



Univ. L'Aquila



ForeChem: An Air-Quality Forecasting Tool over Italy

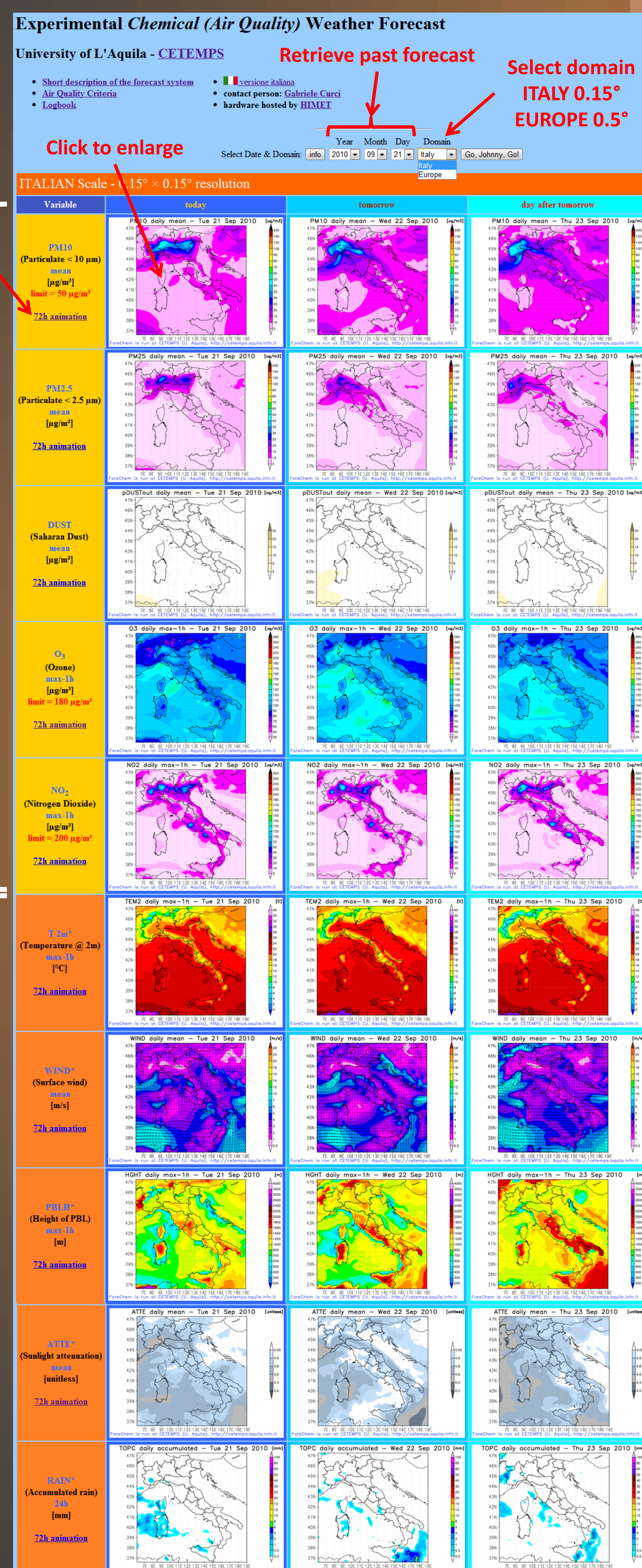
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<http://pumpkin.aquila.infn.it/forechem>

