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

Pawel Durka, Joanna Struzewska, Jacek W. Kaminski
Main contractor: Warsaw University of Technology
Sub-contractor: EcoForecast Foundation

Dofinansowano ze środków Narodowego Funduszu Ochrony Środowiska i Gospodarki Wodnej

Outline

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

GEM-AQ description

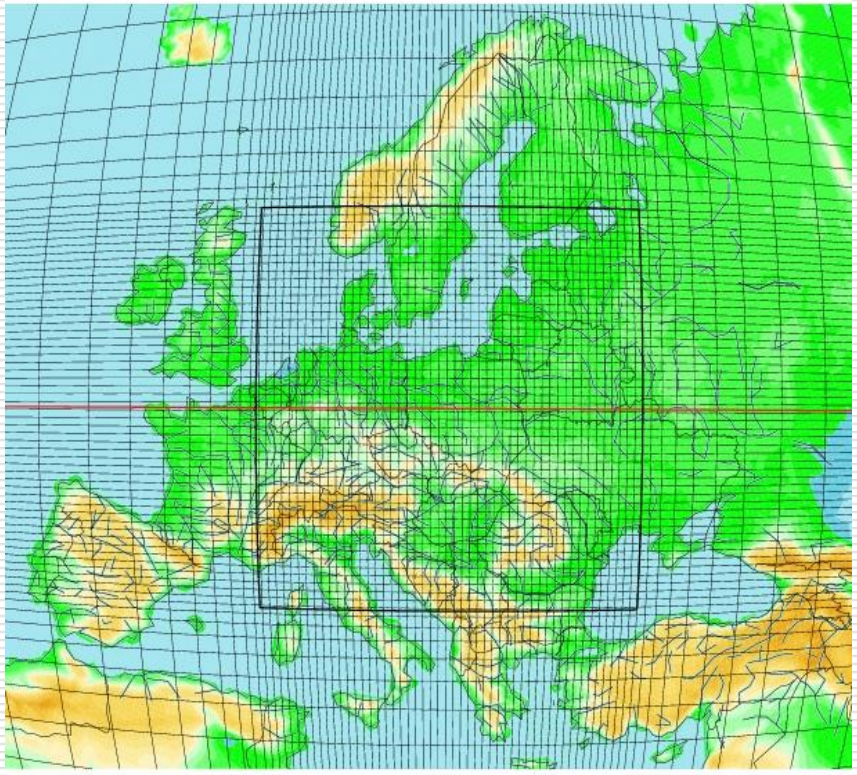
Global Environmental Multiscale – Air Quality model built as part of a Canadian consortium MAQNet (2001-2008)

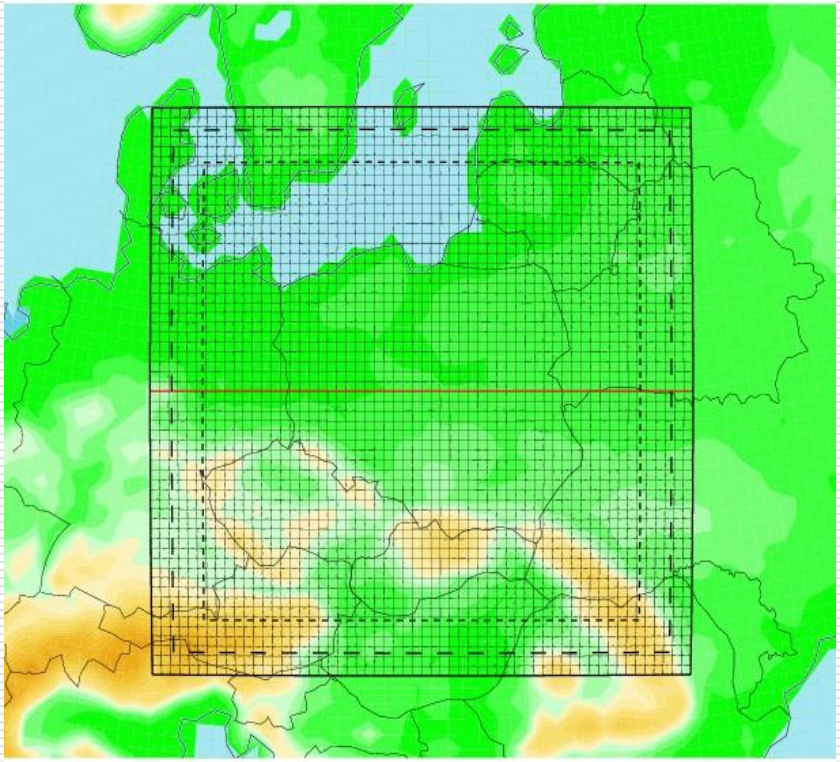
- Meteorological model GEM
  - Model developed by RPN
  - Canadian operational weather forecast
  - Grid configuration allows for calculations in variable resolutions
  - Built-in option of limited area domains– LAM (cascade consistent calculation)
  - An extensive library of parameterization of physical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

GEM-AQ description

- 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 temperatue and pressure
    - chemical transformations typical of the troposphere
  - Dry deposition and washout
  - Aeorosols chemistry and physics
  - Biogenic and anthropogenic emissions

