One of the FAIRMODE activities: Source apportionment methods for the AAQD

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5th CAMS Policy User Workshop, 29th June 2021

FAIRMODE: https://fairmode.jrc.ec.europa.eu/

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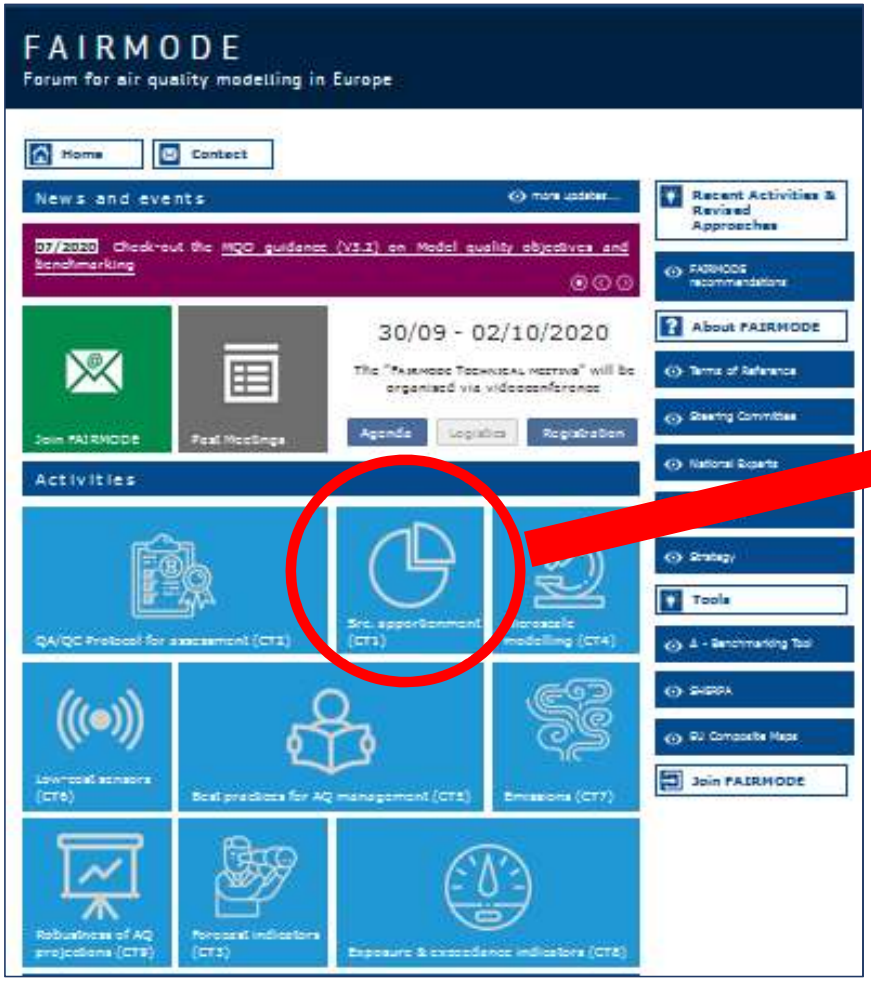
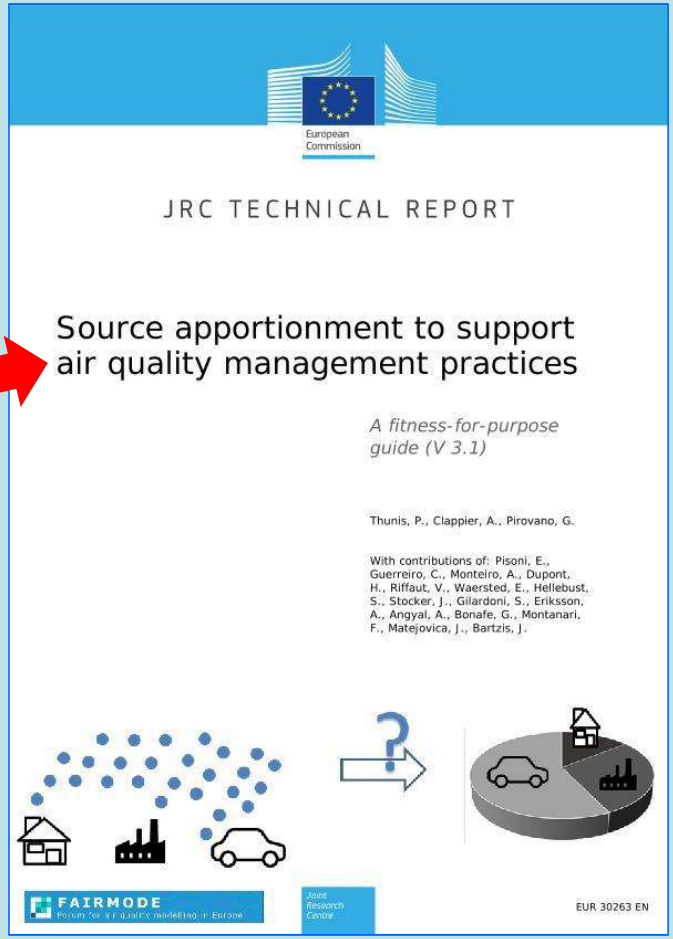
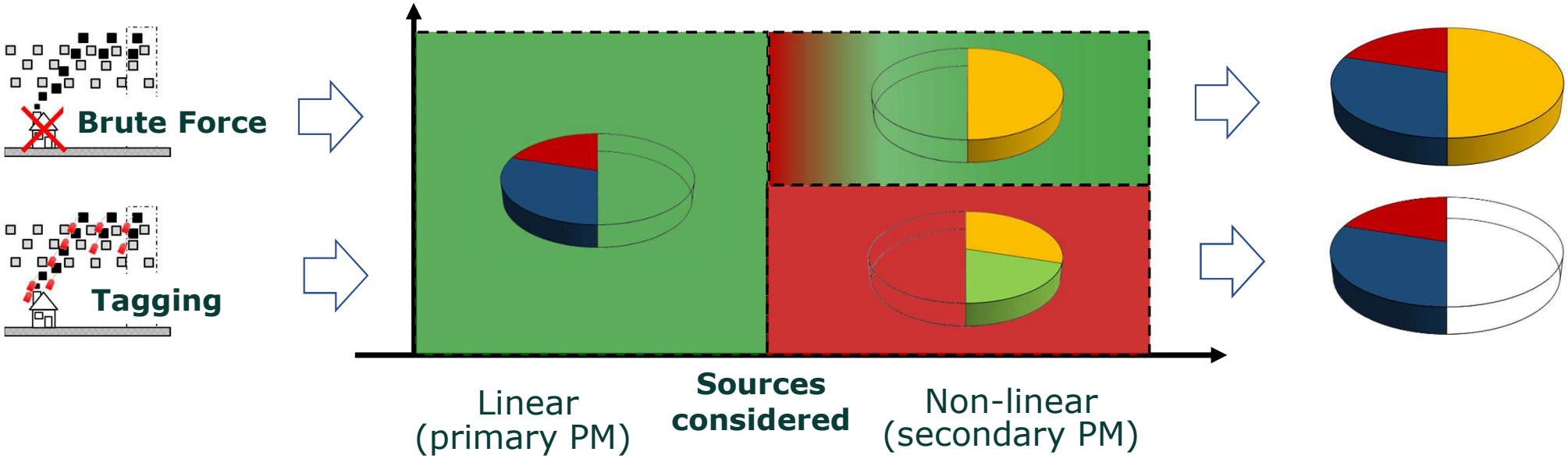