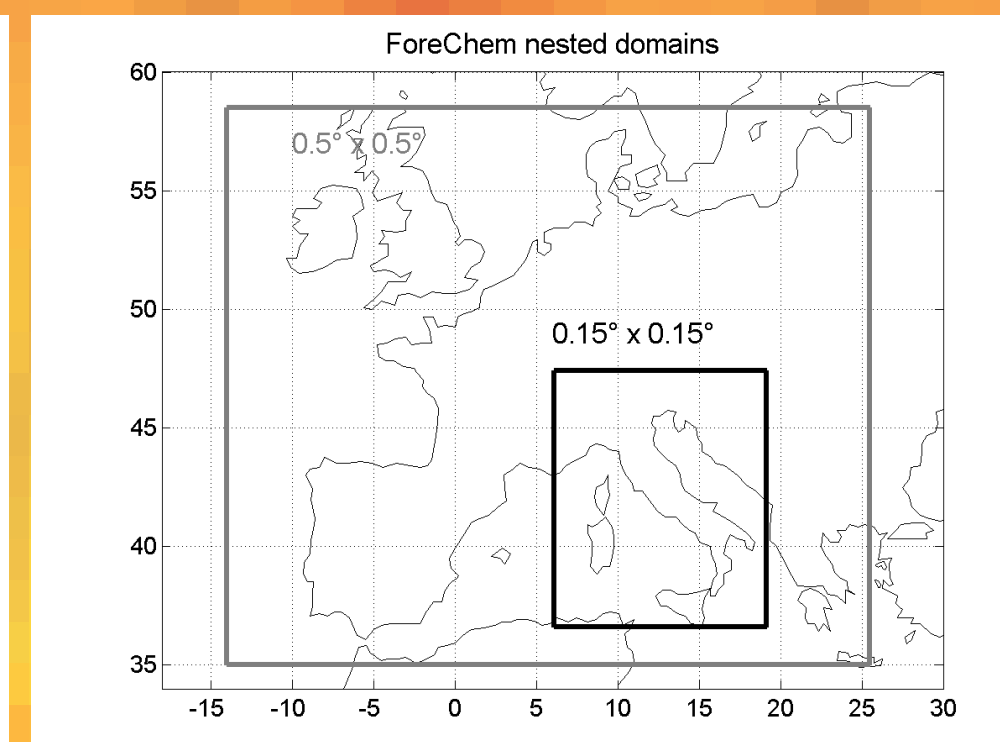
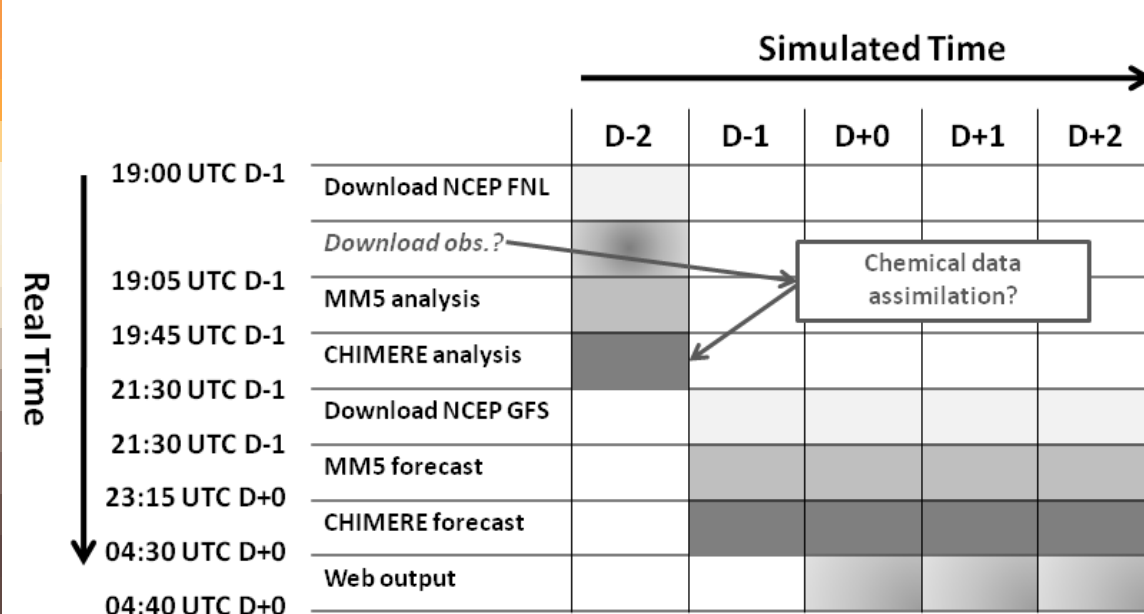
ALL-IN-ONE view of 3-days forecast



MODELS

- GLOBAL ANALYSES & FORECASTS: NCEP operational $1^\circ \times 1^\circ$
- METEOROLOGY: MM5 36-12 km resolution, 32 levels up to 100 hPa
- CHEMISTRY-TRANSPORT: CHIMERE 0.5° - 0.15° , 8 levels up to 500 hPa
- ANTHROPOGENIC EMISSIONS: EMEP 0.5° and CTN-ACE 0.15°
- BIOGENIC EMISSIONS: MEGAN model
- RESOURCES: 4-Xeon Linux PC, ~10 hours CPU/day, ~8 Gb disk/day