Modelling domain

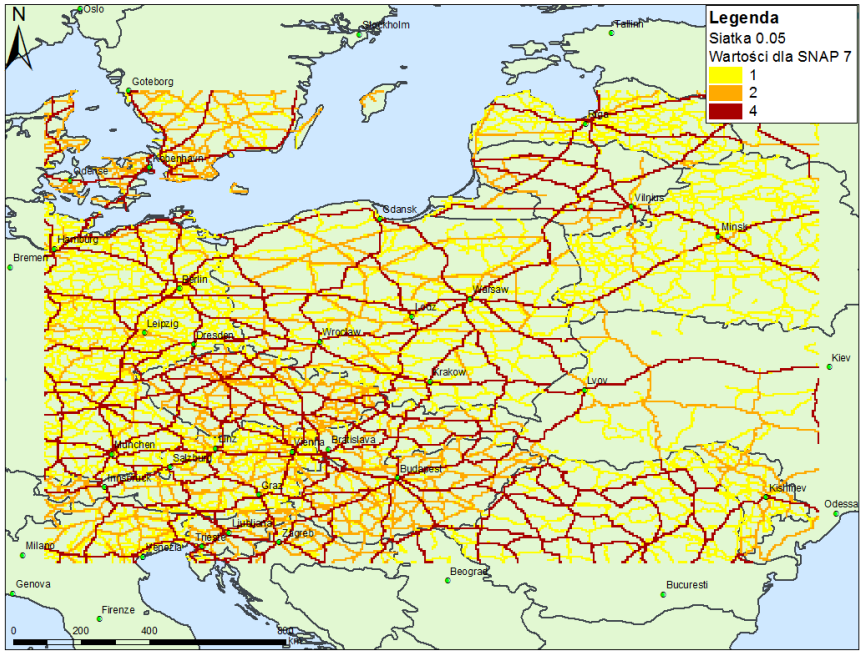


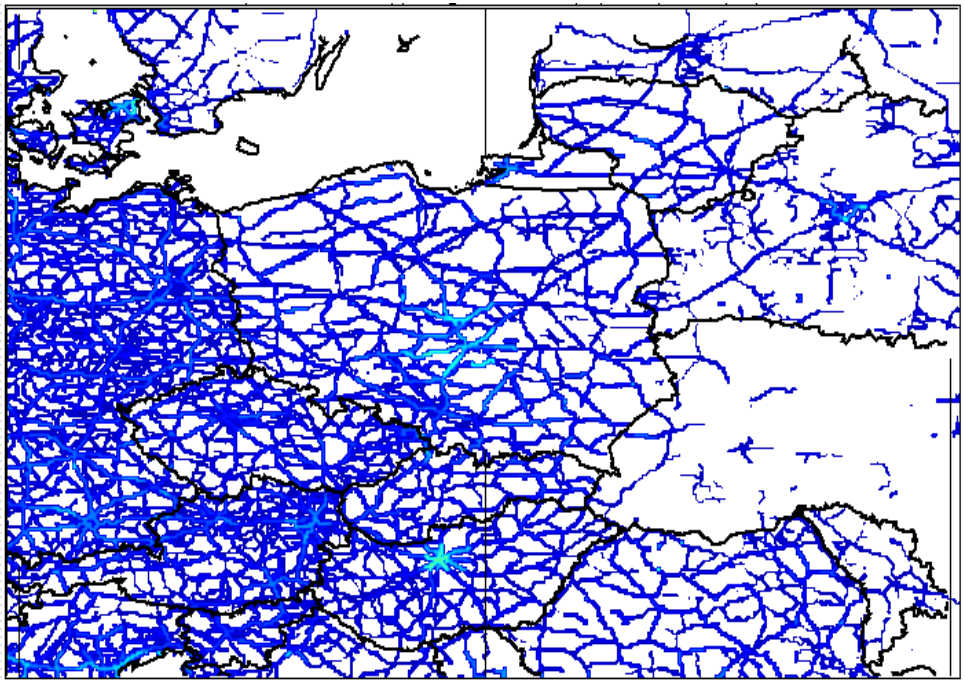


Emission data

- 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

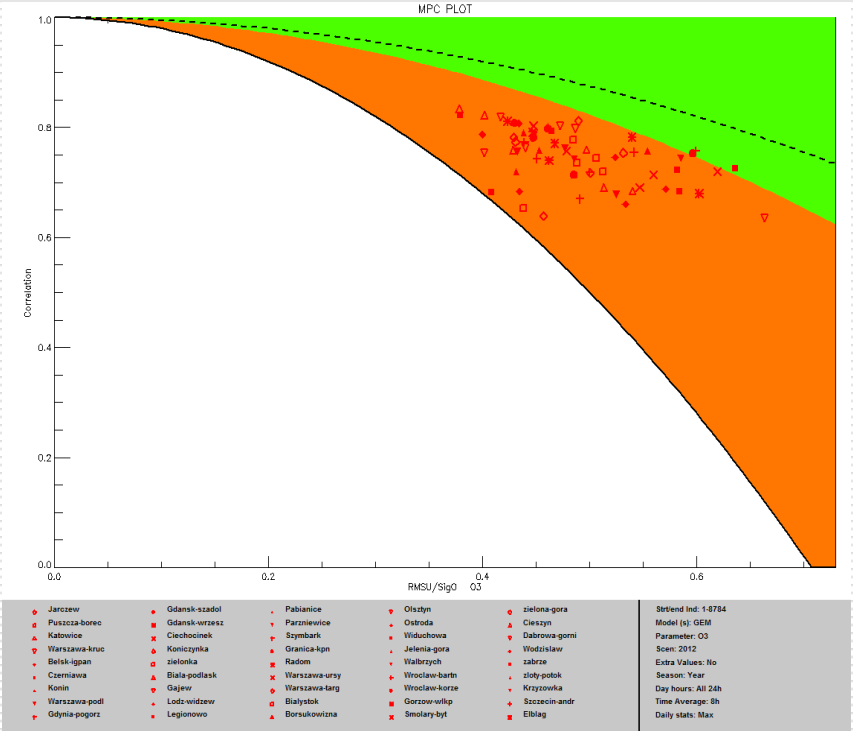
Final emission flux

NOx SNAP07

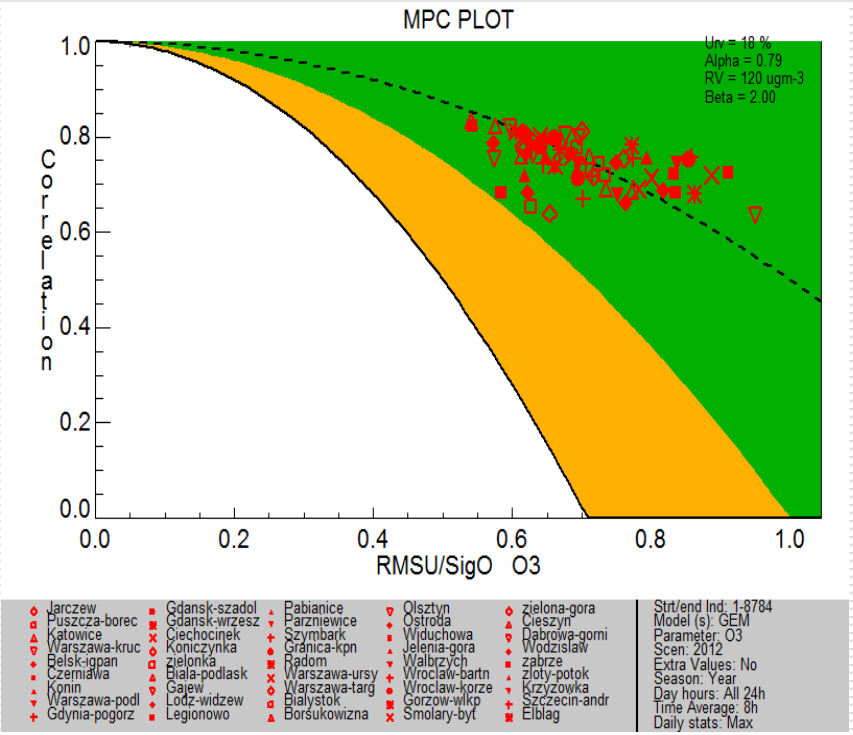
Delta tool aplication for Poland

MPC – correlation
Delta 3.0 vs Delta 5.4 - 2012

3.0

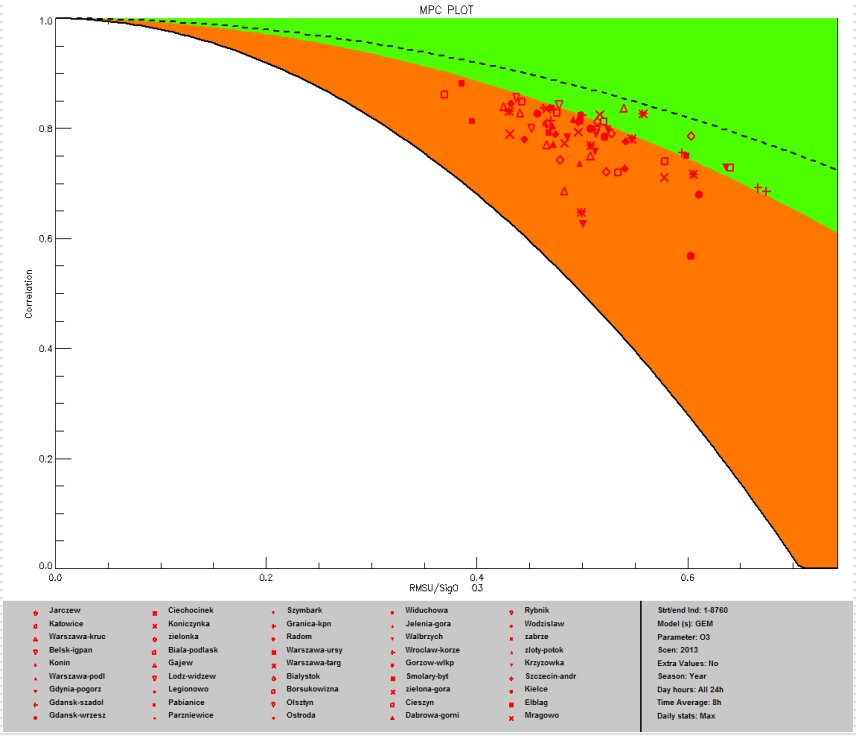


5.4

