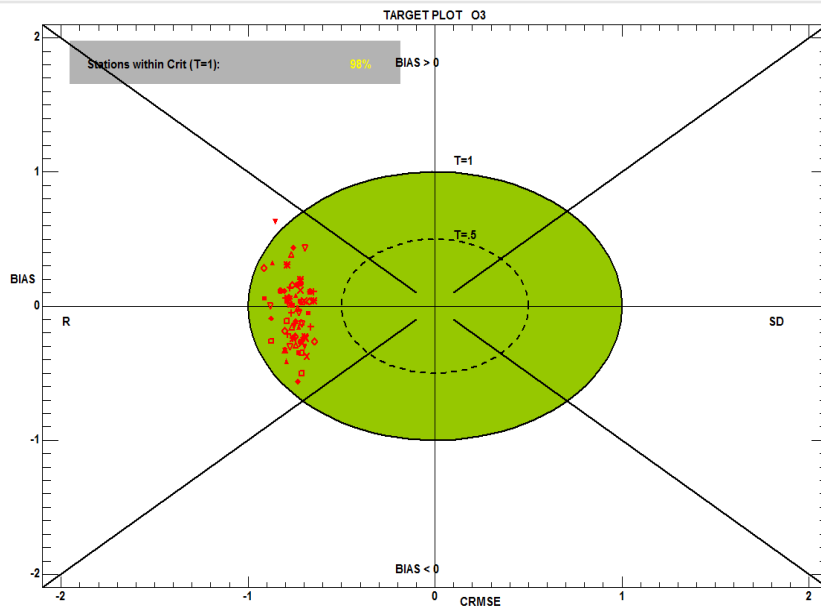
### 5.4



# Target plot

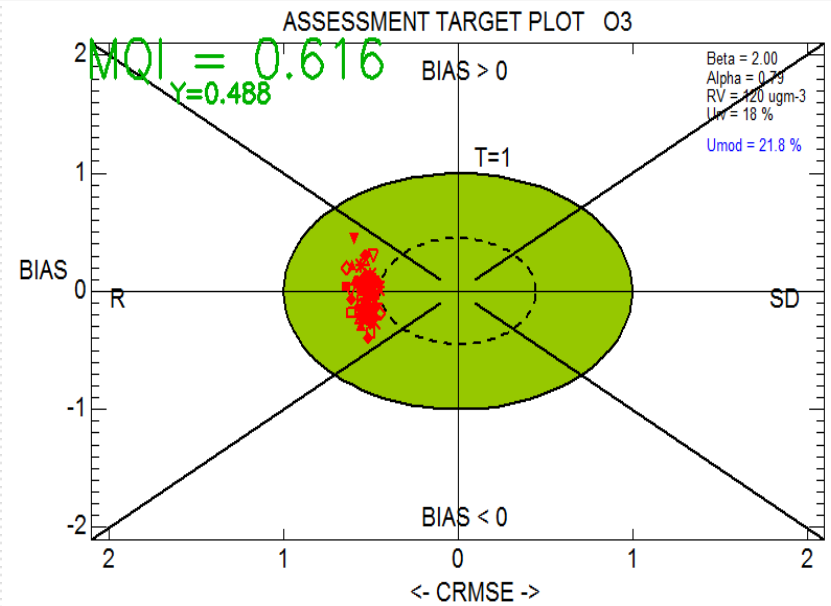
## Delta 3.0 vs Delta 5.4 – 2012

### 3.0



♦ Jarczew	♦ Gdansk-szadol	♦ Fabianice	♦ Olsztyn	♦ Zielona-gora	Strt/end Ind: 1-8784
♦ Puszcza-borec	♦ Gdansk-wrzesz	♦ Parzniewice	♦ Ostroda	♦ Cieszyn	Model (s): GEM
♦ Katowice	♦ Ciechocinek	♦ Szymbark	♦ Widuchowa	♦ Dabrowa-gorni	Parameter: O3
♦ Warszawa-kruc	♦ Konieczynka	♦ Granica-kpn	♦ Jelenia-gora	♦ Wodzislaw	Scen: 2012
♦ Belsk-igpan	♦ Radom	♦ zabrze	♦ Walbrzych	♦ zloty-potok	Extra Values: No
♦ Czarniawa	♦ Biala-podlask	♦ Warszawa-ursy	♦ Wroclaw-barth	♦ sroly-pobok	Season: Year
♦ Konie	♦ Gajew	♦ Warszawa-targ	♦ Wroclaw-korze	♦ Krzywinka	Day hours: All 24h
♦ Warszawa-podl	♦ Bialystok	♦ Lodz-widzew	♦ Gorzow-wlkp	♦ Szczecin-andr	Time Average: 8h
♦ Gdynia-pogorz	♦ Legionowo	♦ Borsukowizna	♦ Smolary-byt	♦ Elblag	Daily stats: Max