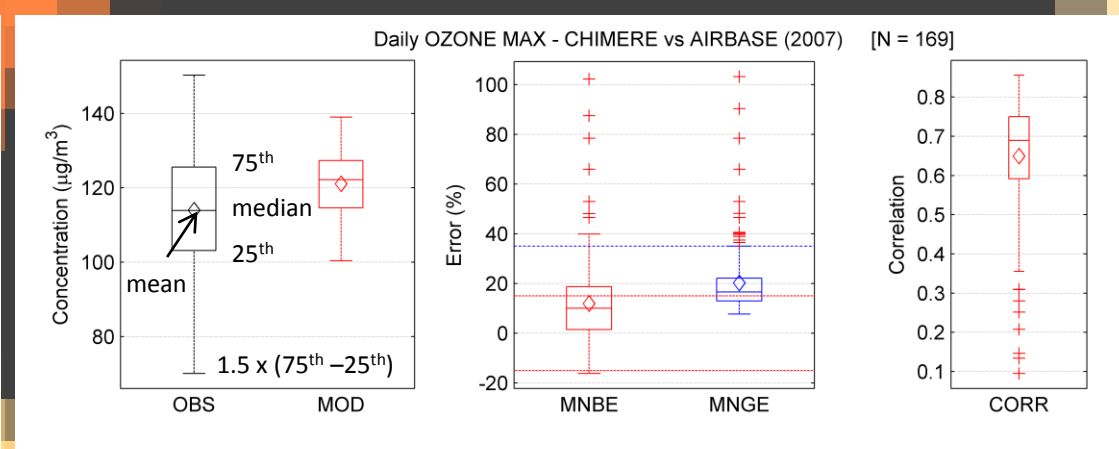
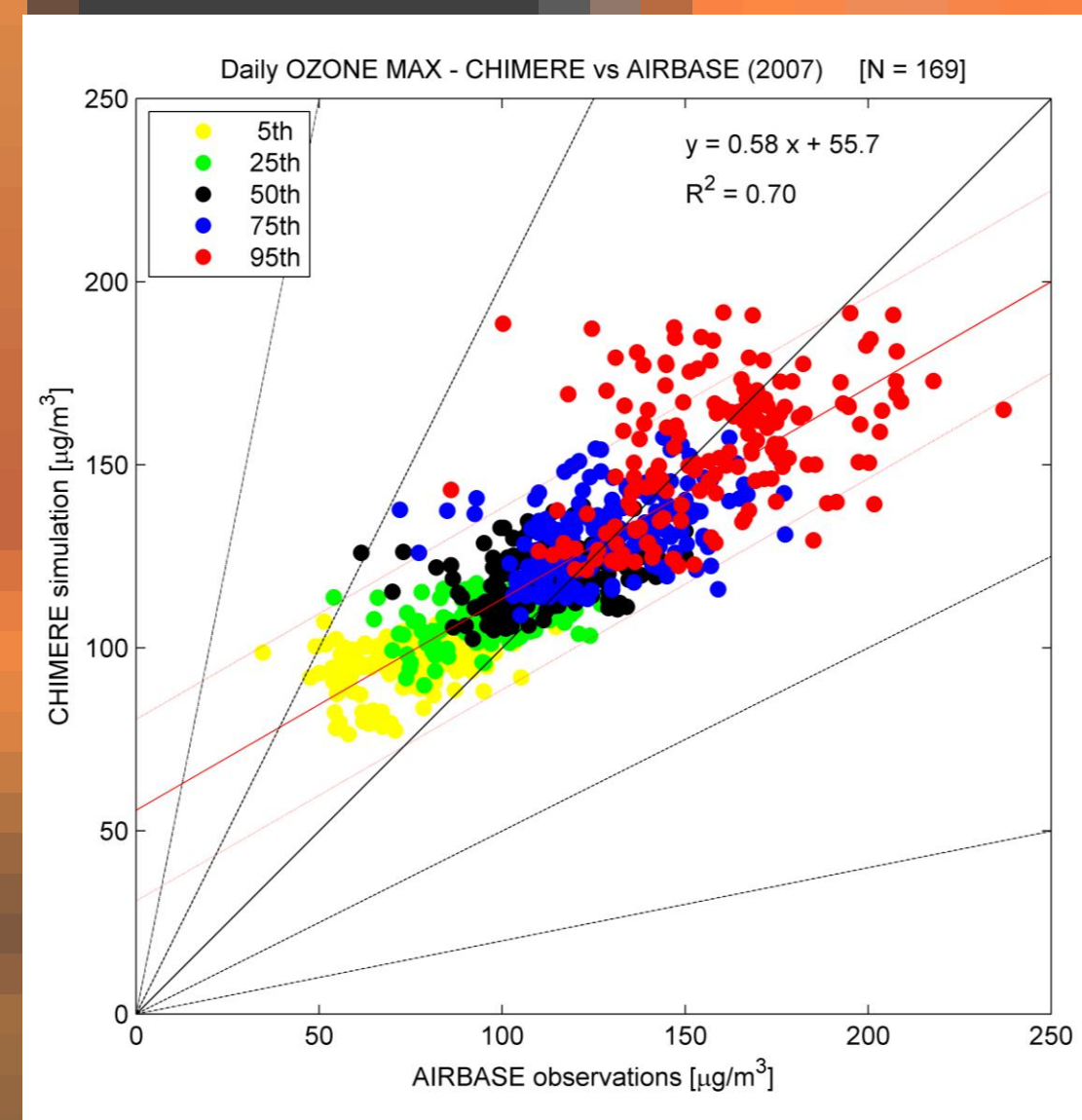