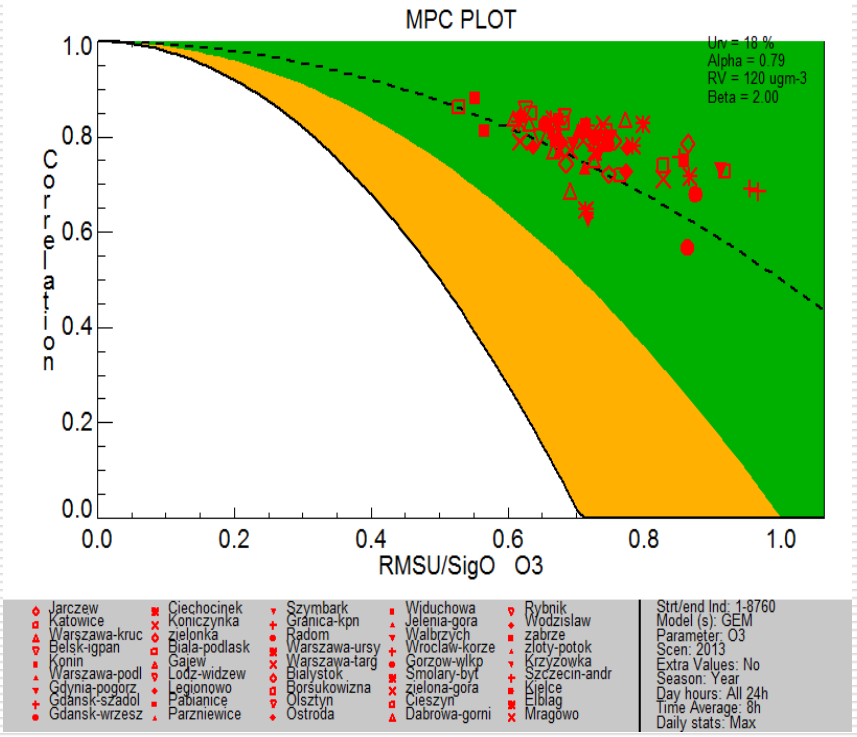


MPC – correlation
Delta 3.0 vs Delta 5.4 – 2013

3.0

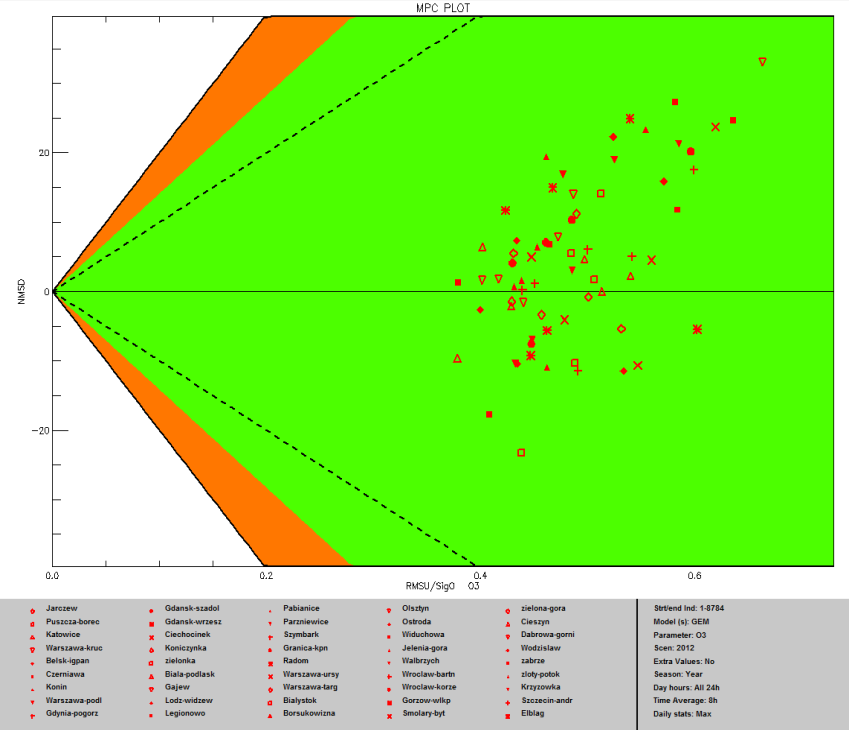


5.4

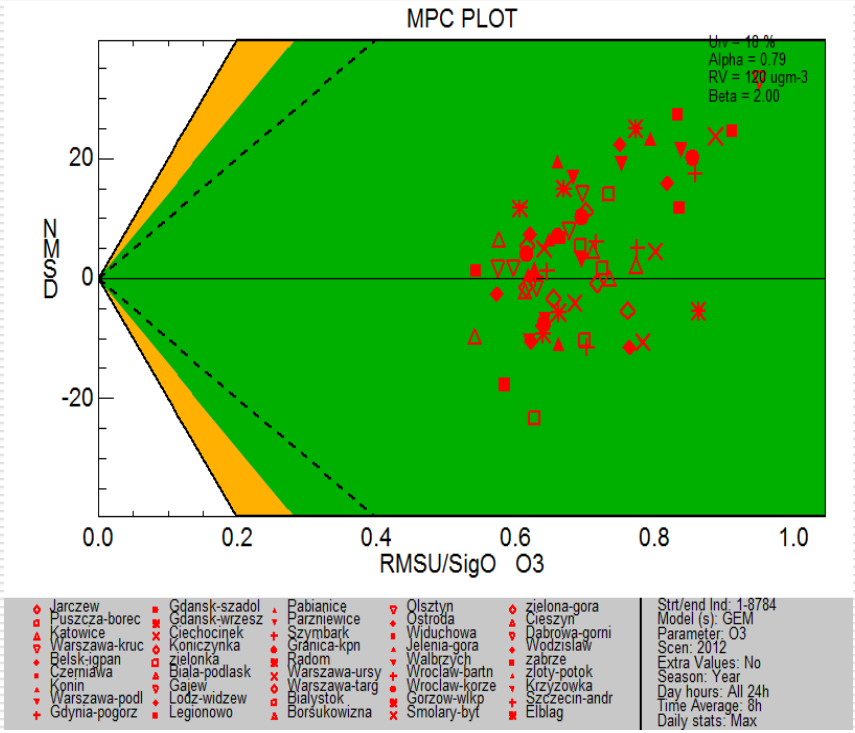


MPC – standard deviation
Delta 3.0 vs Delta 5.4 – 2012

3.0

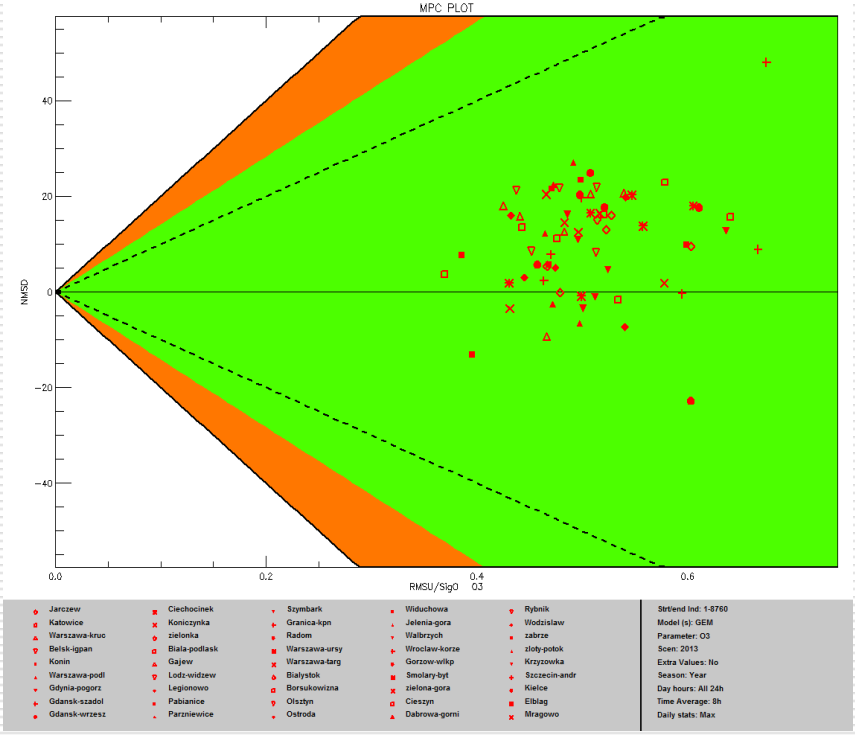


5.4

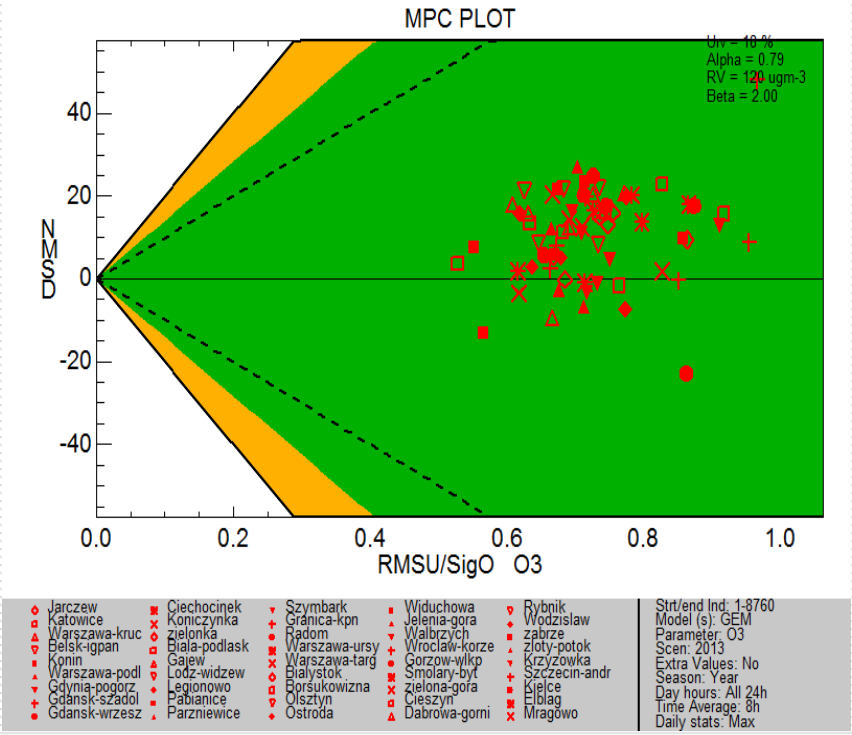


MPC – standard deviation
Delta 3.0 vs Delta 5.4 – 2013

3.0

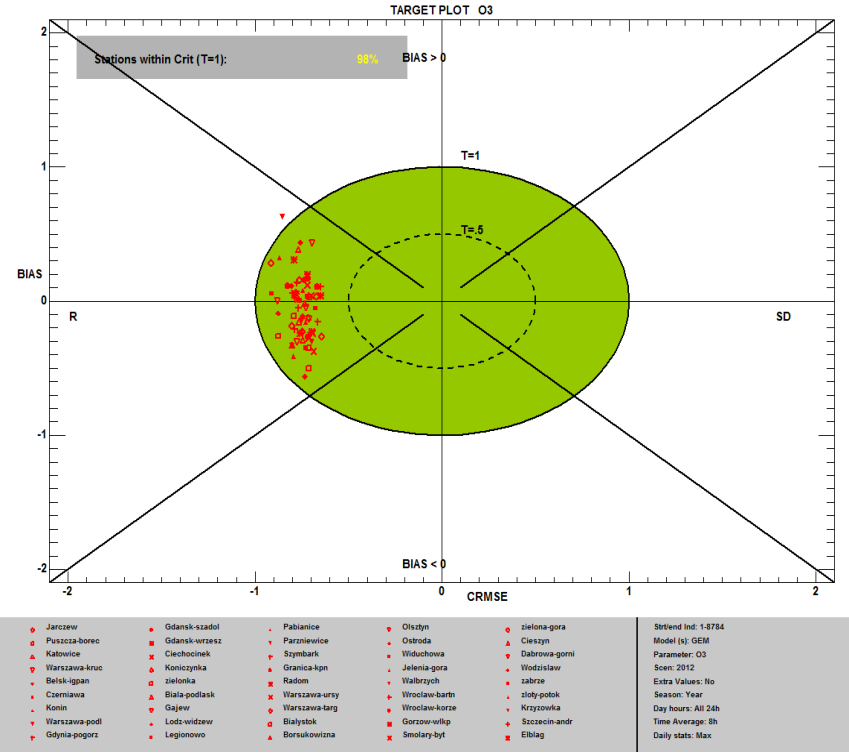


