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Supplement of

Prioritising the sources of pollution in European cities: do air quality modelling applications provide consistent responses?

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Supplementary material

In this section we show the results of the basecase validation for the 2 model configurations considered in this paper. At first, comparing measured PM_{2.5} yearly averages (as derived by AirBase European Environmental Agency, EEA, database) VS the model results, with CHIMERE referring to the 2009 year and EMEP to 2014. Then, also comparing the results of the SRR against the model results, for a selected number of emission reduction scenarios. In both Figure S1 and Figure S2 in the next pages (related respectively to CHIMERE and EMEP configurations) the scatter plot show the measurements (x-axis) VS the modelled results (y-axis), with PM_{2.5} in µg/m³. Each point represents the PM_{2.5} yearly average for a station, grouping the points per country. Results are quite comparable in terms of quality of the results, with Poland and Austria slightly better for CHIMERE, and Spain and Italy slightly better for EMEP.

Figure S3 shows modelled versus measured PM_{2.5} concentrations at background stations for CHIMERE in 2009 (left) and EMEP 2014 (right).

Figure S4 and Figure S5 show the validation of the Source Receptor Relationships when used for simulating scenarios. For these two Figures, the validation is not done against observations (we do not have observations representative of hypothetical scenarios) but against the results of the CHIMERE and EMEP runs. Note that for the 2 configurations there are slight differences in terms of assumptions (i.e. some of the CHIMERE scenarios reduce emissions considering a bound on the ‘Maximum Feasible Reductions’¹, while this concept is not considered for EMEP emission reduction scenarios). However, even if with some differences, both validation data contains simulations done with reductions, for various precursors and sector:

- at EU scale;
- at national scale (considering France and Poland as cases);
- at regional scale (considering Katowice, Milan, London, Barcelona, Athens and Stockholm);
- at local scale (considering Katowice, Milan, London, Barcelona, Athens, Stockholm, Antwerp, Porto, Paris, Berlin, Clermont-Ferrand, Copenhagen and Sofia).

More details on the validation strategy can be found in Pisoni et al., 2017, Pisoni et al., 2019.

¹ For ‘Maximum Feasible Reduction’, we mean the maximum reductions that can be achieved with the existing set of abatement technologies.