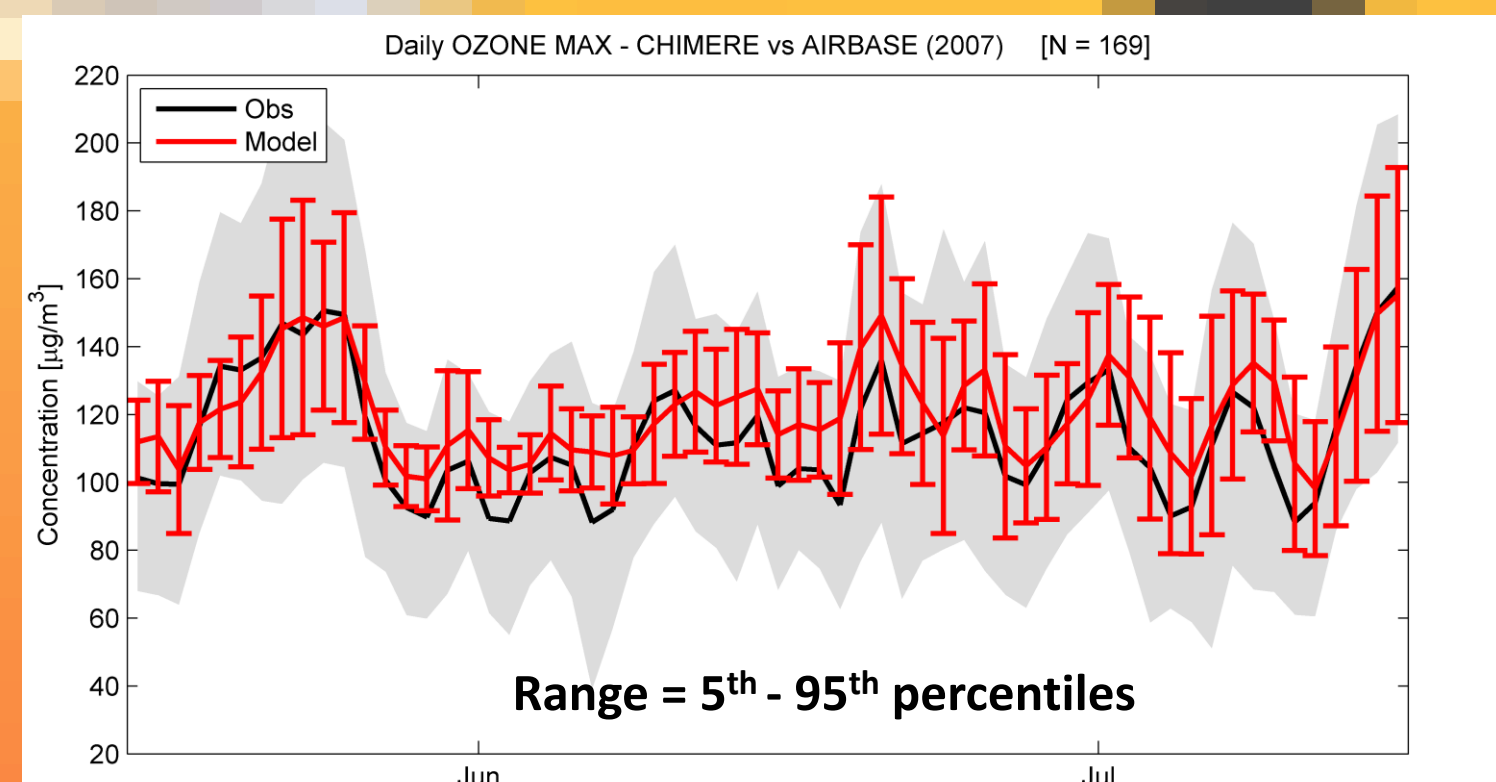
ForeChem timings & domains