5.4

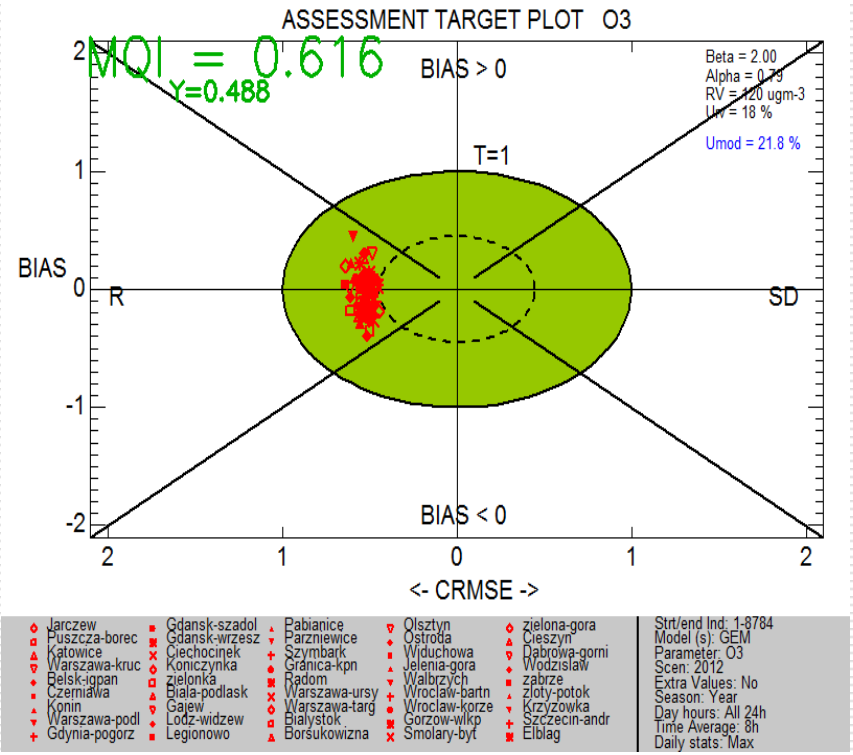


Target plot
Delta 3.0 vs Delta 5.4 – 2012

3.0

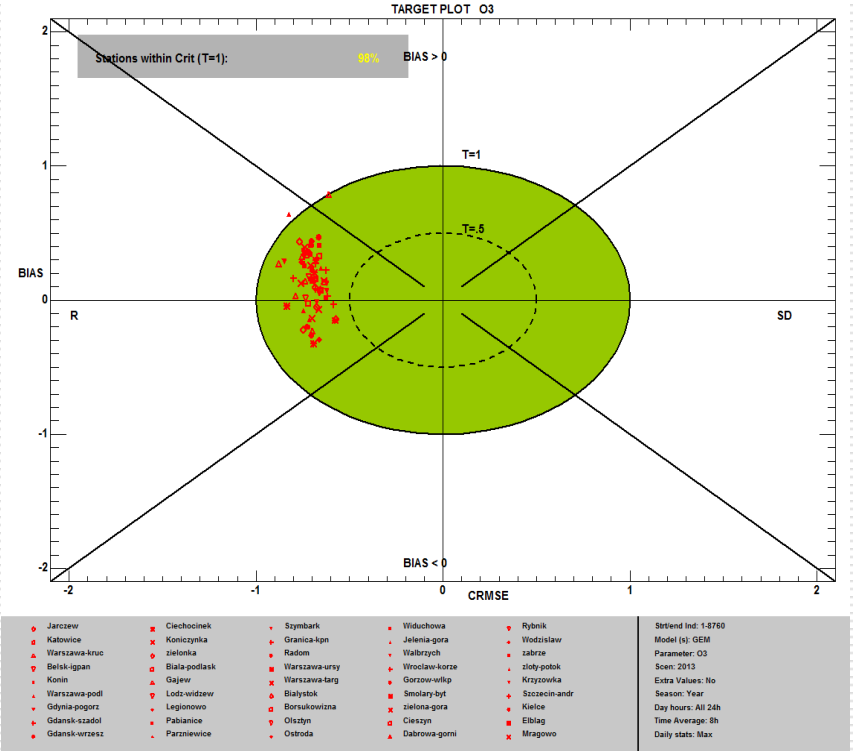


5.4

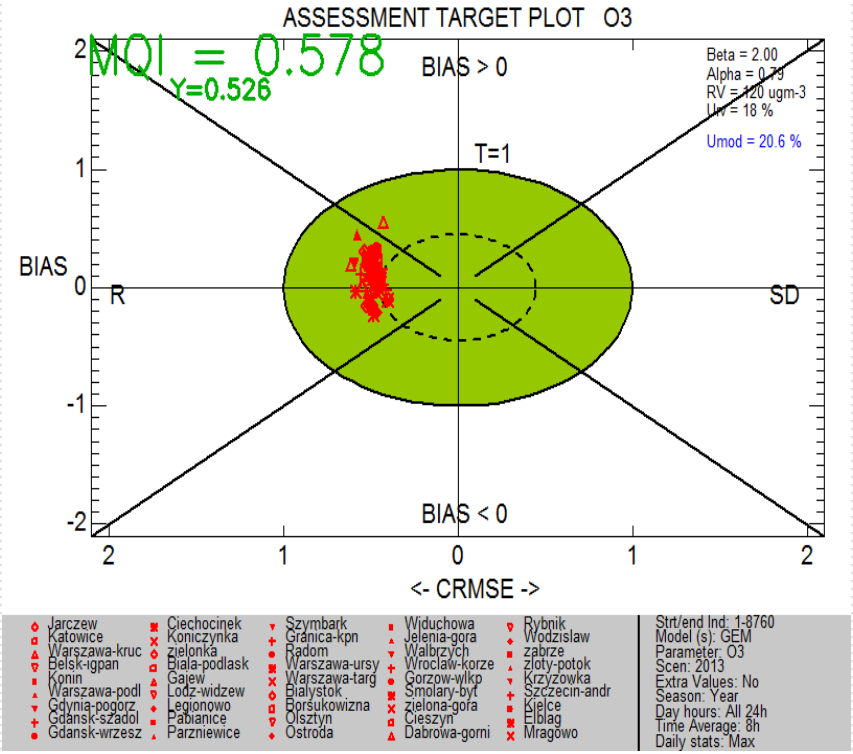


Target plot
Delta 3.0 vs Delta 5.4 – 2013

3.0

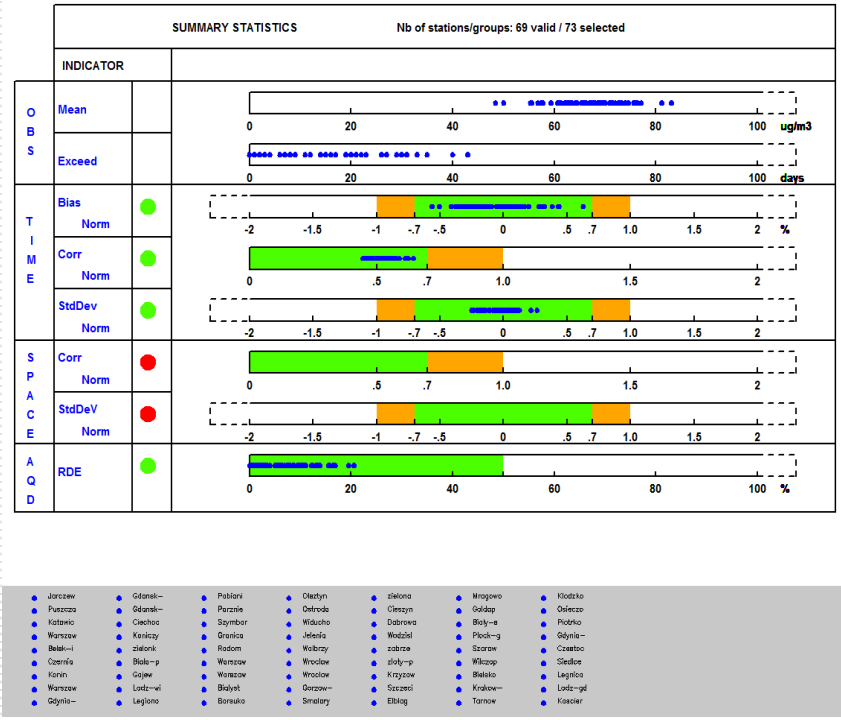


5.4

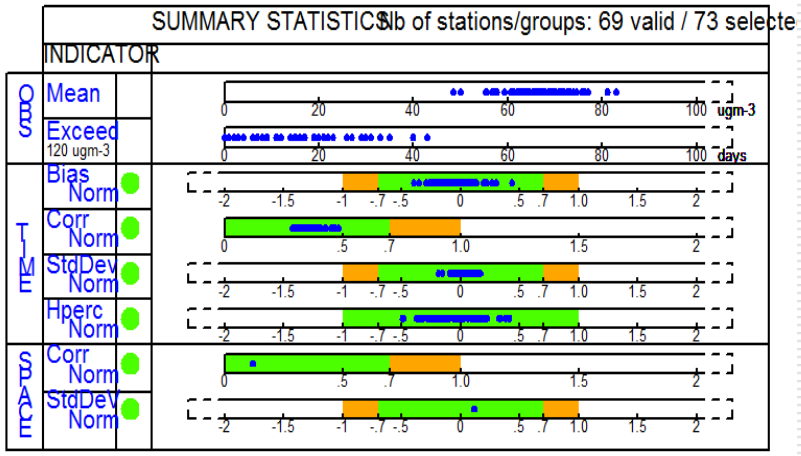


Summary report
Delta 3.0 vs Delta 5.4 – 2012

3.0



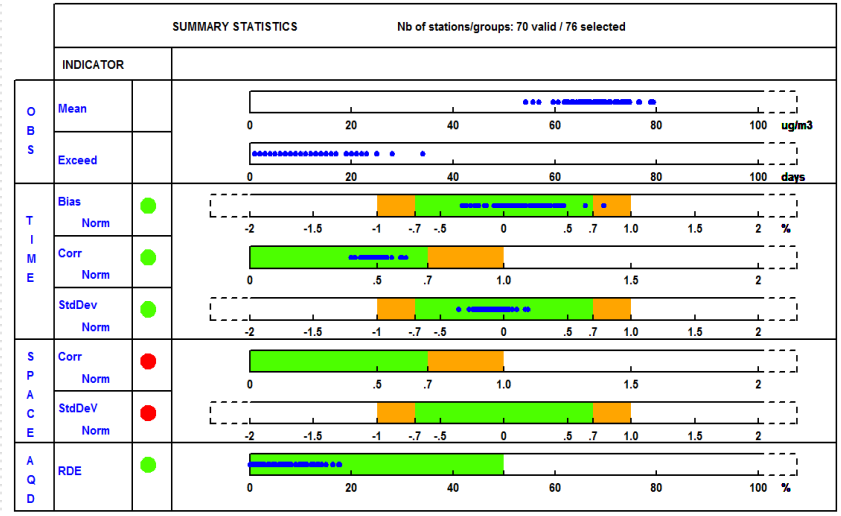