FAIRMODE Recommendations (2019)

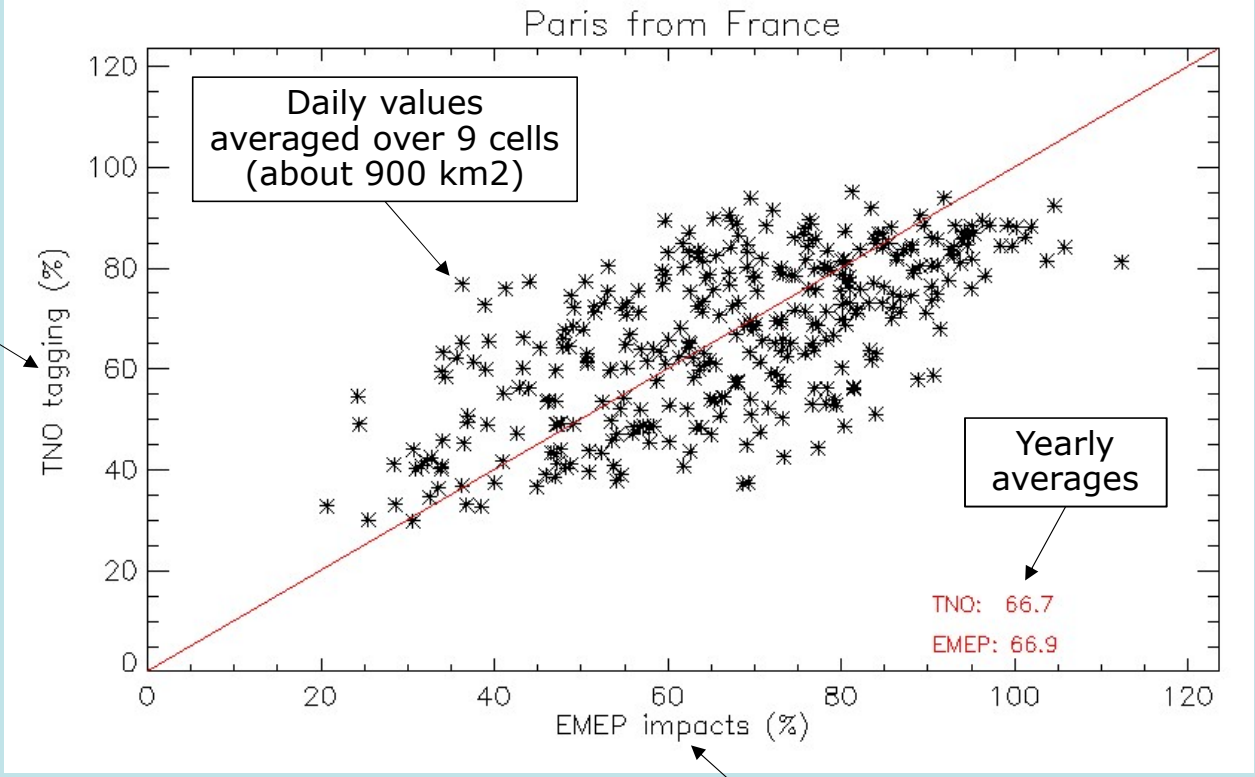
concerning



- **FAIRMODE recommendations about tagging and brut force are based on several comparisons,**
- **these recommendations seems to be still difficult to apply in practice…**

TNO tagging vs. EMEP impacts (CAMS results)

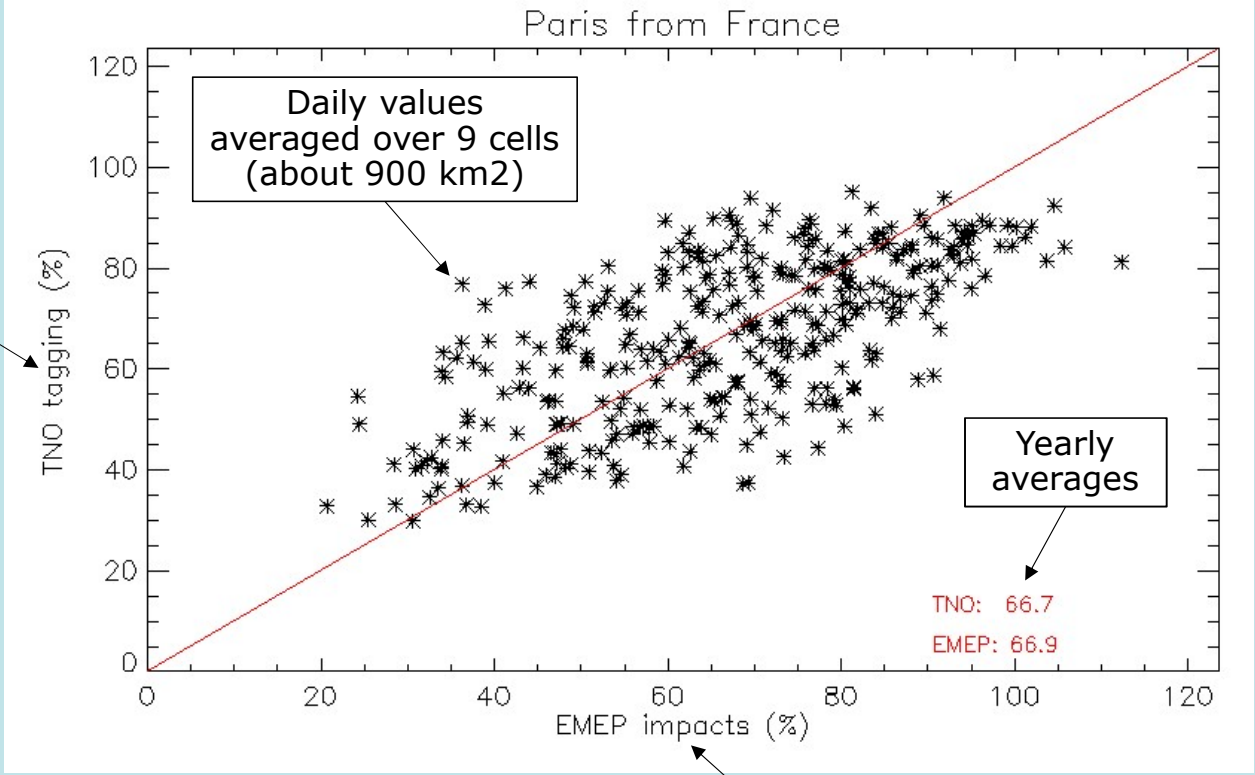
Contribution of French emissions on Paris