### 5.4

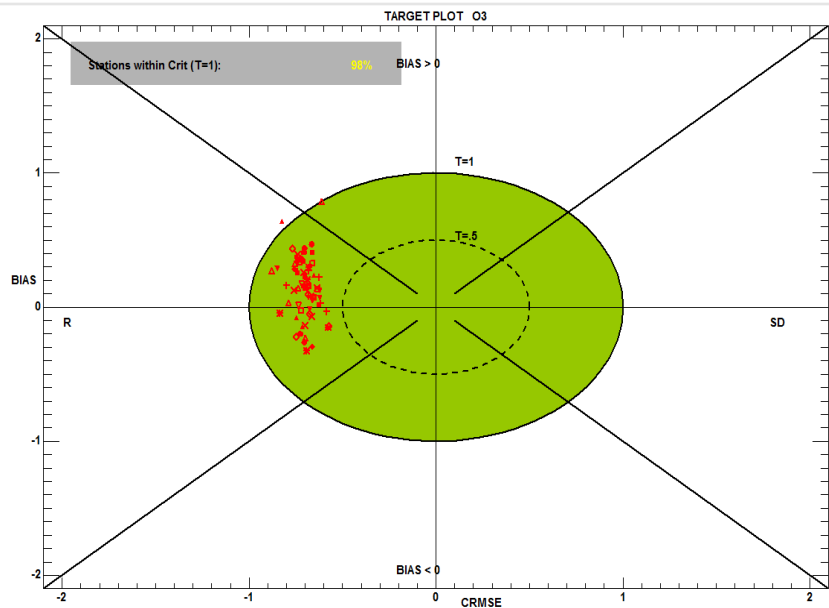


♦ Jarczew	♦ Gdansk-szadol	♦ Pabianice	♦ Olsztyn	♦ Zielona-gora	Strt/end Ind: 1-8784
♦ Puszcza-borec	♦ Gdansk-wrzesz	♦ Parzniewice	♦ Ostroda	♦ Cieszyn	Model (s): GEM
♦ Katowice	♦ Ciechocinek	♦ Szymbark	♦ Widuchowa	♦ Dabrowa-gorni	Parameter: O3
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♦ Gdynia-pogorz	♦ Legionowo	♦ Borsukowizna	♦ Smolary-byt	♦ Elblag	Daily stats: Max

# Target plot

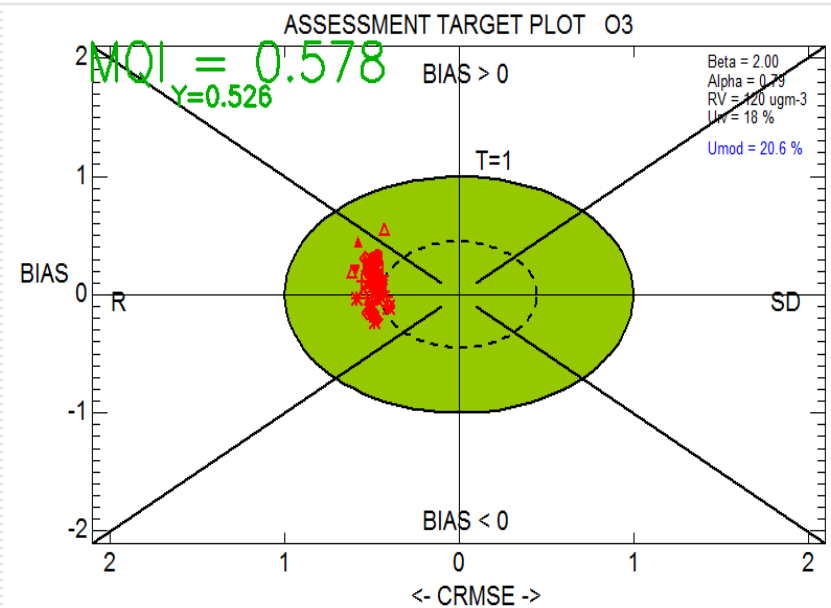
## Delta 3.0 vs Delta 5.4 – 2013

### 3.0



◊ Jarczew	◊ Cielochocinek	◊ Szymbark	◊ Widuchowa	◊ Rybnik	Strt/End Ind: 1-8760 Model (s): GEM Parameter: O3 Scen: 2013 Extra Values: No Season: Year Day hours: All 24h Time Average: 8h Daily stats: Max
◊ Katowice	◊ Koniczynka	◊ Granica-kpn	◊ Jelenia-gora	◊ Wodzislaw	
◊ Warszawa-kruc	◊ Zielonka	◊ Radom	◊ Walbrzych	◊ Zabrze	
◊ Belsk-igpan	◊ Biata-podlask	◊ Warszawa-ursy	◊ Wroclaw-korze	◊ Zloty-potok	
◊ Konin	◊ Gajew	◊ Warszawa-targ	◊ Gorzow-wlkp	◊ Krzywzowka	
◊ Warszawa-podl	◊ Lodz-widzew	◊ Bialystok	◊ Smolary-byt	◊ Szczecin-andr	
◊ Gdynia-pogorz	◊ Legionowo	◊ Borsukowizna	◊ Zielona-gora	◊ Kielce	
◊ Gdansk-szadol	◊ Pabianice	◊ Olsztyn	◊ Cieszyn	◊ Elblag	
◊ Gdansk-wrzesz	◊ Parzniewice	◊ Ostroda	◊ Cieszyn	◊ Dabrowa-gorni	
			◊ Mragowo		

### 5.4



◊ Jarczew	◊ Cielochocinek	◊ Szymbark	◊ Widuchowa	◊ Rybnik	Strt/End Ind: 1-8760 Model (s): GEM Parameter: O3 Scen: 2013 Extra Values: No Season: Year Day hours: All 24h Time Average: 8h Daily stats: Max
◊ Katowice	◊ Koniczynka	◊ Granica-kpn	◊ Jelenia-gora	◊ Wodzislaw	
◊ Warszawa-kruc	◊ Zielonka	◊ Radom	◊ Walbrzych	◊ Zabrze	
◊ Belsk-igpan	◊ Biata-podlask	◊ Warszawa-ursy	◊ Wroclaw-korze	◊ Zloty-potok	
◊ Konin	◊ Gajew	◊ Warszawa-targ	◊ Gorzow-wlkp	◊ Krzywzowka	
◊ Warszawa-podl	◊ Lodz-widzew	◊ Bialystok	◊ Smolary-byt	◊ Szczecin-andr	
◊ Gdynia-pogorz	◊ Legionowo	◊ Borsukowizna	◊ Zielona-gora	◊ Kielce	
◊ Gdansk-szadol	◊ Pabianice	◊ Olsztyn	◊ Cieszyn	◊ Elblag	
◊ Gdansk-wrzesz	◊ Parzniewice	◊ Ostroda	◊ Cieszyn	◊ Dabrowa-gorni	
			◊ Mragowo		