5.4



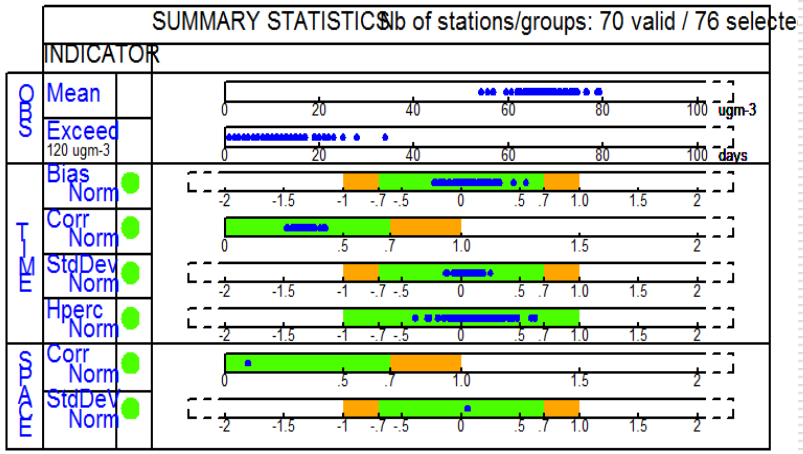
Performance Criteria satisfied
Performance Criteria satisfied; Error dominated by corresponding Indicator
TIME: >90% of stations fulfills the Performance Criteria
SPACE: Dot fulfills the Performance Criteria
TIME: <90% of stations fulfills the Performance Criteria
SPACE: Dot does not fulfill the Performance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