OZONE DAILY MAX

2-months simulation
15 May-15 July 2007

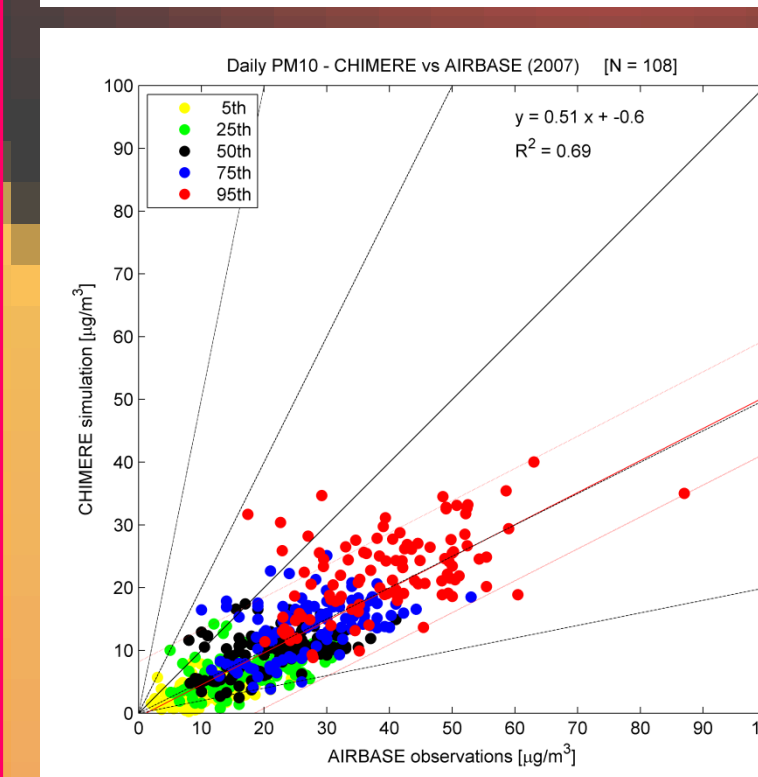
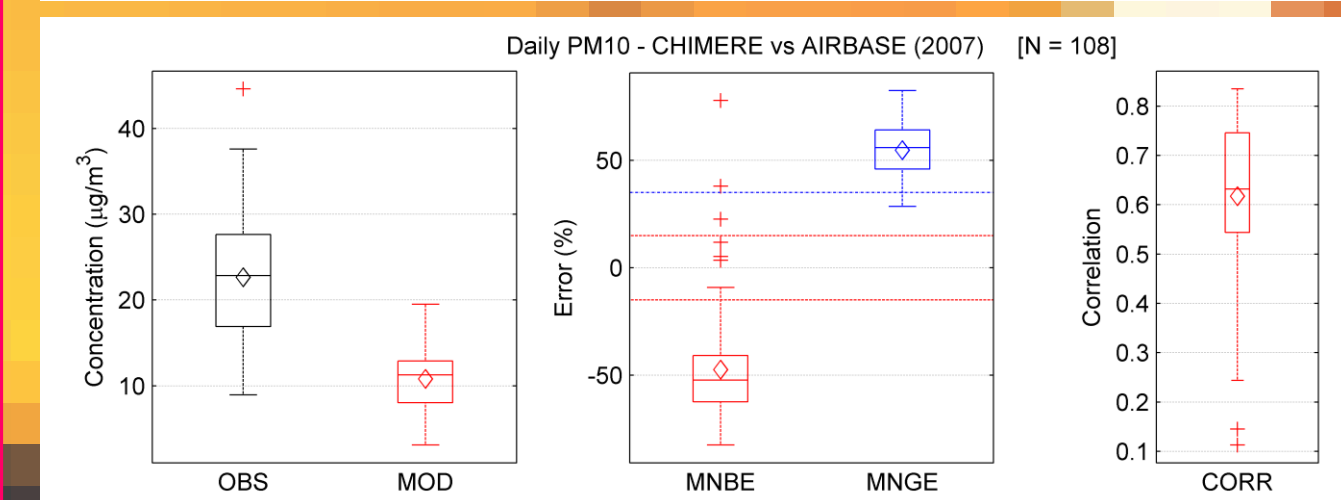
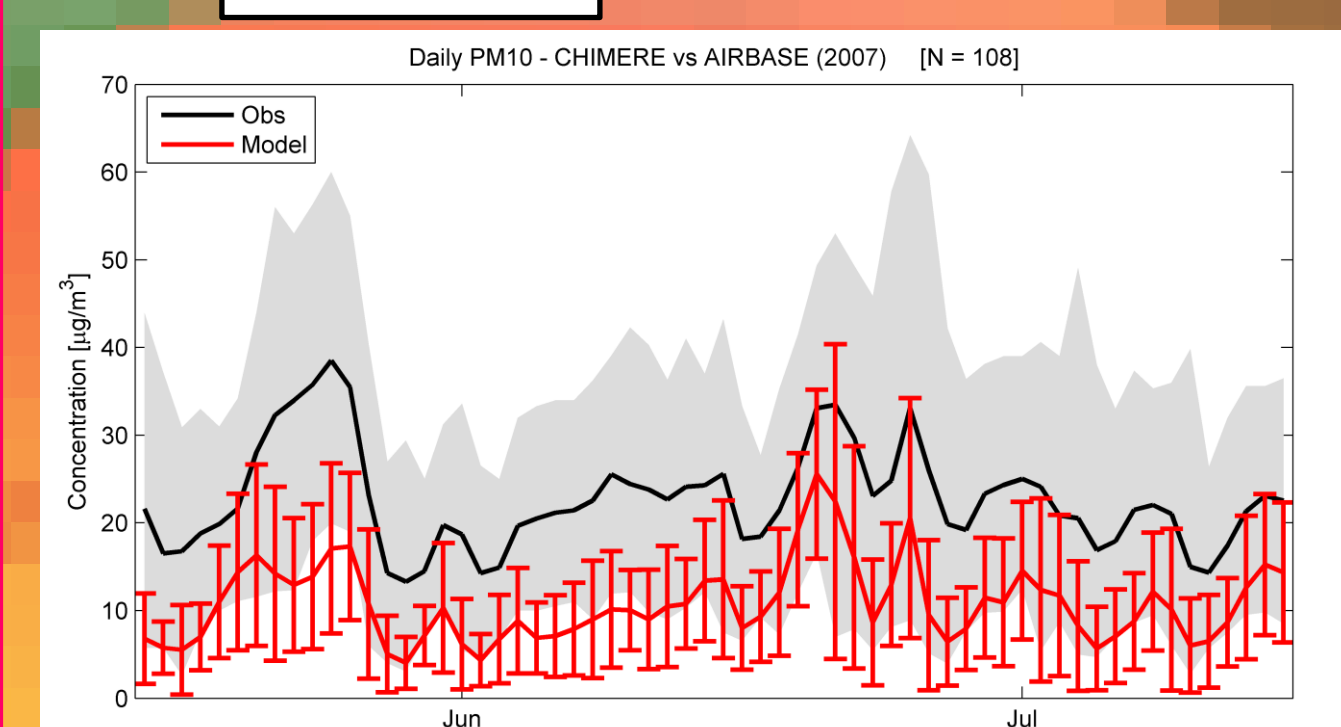
We show comparison
of higher resolution
simulation vs AirBase
observations