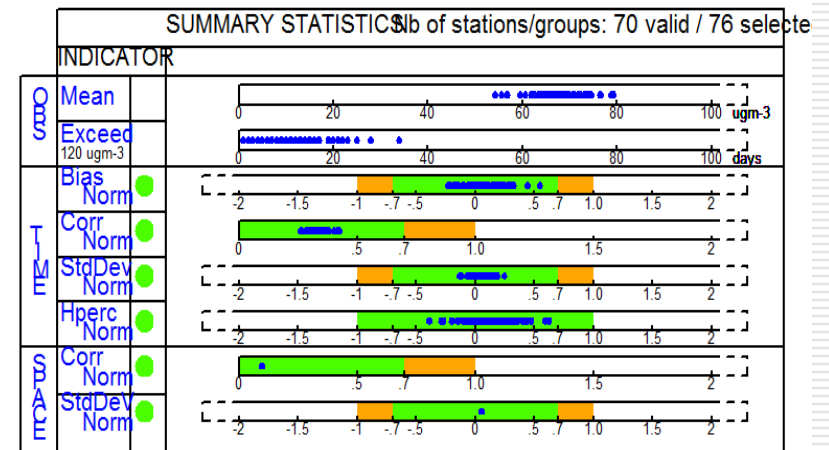
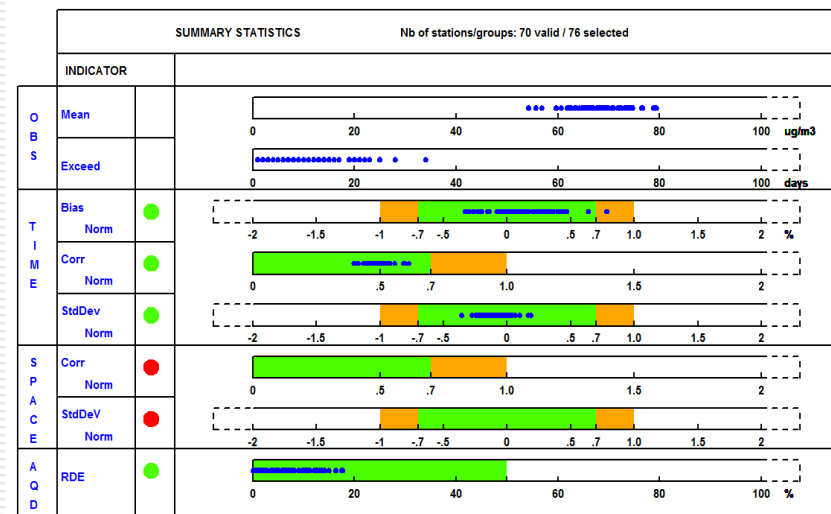


# Summary report

## Delta 3.0 vs Delta 5.4 – 2013

### 3.0

### 5.4



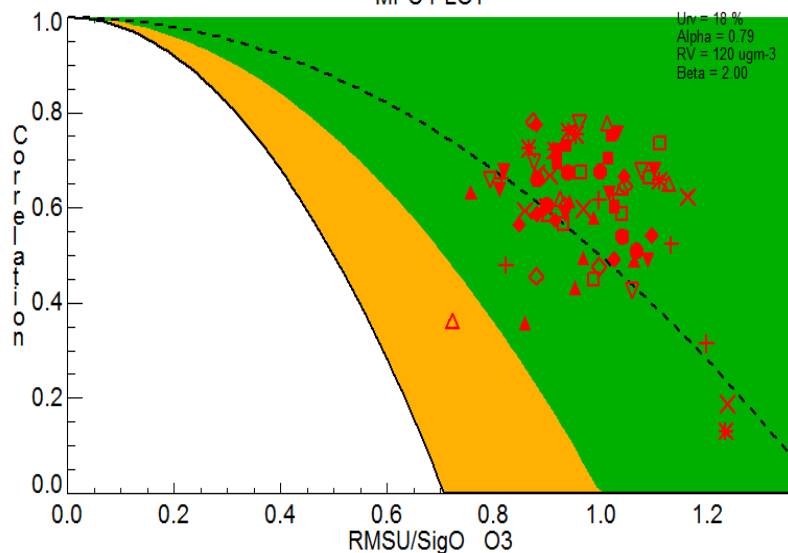
- Jarczew
- Katowice
- Warszawa
- Belski
- Krynin
- Warszawa
- Gdynia
- Odzianki
- Gdansk
- Cielochoc
- Keniczy
- Zielonki
- Bialki
- Gajew
- Warszawa
- BialyK
- Legnica
- Pabianki
- Parnie
- Szymbar
- Gienica
- Radom
- Warszawa
- Gajew
- Warszawa
- BialyK
- Borsuko
- Glatyn
- Ostroda
- Widuchlo
- Jelenia
- Wabrz
- Wroclaw
- Gorzow
- Smolary
- Zielona
- Glatyn
- Dobrowa
- Rybnik
- Wedzil
- zobrze
- Krynów
- Siczest
- Klucze
- Elblag
- Mragowo
- Golzop
- Bialy
- Plock
- Scarow
- Wilczop
- Bialski
- Krakow
- Kłodzka
- Orlievo
- Lubin
- Pielrko
- Jaska
- Gdynia
- Czembo
- Sladka
- Legnica
- Kaszier