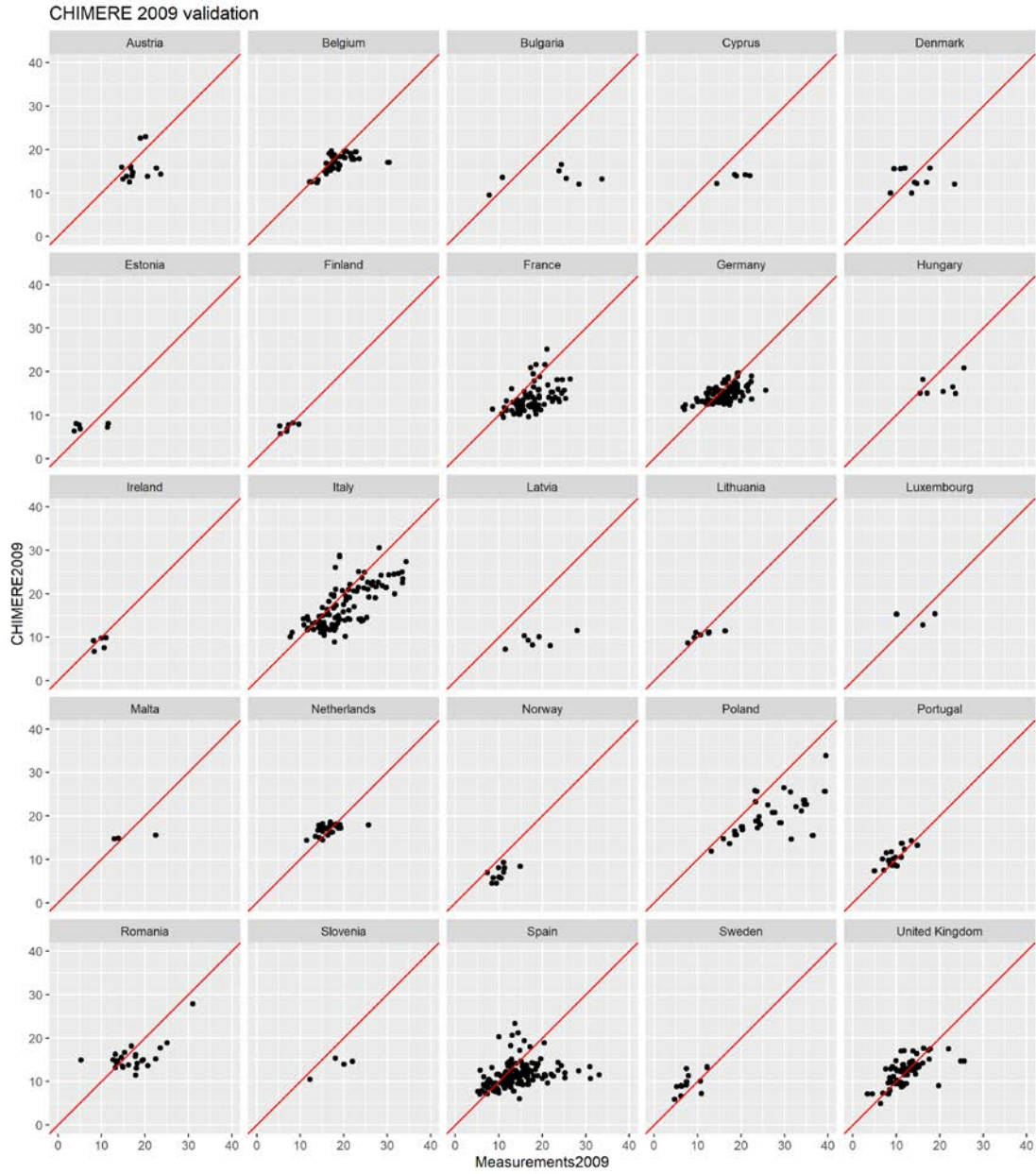


Figure S1: CHIMERE 2009 validation results, comparing observations VS model results.