Impact of a reduction of French emissions over Paris

TNO tagging vs. EMEP impacts (CAMS results)

Contribution of French emissions on Paris



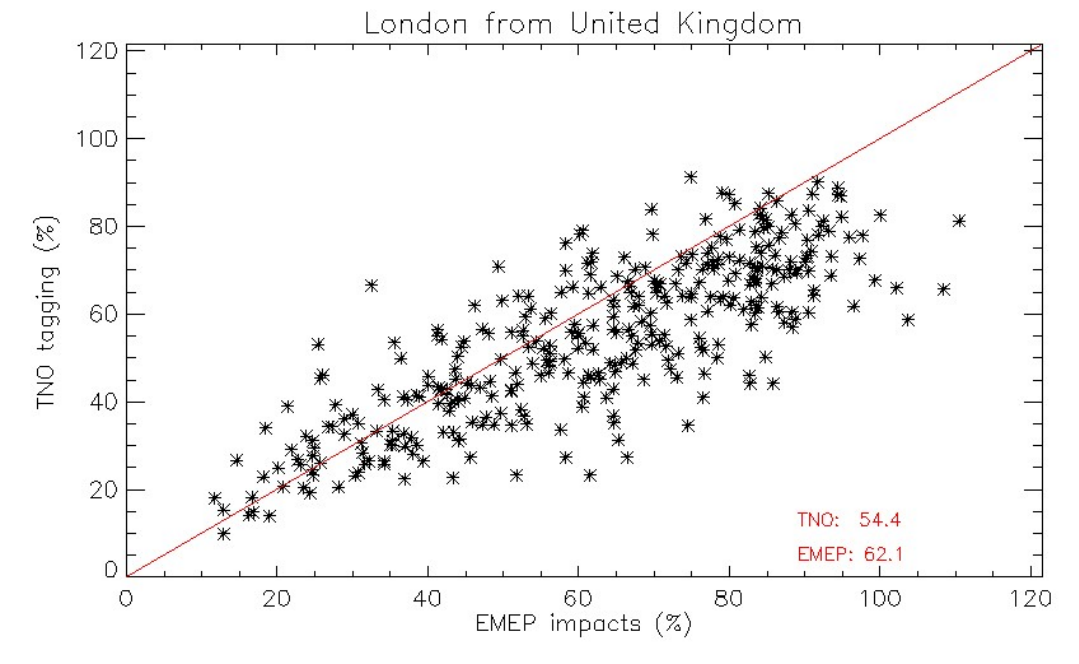
Impact of a reduction of French emissions over Paris