- Performance Criteria satisfied
- Performance Criteria satisfied; Error dominated by corresponding Indicator
- TIME: >90% of stations fulfills the Performance Criteria
- SPACE: Dot fulfills the Performance Criteria
- TIME: <90% of stations fulfills the Performance Criteria
- SPACE: Dot does not fulfill the Performance Criteria

# MPC – correlation

## 2014

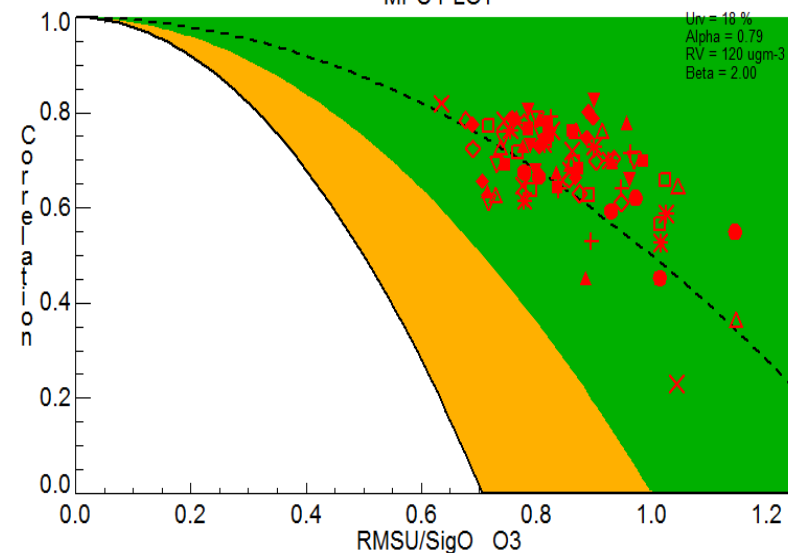
MPC PLOT



♦ jarczew	♦ ciechocinek	+ legionowo	♦ widuchowa	♦ cieszyn	Strt/end Ind: 2161-6552
♦ buszcza-borec	♦ koniczynka	♦ piastow	♦ częstochowa	♦ dabrowa-gora	Model (s): GEM
♦ katowice	♦ biala-podlask	♦ radom	♦ legnica	♦ rybnik	Parameter: O3
♦ belsk-igpan	♦ gajew	♦ wars-ursynow	♦ walbrzych	♦ wodzislaw	Scen: 2014
♦ konin	♦ fodz-widzew	♦ wars-targow	♦ wroc-korzen	♦ zloty-potok	Extra Values: No
♦ wars-podles	♦ pabianice	♦ bialystok	♦ gorzow-wlkp	♦ poznan	Season: Year
+ gdynia-pogorz	♦ parzniewice	♦ borsukowizna	♦ zielona-gora	♦ krzywzowka	Day hours: All 24h
♦ gdansk-szadol	♦ szymbark	♦ olsztyn	♦ opole	♦ szczecin-andr	Time Average: 8h
♦ gdansk-wrzesz	♦ granica-kpn	♦ ostroda	♦ bielsko-biala	♦ glogow	Daily stats: Max

## 2015

MPC PLOT

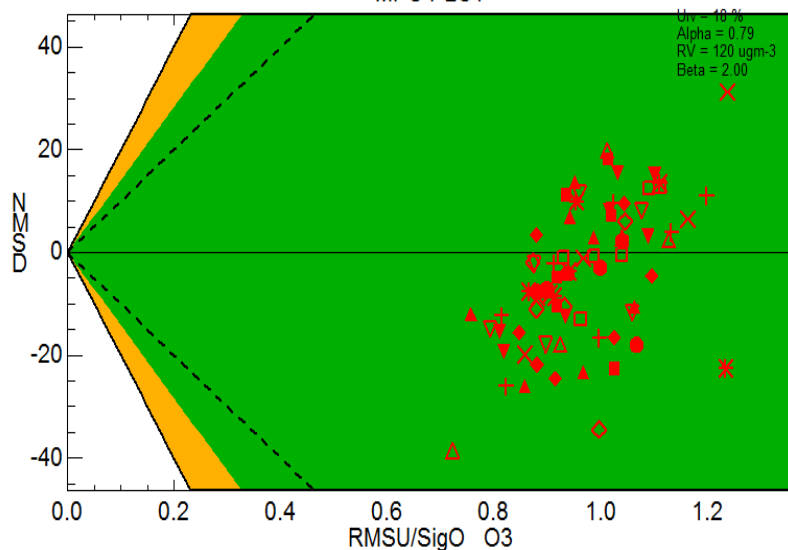


♦ jarczew	♦ gdansk-szadol	+ parzniewice	♦ zyrdow	♦ walbrzych	Strt/end Ind: 2161-6552
♦ sniezka	♦ gdansk-wrzesz	+ szymbark	♦ bialystok	♦ wroc-bart	Model (s): GEM
♦ leba	♦ swidnica	♦ zakopane	♦ borsukowizna	♦ wroc-korzen	Parameter: O3
♦ katowice	♦ ciechocinek	♦ granica-kpn	♦ ostroda	♦ gorzow-wlkp	Scen: 2015
♦ belsk-igpan	♦ koniczynka	♦ legionowo	+ widuchowa	♦ smolany-byt	Extra Values: No
♦ czerniawa	♦ biala-podlask	♦ piastow	♦ radom	♦ zielona-gora	Season: Year
+ konin	♦ gajew	♦ wars-ursynow	♦ wars-ursynow	♦ kedz-kozle	Day hours: All 24h
+ wars-podles	♦ fodz-widzew	♦ wars-targow	♦ jelenia-gora	♦ opole	Time Average: 8h
♦ gdynia-pogorz	♦ pabianice		♦ legnica	♦ bielsko-biala	Daily stats: Max