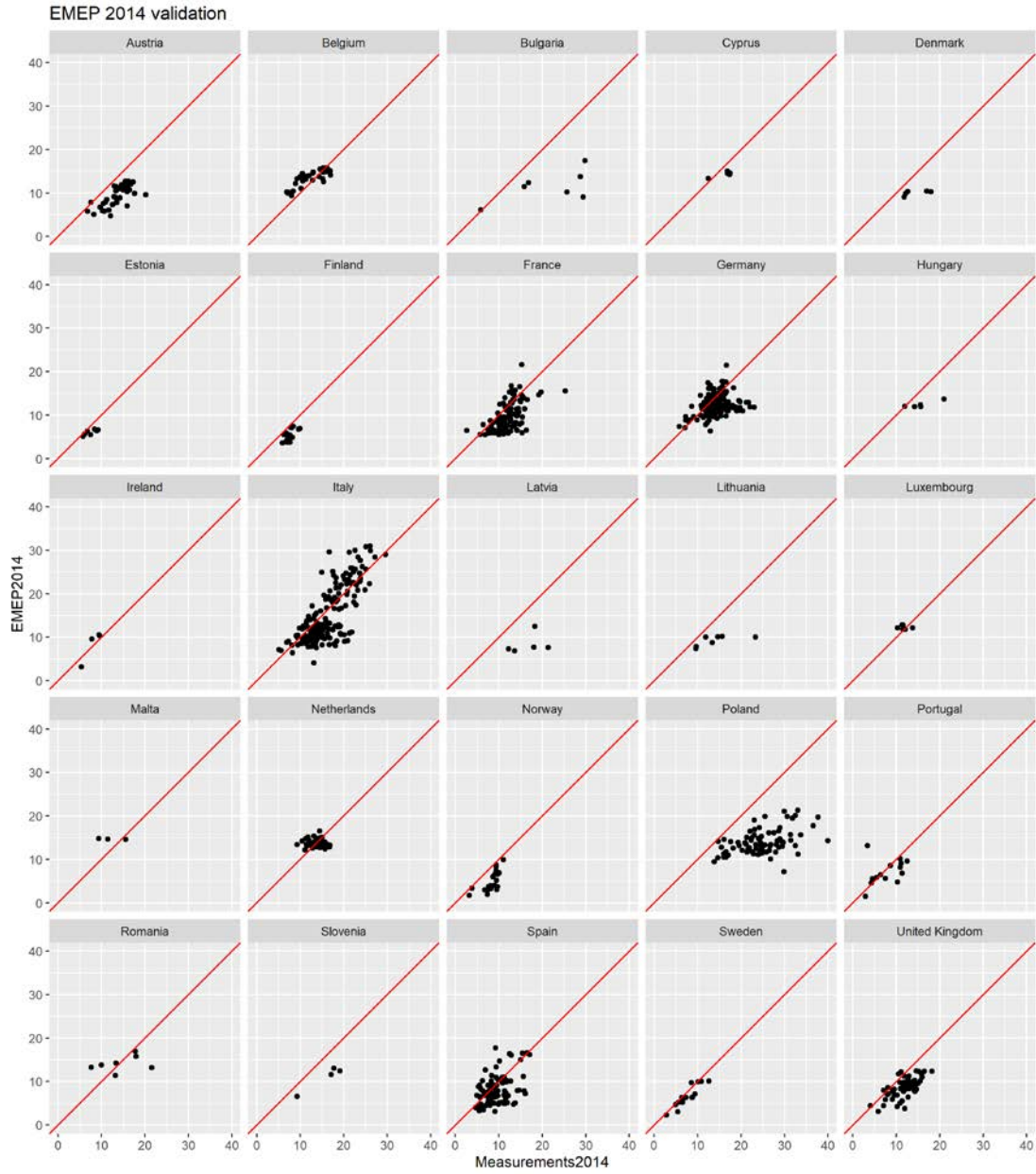


Figure S2: EMEP 2014 validation results, comparing observations VS model results.