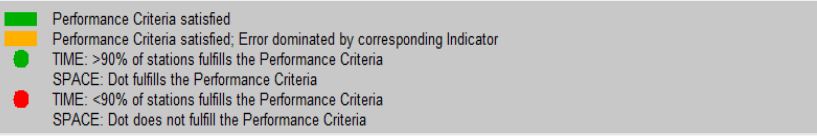
Summary report
Delta 3.0 vs Delta 5.4 – 2013

3.0



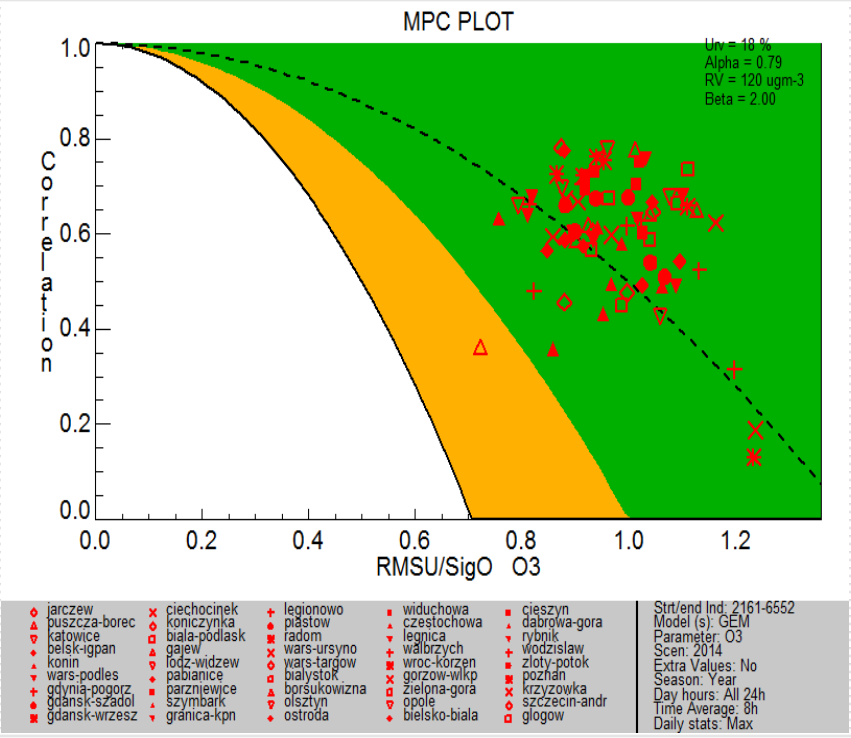
5.4



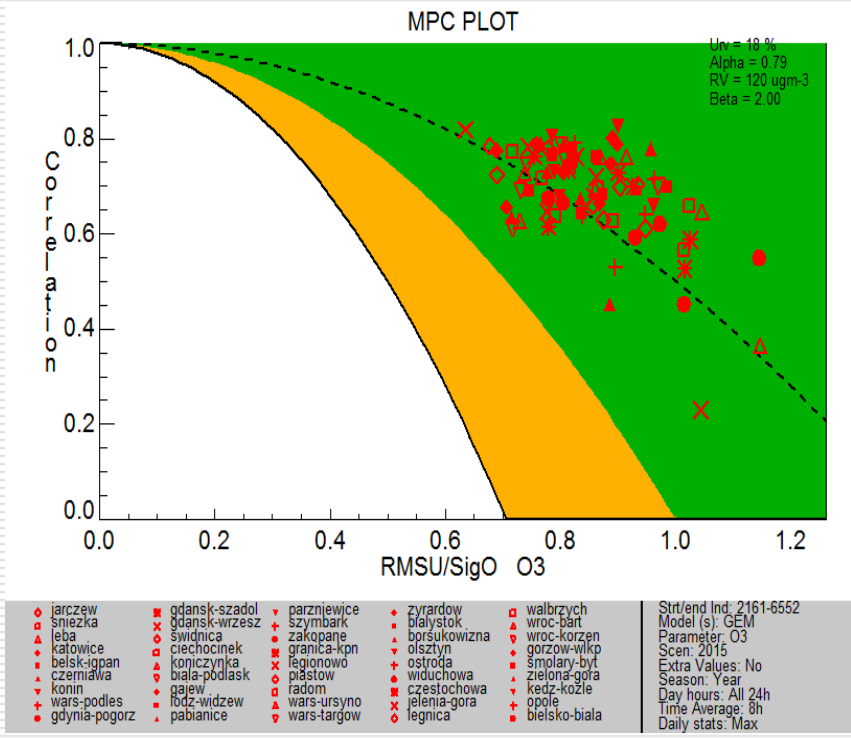


MPC – correlation

2014

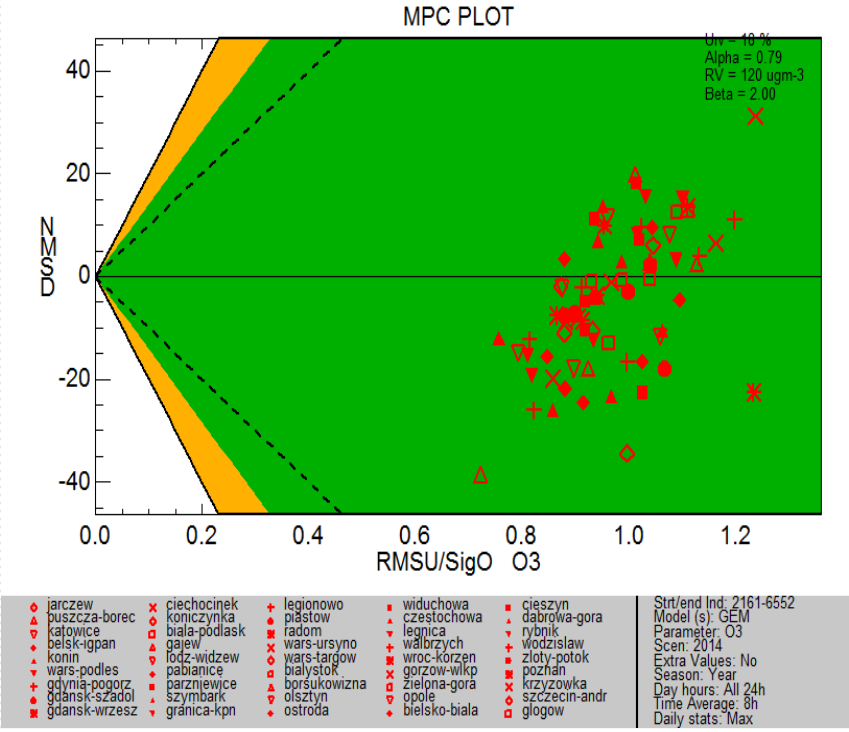


2015

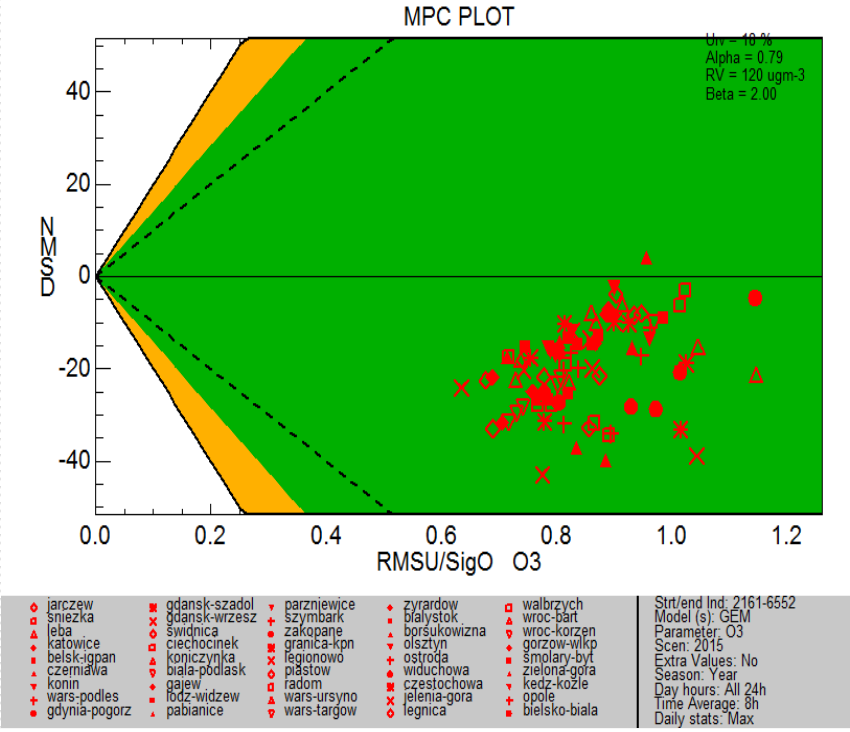


MPC – standard deviation

2014

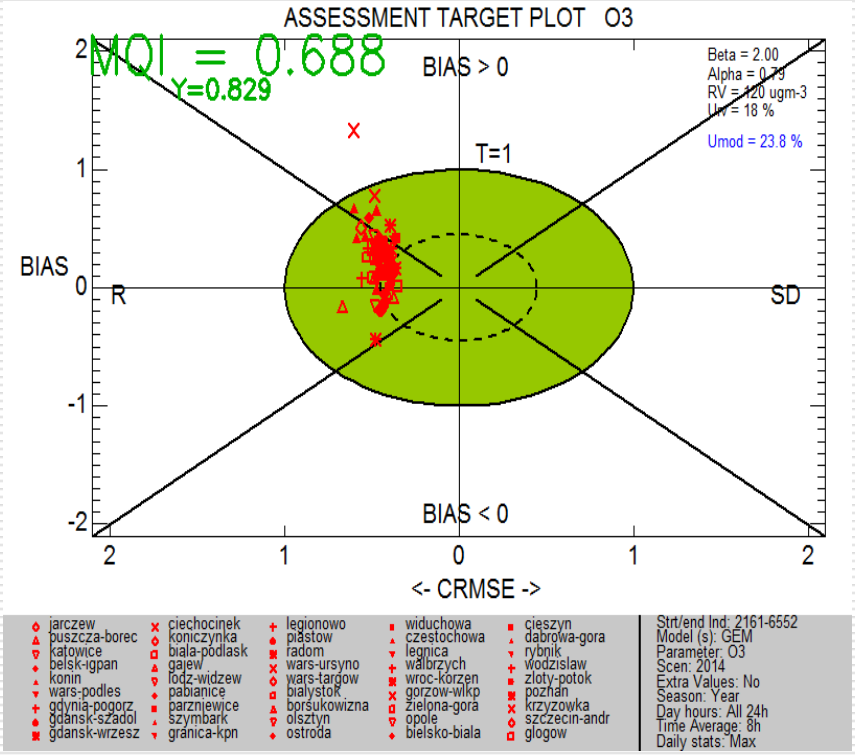


2015

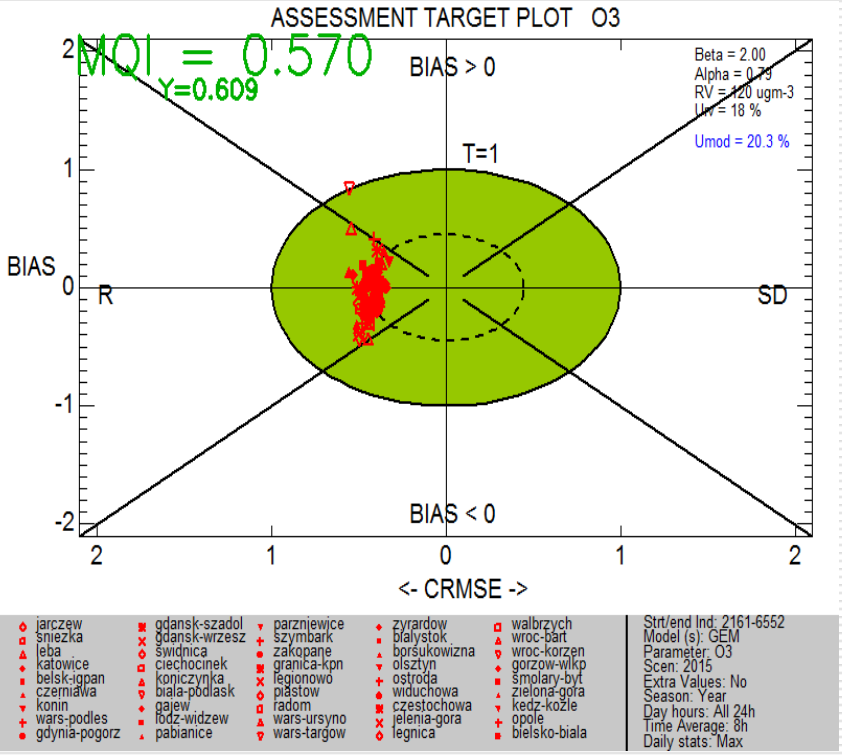


Target plot

2014