# MPC – standard deviation

## 2014

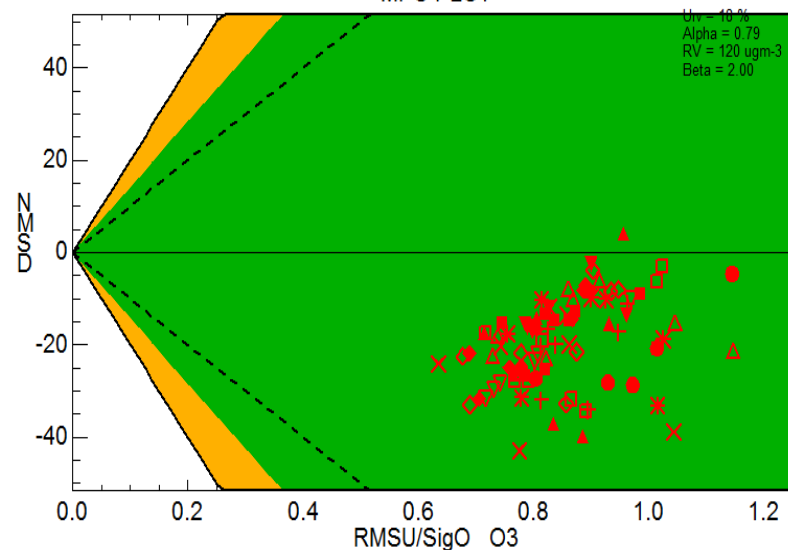
MPC PLOT



◊ jarczew	× ciechocinek	+ legionowo	■ widuchowa	■ cieszyn	Strt/end Ind: 2161-6552
◊ puszcza-borec	◊ koniczynka	■ piastow	■ czestochowa	■ dabrwa-gora	Model (s): GEM
◊ katowice	◊ biala-podlask	■ radom	■ legnica	■ rybnik	Parameter: O3
◊ belsk-igpan	◊ gajew	× wars-ursyno	+ walbrzych	+ wodzislaw	Scen: 2014
◊ konin	◊ lodz-widzew	◊ wars-targow	× wroc-korzen	+ zloty-potok	Extra Values: No
◊ wars-podles	◊ pabianice	◊ bialystok	× gorzow-wlkp	■ poznan	Season: Year
+ gdynia-pogorz	■ parzniewice	◊ bprukowizna	■ zielona-gora	× krzywzowa	Day hours: All 24h
◊ gdansk-szadol	◊ szymbark	◊ olsztyn	◊ opole	◊ szczecin-andr	Time Average: 8h
◊ gdansk-wrzesz	◊ granica-kpn	◊ ostroda	◊ bielsko-biala	◊ gligow	Daily stats: Max

## 2015

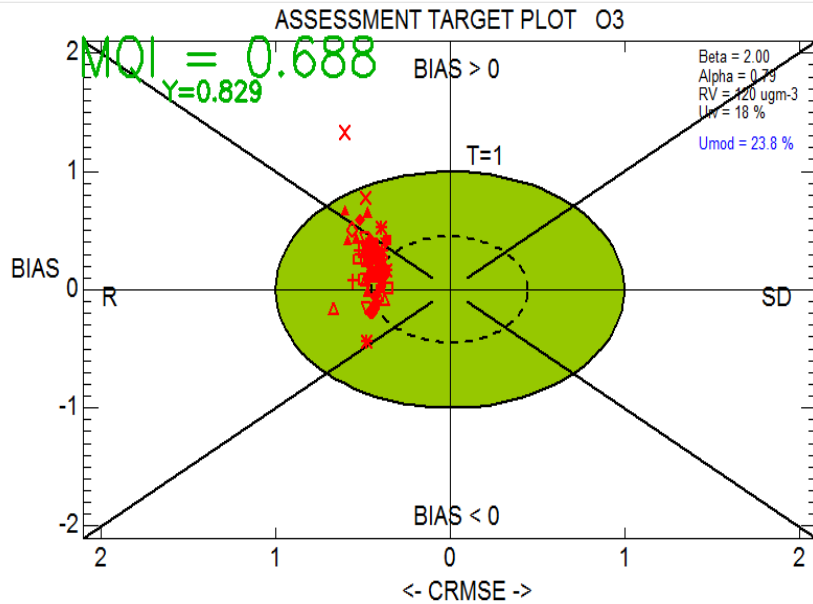
MPC PLOT



◊ jarczew	■ gdansk-szadol	▼ parzniewice	◊ zyrdarow	◊ walbrzych	Strt/end Ind: 2161-6552
◊ sniezka	× gdansk-wrzesz	+ szymbark	■ bialystok	◊ wroc-bart	Model (s): GEM
◊ leba	◊ swidnica	+ zakopane	■ bprukowizna	◊ wroc-korzen	Parameter: O3
◊ ratowice	◊ ciechocinek	■ granica-kpn	▼ olsztyn	◊ gorzow-wlkp	Scen: 2015
◊ belsk-igpan	◊ koniczynka	■ legionowo	+ ostroda	◊ smolary-byt	Extra Values: No
◊ belsk-igpan	◊ biala-podlask	◊ piastow	■ widuchowa	◊ zielona-gora	Season: Year
◊ czemiawa	◊ gajew	■ radom	■ czestochowa	◊ kedz-kozle	Day hours: All 24h
◊ konin	◊ lodz-widzew	◊ wars-ursyno	■ jelenia-gora	◊ opole	Time Average: 8h
◊ wars-podles	◊ pabianice	◊ wars-targow	◊ legnica	◊ bielsko-biala	Daily stats: Max
◊ gdynia-pogorz					