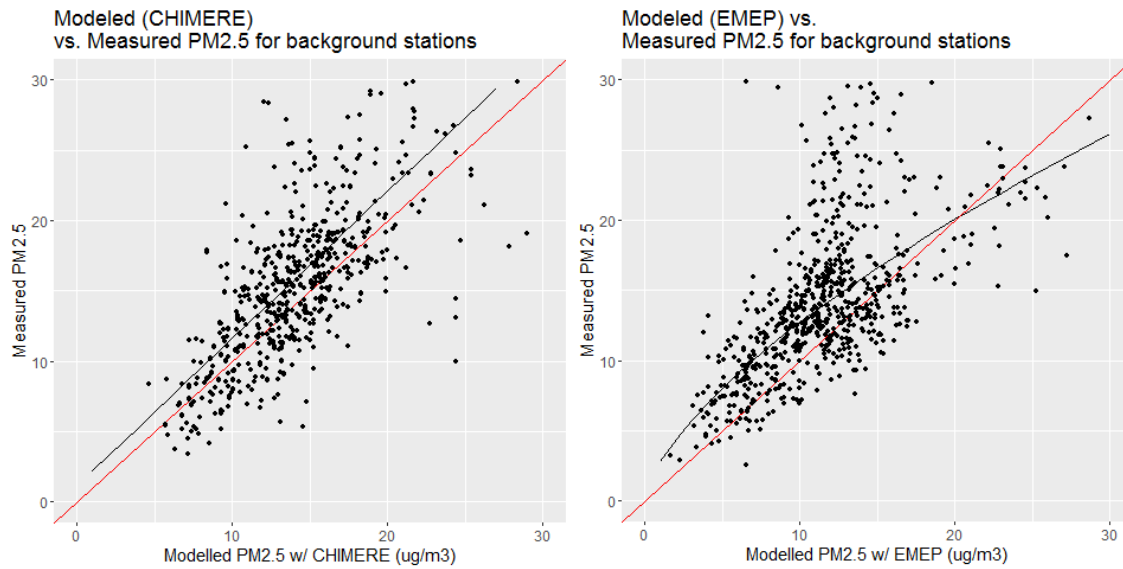


Figure S3: Modelled versus measured PM2.5 concentration at background stations for CHIMERE in 2009 (left) and EMEP 2014 (right).

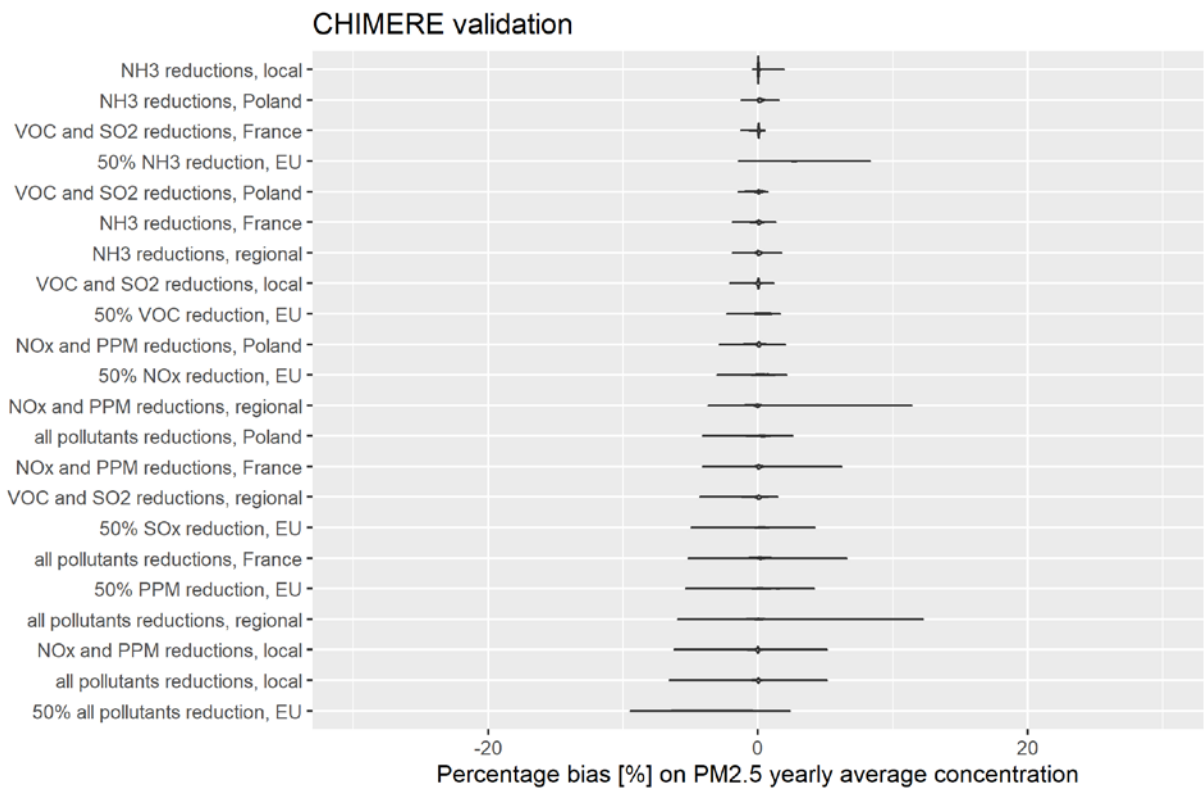


Figure S4: validation results for the SRR (in terms of percentage bias) on a number of CHIMERE scenarios. The % bias is computed comparing the SRR and CTM results, for each point of the domain. On the y-axis all the considered scenarios are listed specifying, for each scenario, the reduced pollutants (NOx, PPM, ...) over which domain (EU, France, ...).