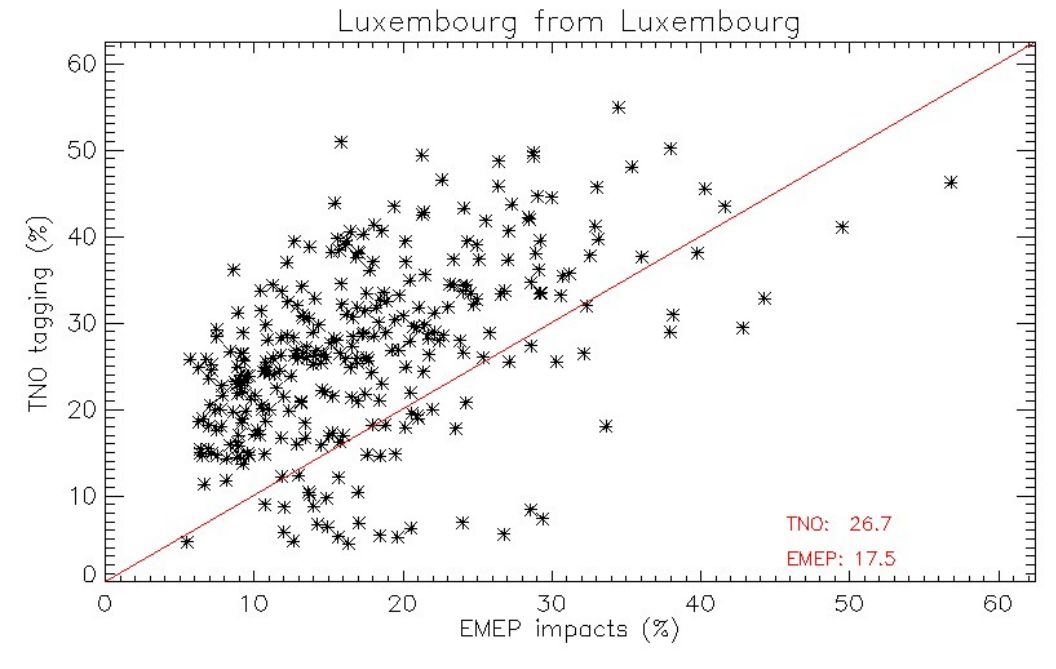
Uncertainties

or

not uncertainties?