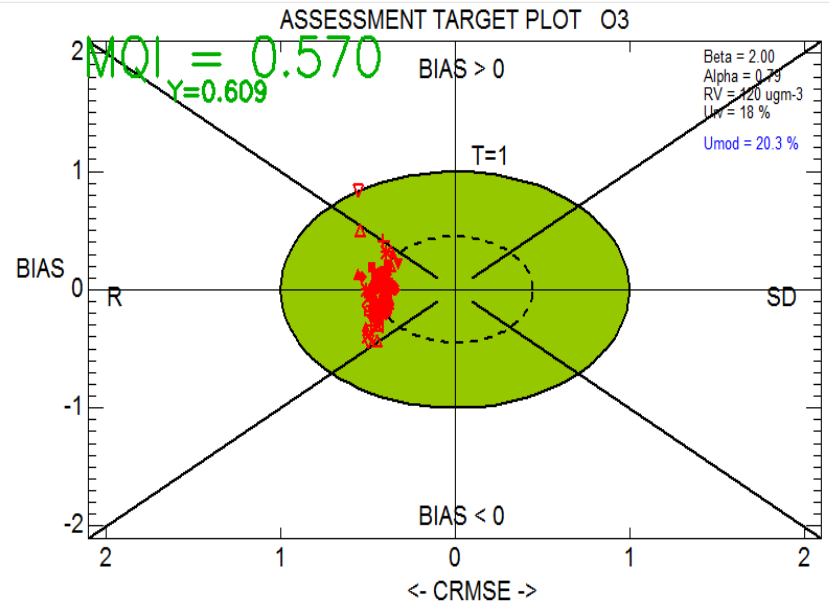
# Target plot

## 2014



◊ jarczew	× ciechocinek	+ legionowo	■ widuchowa	■ cieszyn	Strt/end Ind: 2161-6552
△ puszcza-borec	◊ koniczynka	● piastów	▲ czestochowa	▲ dąbrowa-gora	Model (s): GEM
▽ katowice	◊ biala-podlaska	■ radom	▲ walbrzych	▲ rybnik	Parameter: O3
◆ belsk-igpan	△ gajew	× wars-ursynowo	▲ wroclaw	▲ wroclaw	Scen: 2014
◆ konin	▽ lodz-widzew	× wars-targow	▲ wroclaw-korzen	▲ zloty-potok	Extra Values: No
◆ wars-podles	▽ pabianice	◊ bialystok	▲ poznan	▲ krzywizna	Day hours: Year
◆ gdynia-pogorz	■ parzniewice	▲ borsukowizna	▲ zielona-gora	▲ szczecin-andr	Time Average: 8h
◆ gdansk-szadol	■ szymbark	▲ olsztyn	▲ opole	▲ giogow	Daily stats: Max
◆ gdansk-wrzesz	▽ granica-kpn	◆ ostroda	◆ bielsko-biala		

## 2015

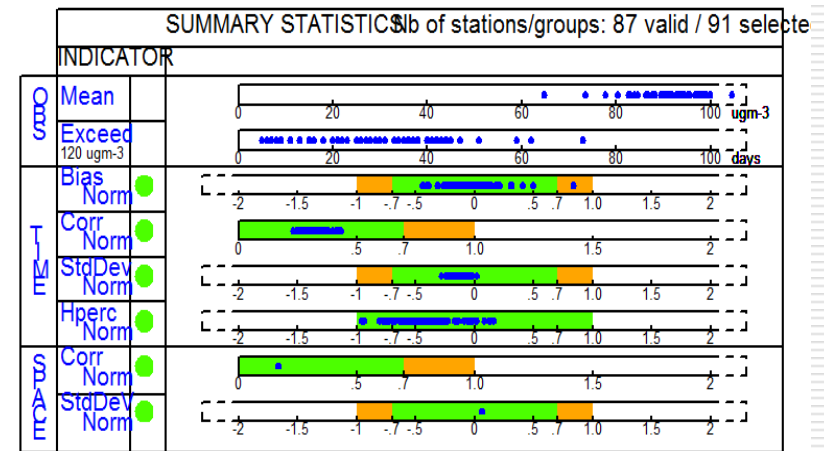
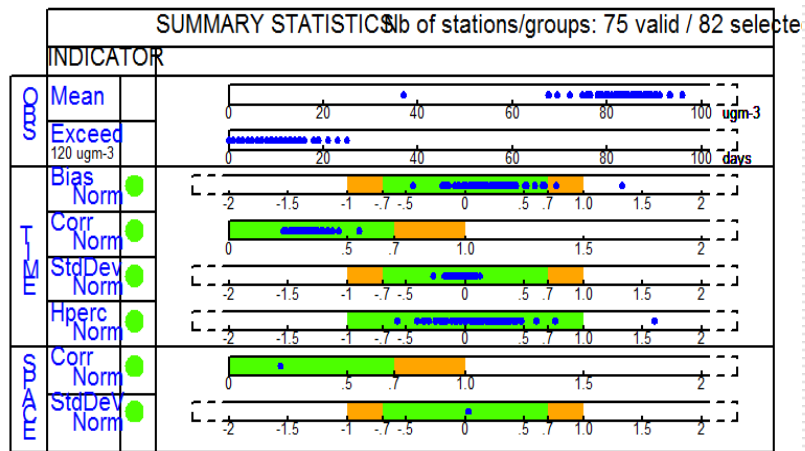