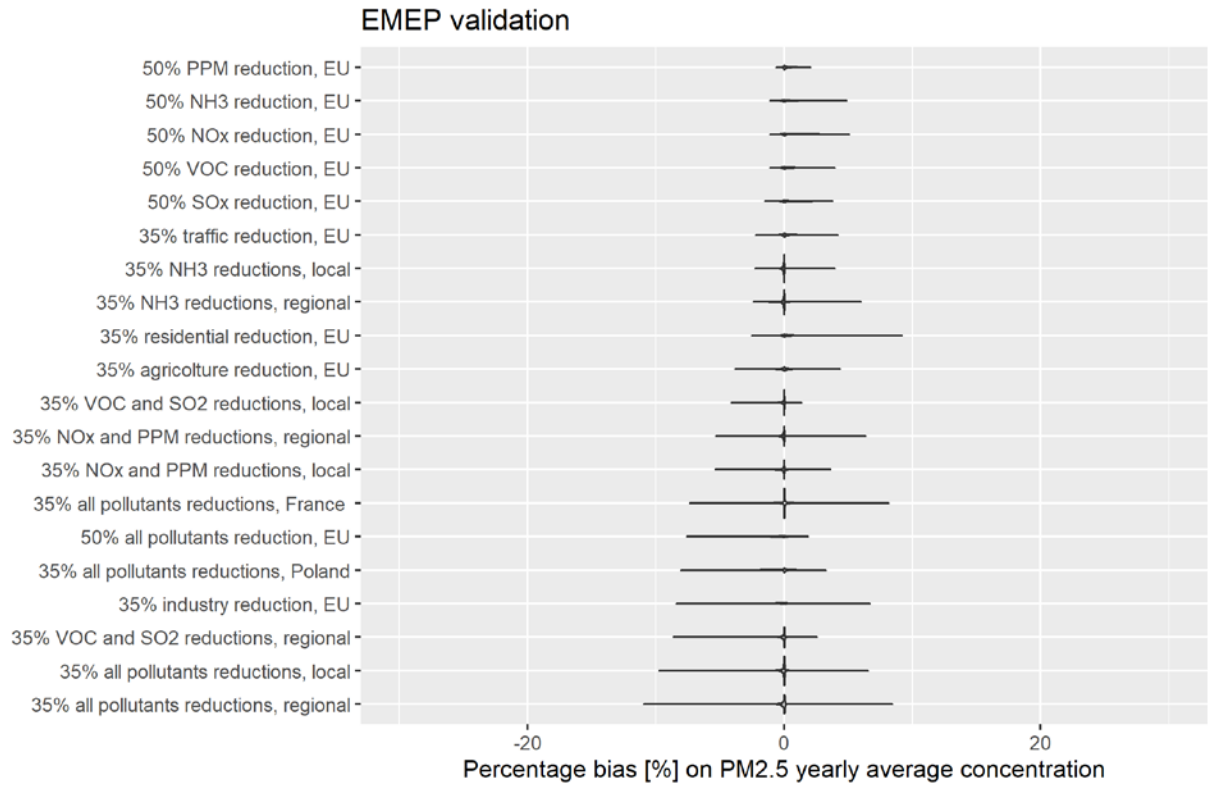


Figure S5: validation results for the SRR (in terms of percentage bias) on a number of EMEP scenarios. The % bias is computed comparing the SRR and CTM results, for each point of the domain. On the y-axis all the considered scenarios are listed specifying, for each scenario, the reduced pollutants (NOx, PPM, ...) over which domain (EU, France, ...).