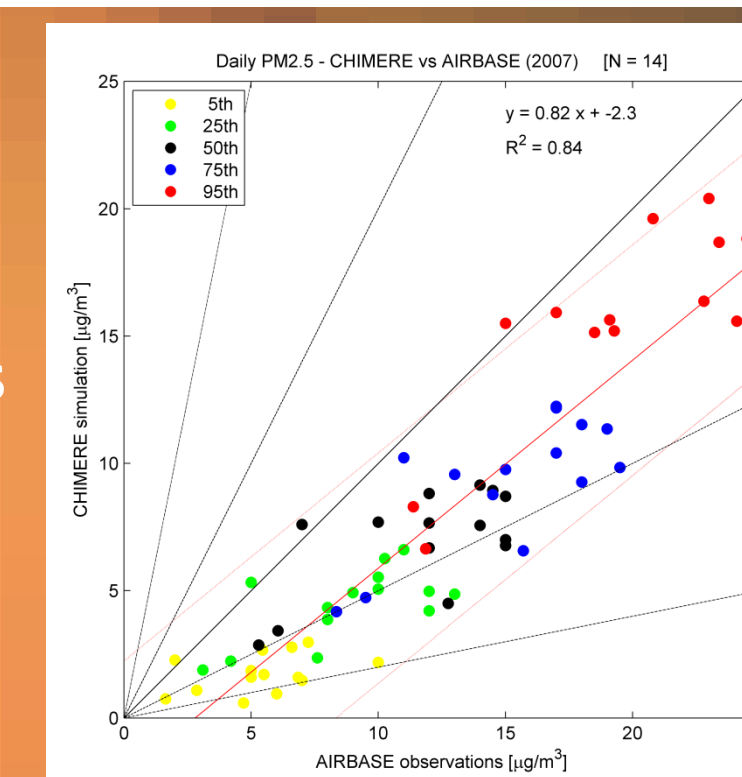
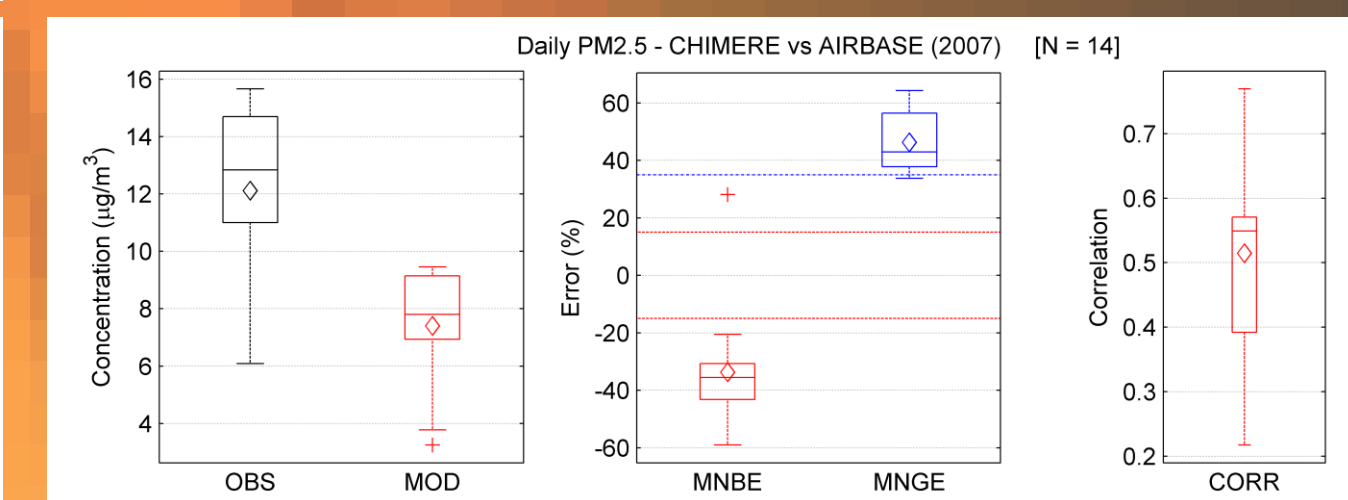
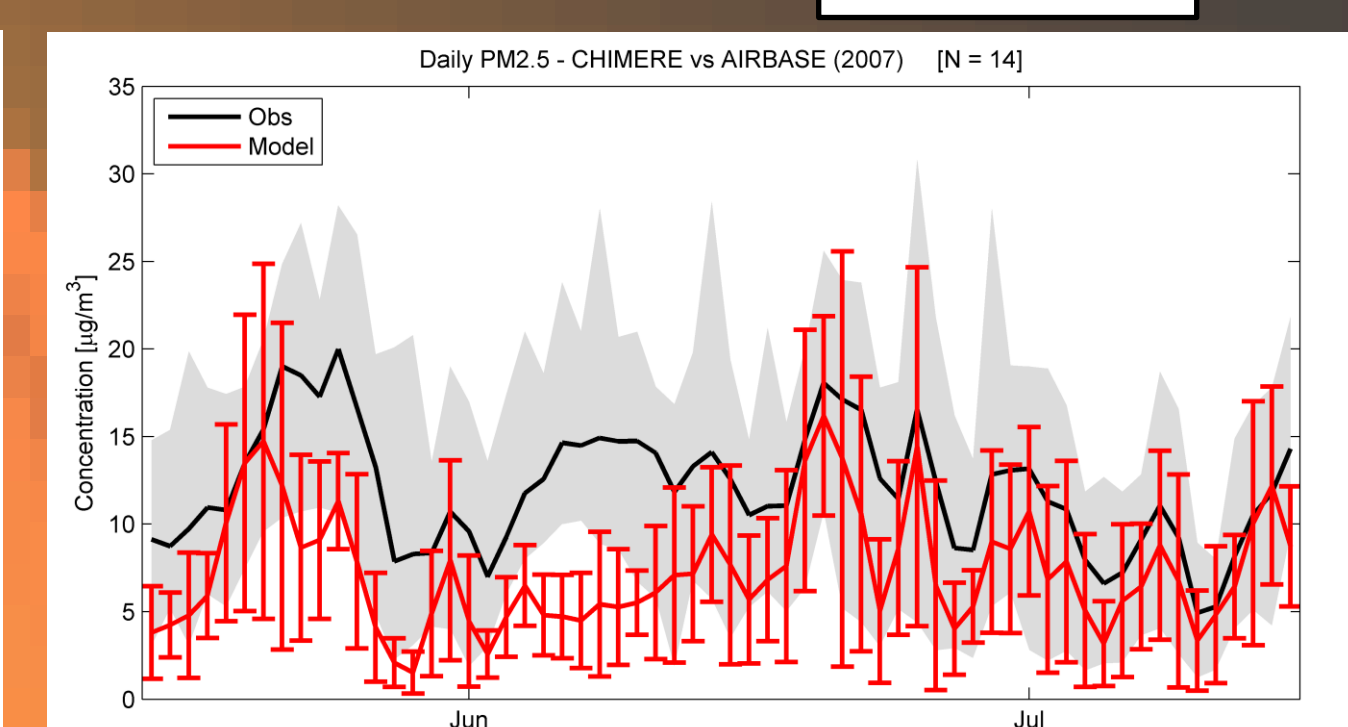
Ozone daily maxima are slightly overestimated (~7 µg/m³), especially at lower end of distribution. Average error within EPA quality criteria (bias < ±15% and error < 35%). Average correlation of 0.65.