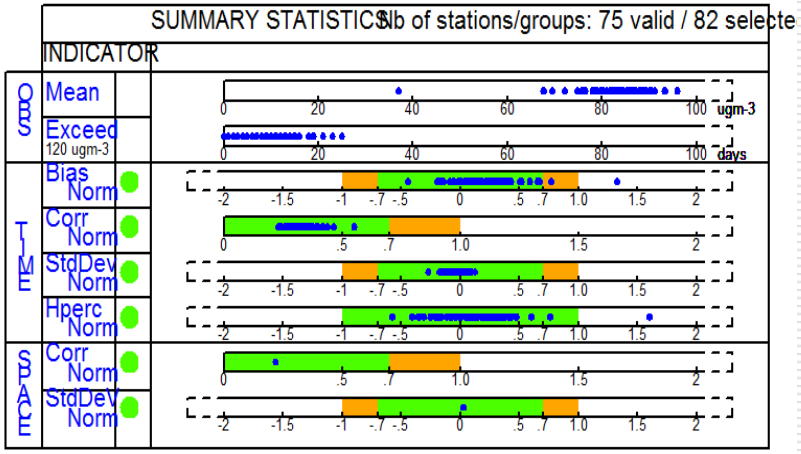


2015



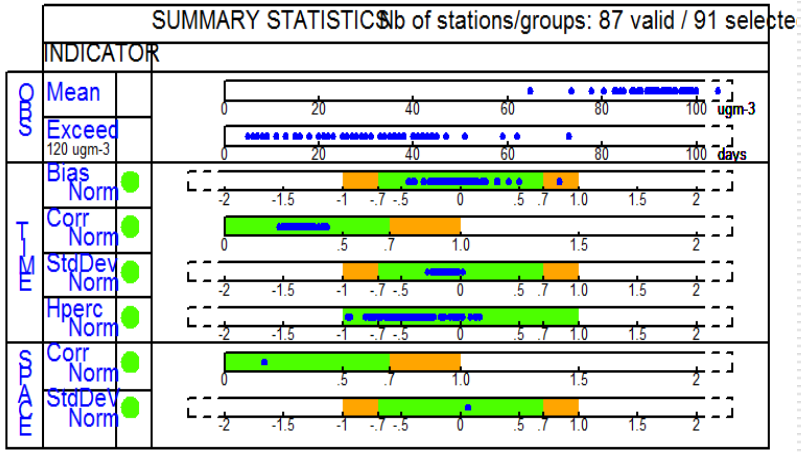
Summary report

2014



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

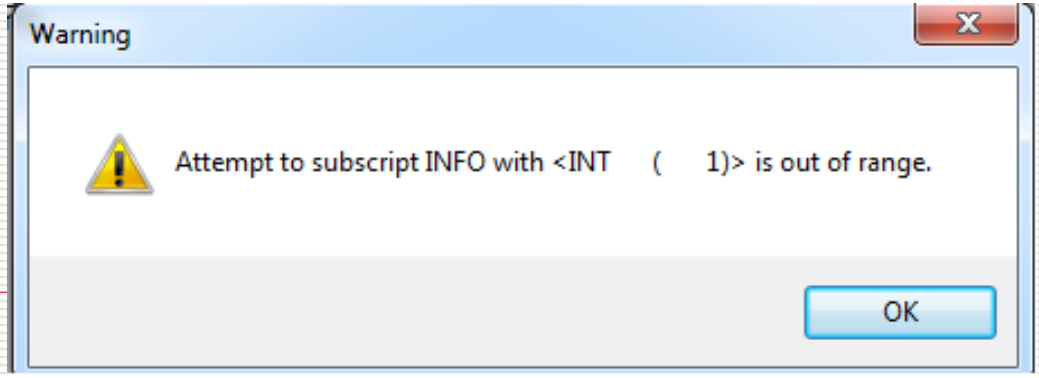
2015



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

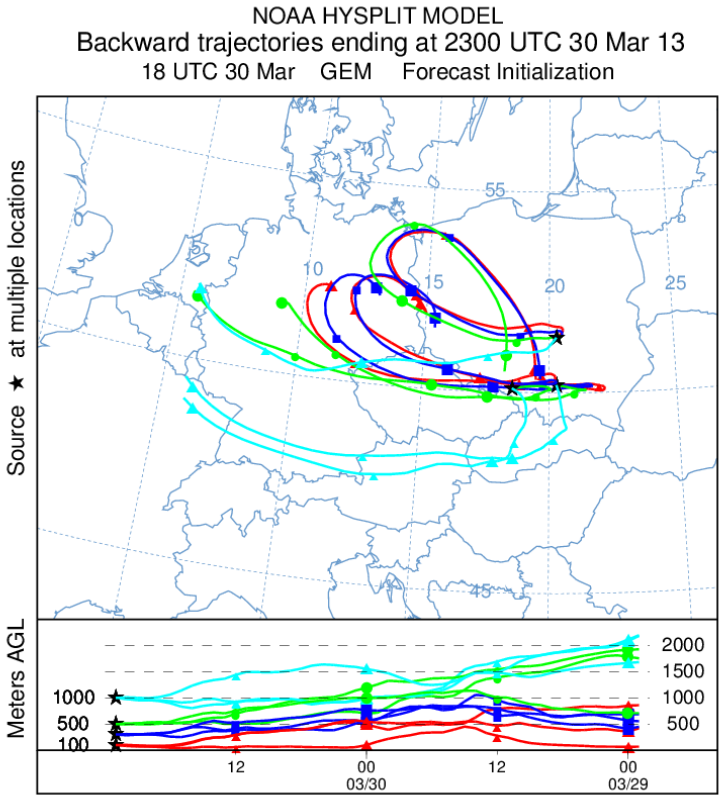
Remarks about MQO and DELTA

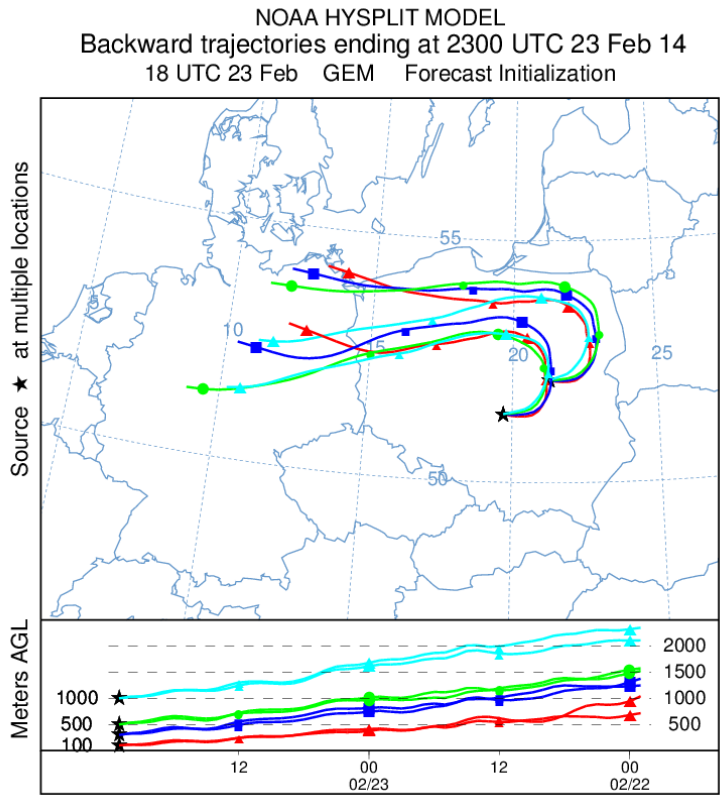
- MQO for O3 is stringent enough – Ur shouldn't be raised any more