◊ jarczew	■ gdansk-szadol	▽ parzniewice	◆ zyrardow	□ walbrzych	Strt/end Ind: 2161-6552
△ sniezka	× gdansk-wrzesz	■ szymbark	▲ bialystok	▲ wroc-bart	Model (s): GEM
▽ leba	◊ swidnica	■ zakopane	▲ borsukowizna	▲ wroc-korzen	Parameter: O3
◆ katowice	▲ ciechocinek	■ granica-kpn	▲ olsztyn	▲ gorzow-wlkp	Scen: 2015
◆ belsk-igpan	△ koniczynka	× legionowo	◆ ostroda	▲ smolary-byt	Extra Values: No
◆ wars-podles	▲ biala-podlaska	◊ piastow	▲ widuchowa	▲ zielona-gora	Day hours: Year
◆ gdynia-pogorz	■ gajew	▲ radom	■ czestochowa	▲ kedz-kozle	Time Average: 8h
◆ gdansk-szadol	▽ lodz-widzew	▲ wars-ursynowo	▲ jelenia-gora	▲ opole	Daily stats: Max
◆ gdansk-wrzesz	■ pabianice	▲ wars-targow	◊ legnica	■ bielsko-biala	

# Summary report

## 2014

## 2015



■ Performance Criteria satisfied  
■ Performance Criteria satisfied; Error dominated by corresponding Indicator  
● TIME: >90% of stations fulfills the Performance Criteria  
● SPACE: Dot fulfills the Performance Criteria  
● TIME: <90% of stations fulfills the Performance Criteria  
● SPACE: Dot does not fulfill the Performance Criteria

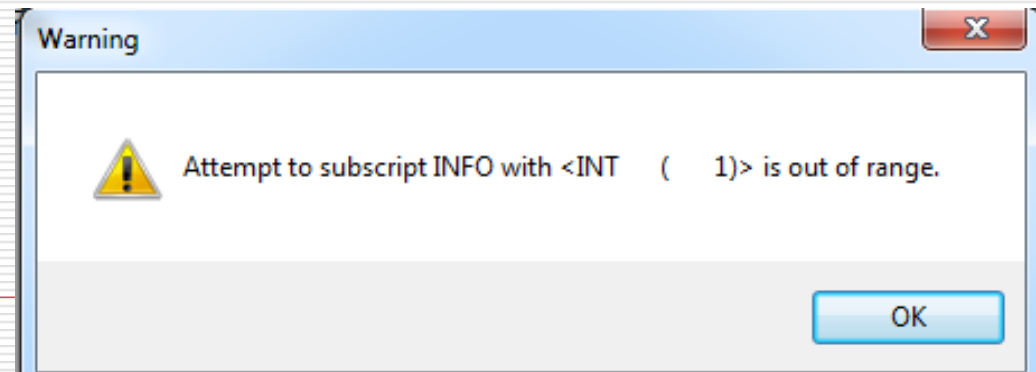
■ Performance Criteria satisfied  
■ Performance Criteria satisfied; Error dominated by corresponding Indicator  
● TIME: >90% of stations fulfills the Performance Criteria  
● SPACE: Dot fulfills the Performance Criteria  
● TIME: <90% of stations fulfills the Performance Criteria  
● SPACE: Dot does not fulfill the Performance Criteria



# Remarks about MQO and DELTA

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- MQO for O3 is stringent enough – Ur shouldn't be raised any more
- 5.4 – huge improvement compared to 3.0
- Very good conversion tool
- Simple and understandable users guide
- Text management on the plots could be better
- Installation path
- Modeling data - bug