PARTICULATE MATTER

PM10



PM2.5

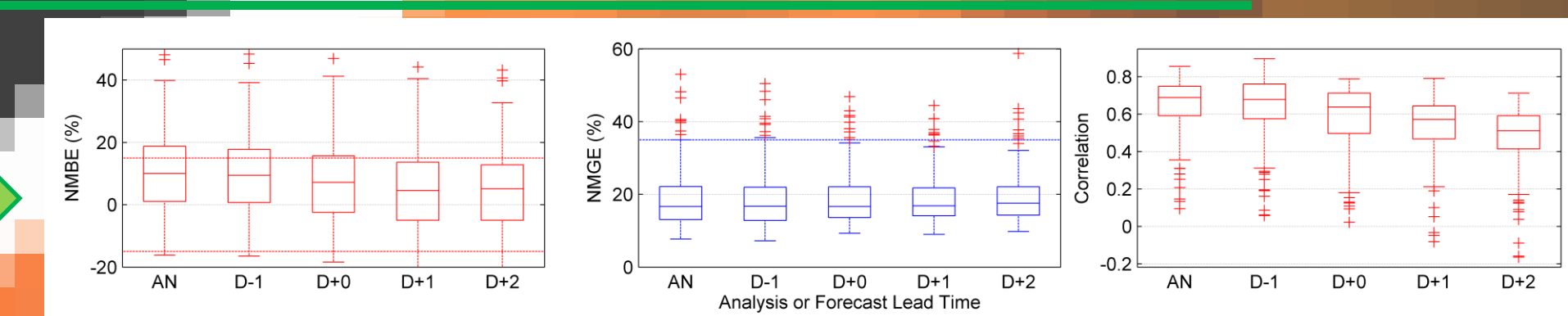


Particulate matter is generally underestimated. The coarse fraction (PM10) by 50% and the fine (PM2.5) fraction by 35%. Average correlation is 0.62 and 0.51, for PM10 and PM2.5 respectively. The episode with elevated PM2.5 on June 5-12 is not captured by the model.

ERRORS AS A FUNCTION OF LEAD-TIME

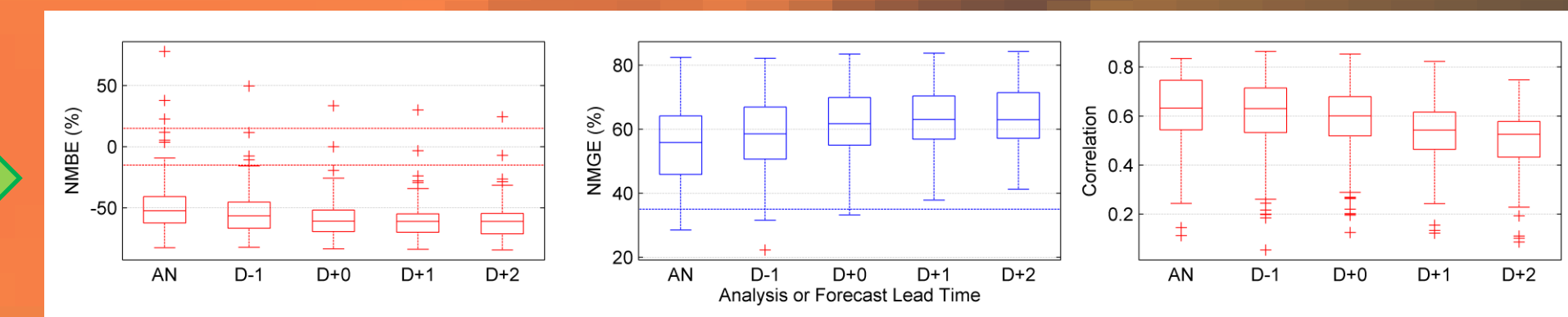
OZONE MAX

Mean bias decreases w/
lead-time, error
increases, and correlation
degrades.



PM10

All indices degrades w/
increasing lead-time.



UNDER DEVELOPMENT

- Validation of a 2-months WINTER period
- Air Quality Index (EPA-like)
- Hit-rate statistics (e.g. false alarms, misses)

More details to be found in: "Curci, G.: An Air Quality Forecasting Tool over Italy (ForeChem): first validation against ground-based observations, manuscript in preparation for Atmospheric Environment"