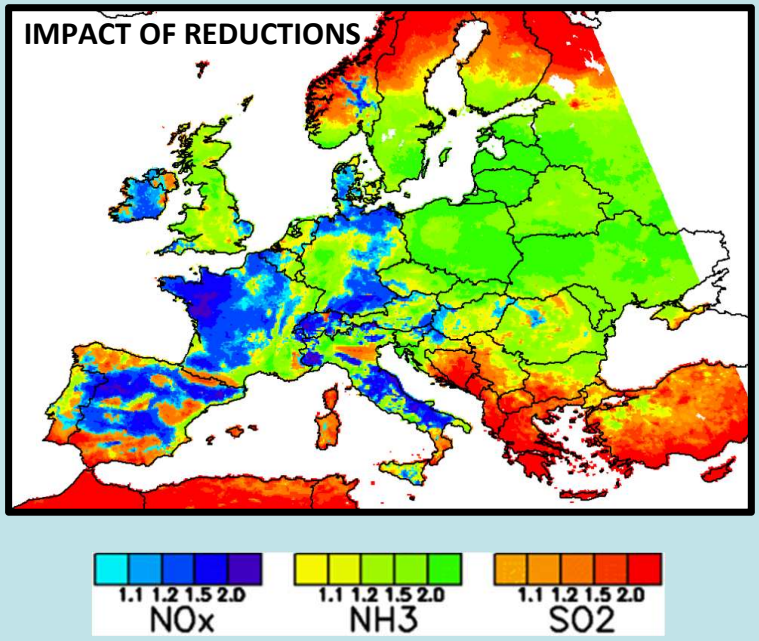
TNO tagging vs. EMEP impacts

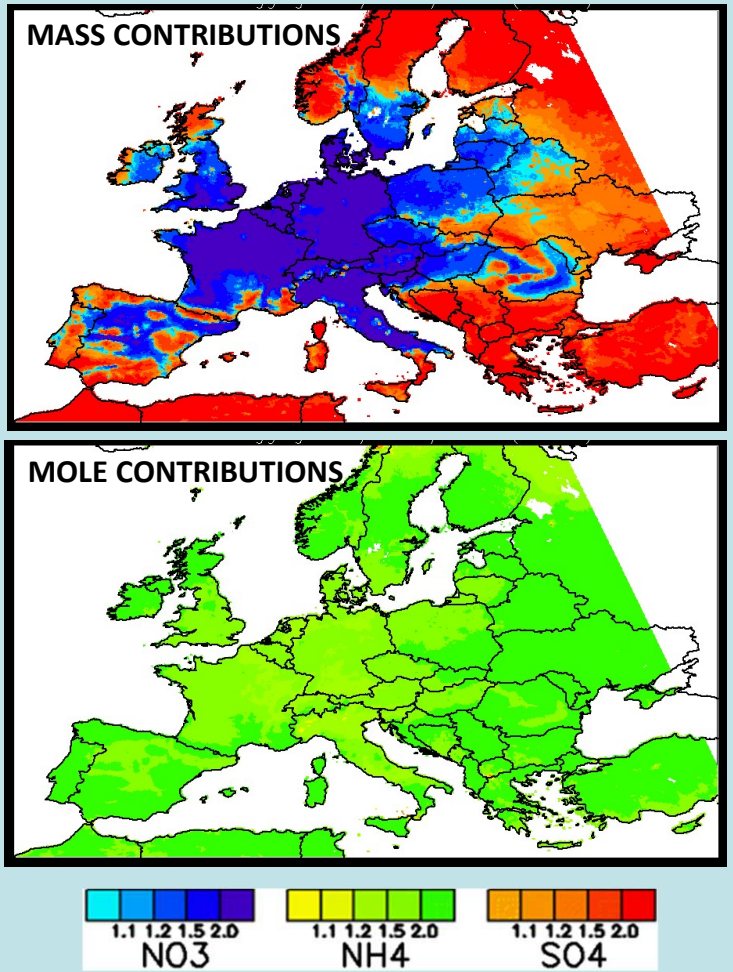




A simple case: Abatement Strategies in Europe

WINTER





$PM\ [NH_4NO_3]$

18 g
1 mole

62 g
1 mole

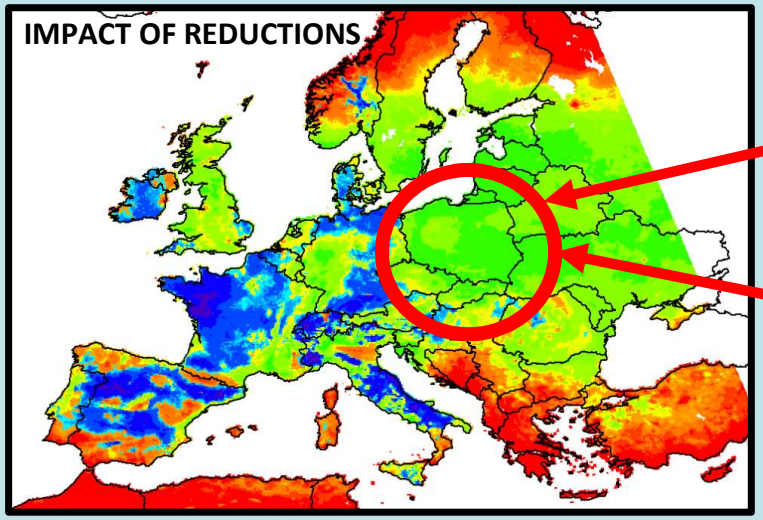
$PM\ [(NH_4)_2SO_4]$

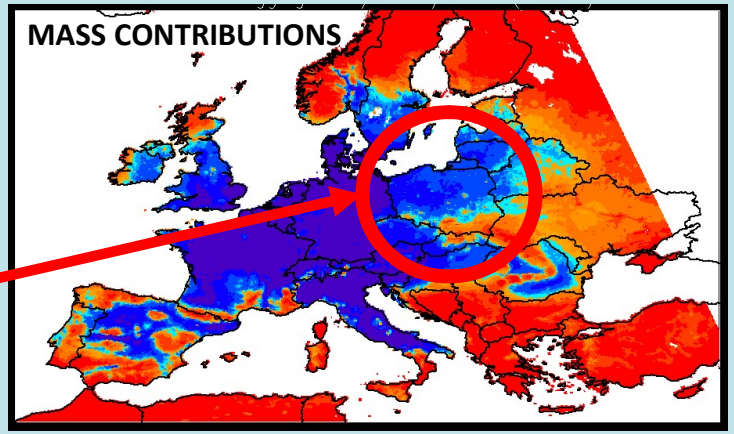