- 5.4 – huge improvement compared to 3.0
- Very good conversion tool
- Simple and understandable users guide
- Text management on the plots could be better
- Installation path
- Modeling data - bug



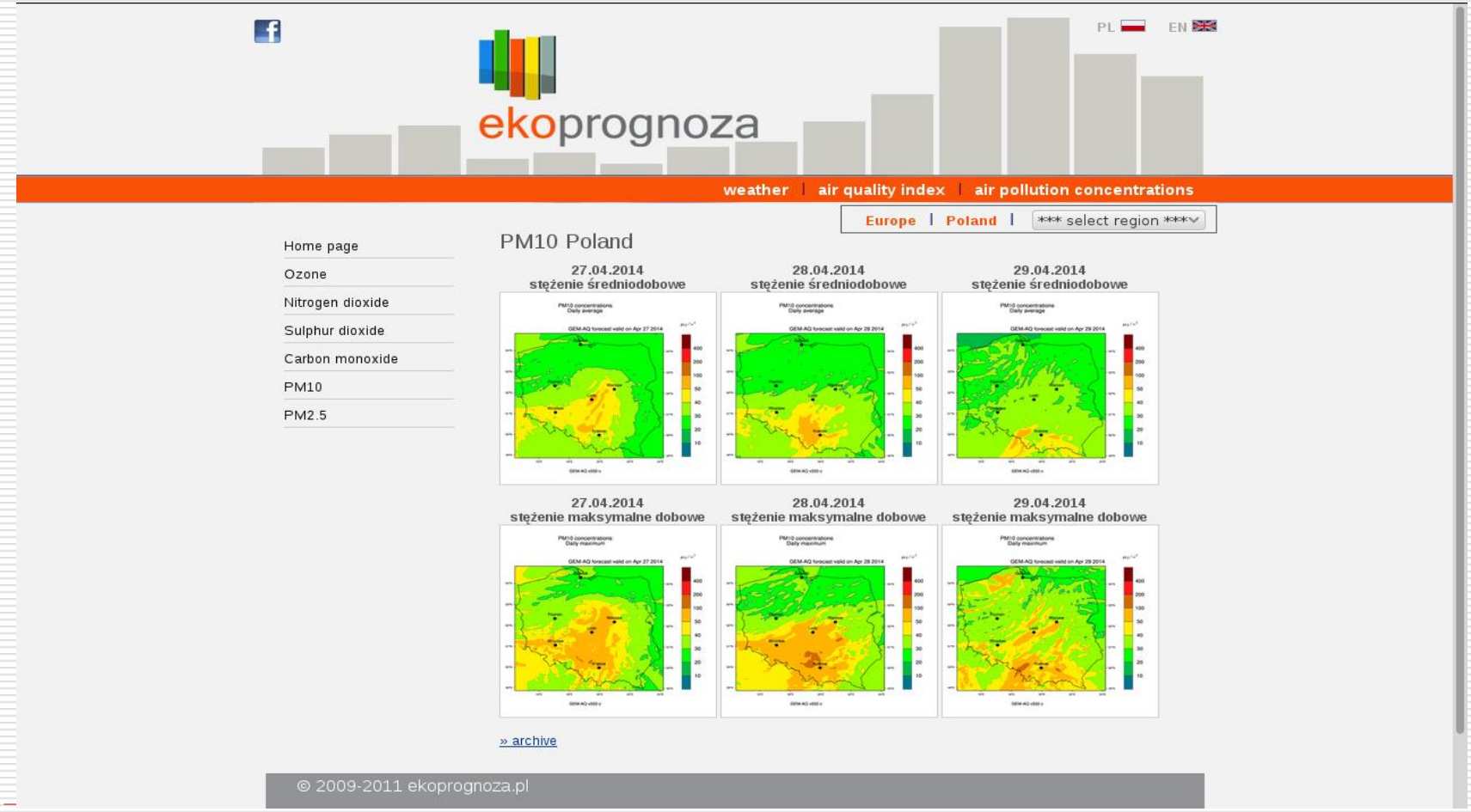
National near-surface ozone forecast 2013 - 2015

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





EcoForecast Foundation air pollution forecasts 2009 – 20??



http://ecoforecast.eu

THANK YOU!