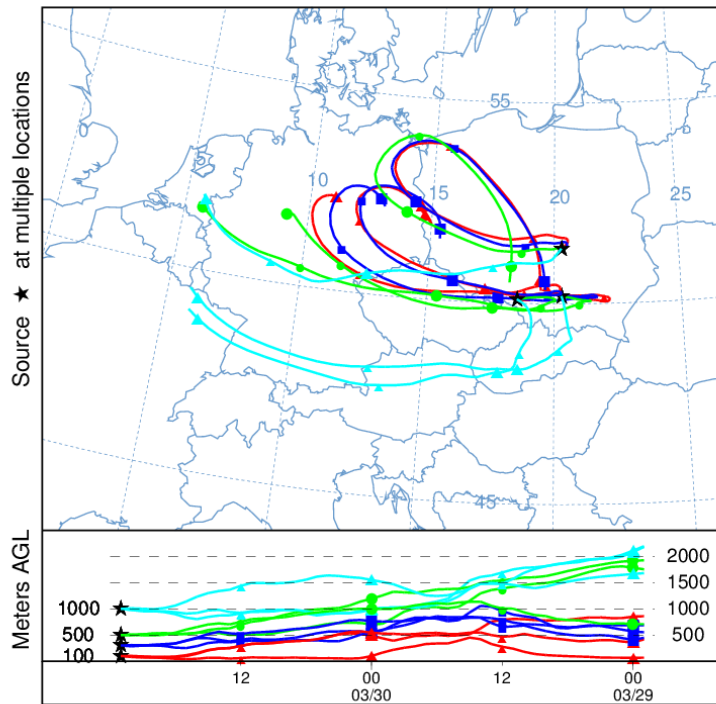


# National near-surface ozone forecast 2013 - 2015

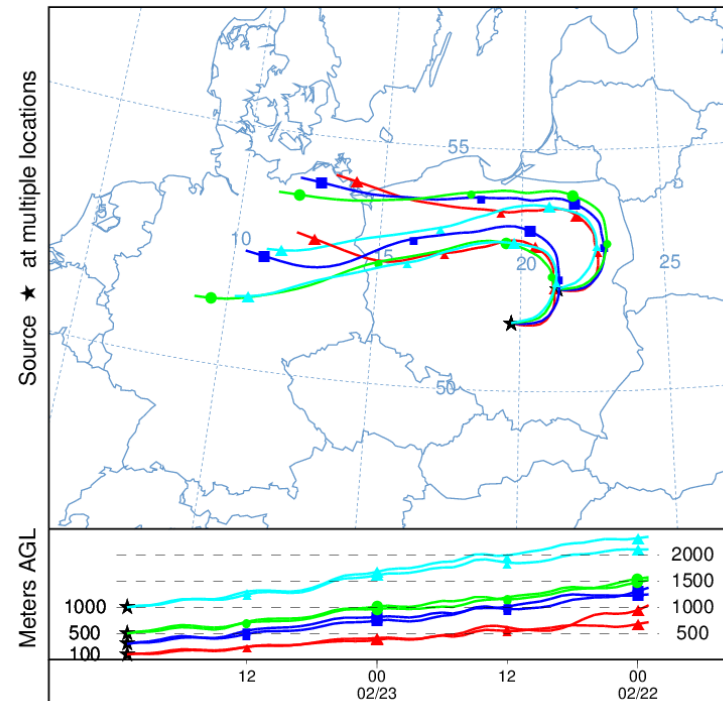
The screenshot displays the website 'Krajowe prognozy krótkoterminowe zanieczyszczenia powietrza ozonem' (National short-term ozone pollution forecasts) on the GIOS portal. The browser window shows the URL 'powietrze.gios.gov.pl/glos/site/forecast/ozone/country;jsessionid=6VnLThWdNCqYCV611WTq8pNzy9PLk6fhsWfYV2LHYynJy3G3PI-166980284'. The page features a green navigation menu on the left with categories like 'Prawodawstwo', 'Normy jakości powietrza', and 'Prognozy jakości powietrza'. The main content area is titled 'Krajowe prognozy krótkoterminowe zanieczyszczenia powietrza ozonem' and includes tabs for 'Informacje ogólne', 'Prognozy krajowe dla ozonu', 'Prognozy wojewódzkie dla ozonu', 'Prognozy regionalne', and 'Prognozy europejskie'. A prominent 'OSTRZEŻENIA' (Warnings) section with a warning sign icon is visible. The forecast section shows a 'Prognoza zanieczyszczenia powietrza ozonem na dziś - animacja' (Today's ozone pollution forecast - animation) and a 'Trzydniowa prognoza zanieczyszczenia powietrza ozonem - mapy' (Three-day ozone pollution forecast - maps) for 'dzisiaj' (today), 'jutro' (tomorrow), and 'pojutrze' (day after tomorrow). The maps are organized by time intervals: 'stężenia maksymalne 1-godzinne' (1-hour maximum concentrations), 'stężenia maksymalne 8-godzinne' (8-hour maximum concentrations), and 'stężenia średnie dobowe' (daily average concentrations). The bottom taskbar shows the Start button and several open applications, including 'DELTA\_2014', 'Microsoft PowerPoint...', 'Zalacznik\_Wyniki mod...', and 'Krajowe prognozy kr...', with the system clock showing 21:52.

# PM10 forecast and trajectories for high concentration episodes in 2013 - 2014

NOAA HYSPLIT MODEL  
Backward trajectories ending at 2300 UTC 30 Mar 13  
18 UTC 30 Mar GEM Forecast Initialization





NOAA HYSPLIT MODEL  
Backward trajectories ending at 2300 UTC 23 Feb 14  
18 UTC 23 Feb GEM Forecast Initialization



# EcoForecast Foundation air pollution forecasts 2009 – 20??

Facebook icon

eko prognoza

PL  EN 

weather | air quality index | air pollution concentrations

Europe | Poland |

Home page

Ozone

Nitrogen dioxide

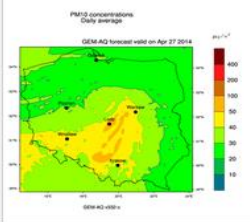
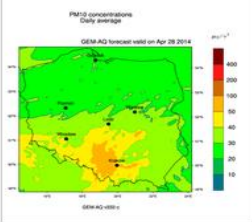
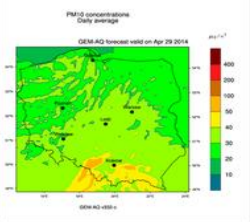
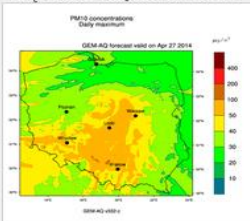
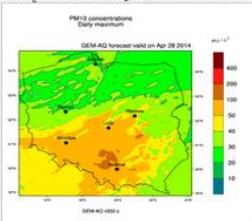
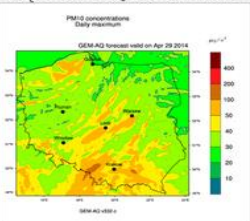
Sulphur dioxide

Carbon monoxide

PM10

PM2.5

### PM10 Poland

27.04.2014 stężenie średniodobowe	28.04.2014 stężenie średniodobowe	29.04.2014 stężenie średniodobowe
		
27.04.2014 stężenie maksymalne dobowe	28.04.2014 stężenie maksymalne dobowe	29.04.2014 stężenie maksymalne dobowe
		

[» archive](#)

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<http://ecoforecast.eu>

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**THANK YOU!**

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