36 g
2 moles

96 g
1 mole

A simple case: Abatement Strategies in Europe

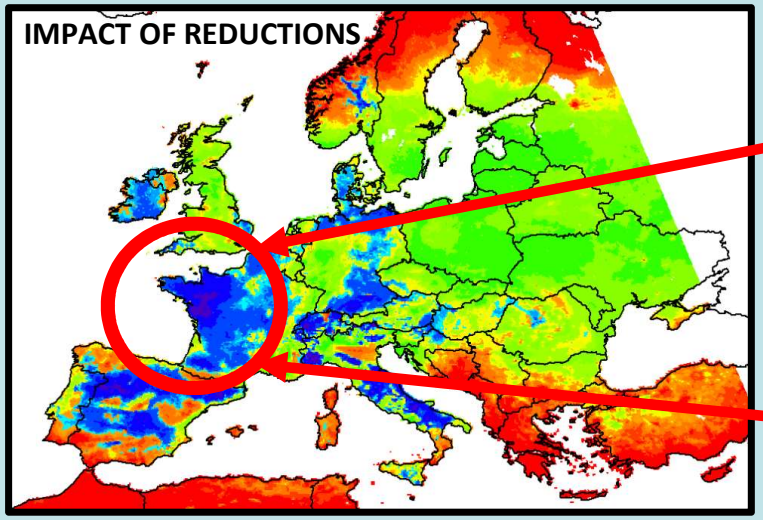
WINTER

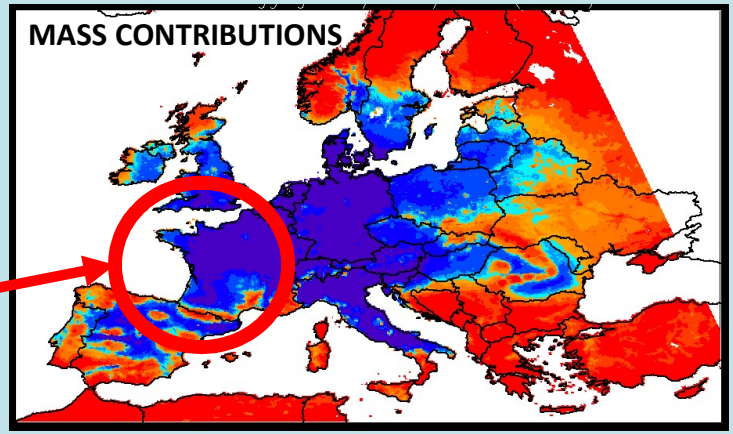


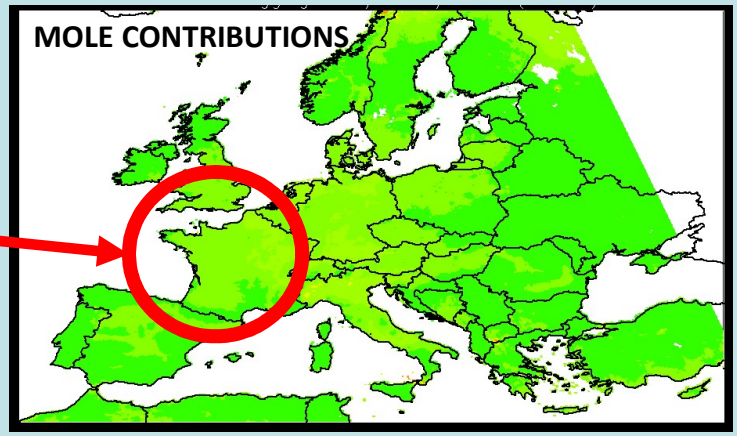


A simple case: Abatement Strategies in Europe

WINTER

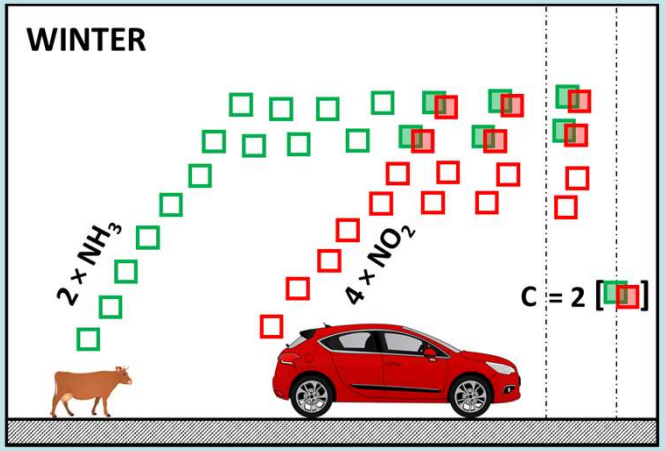


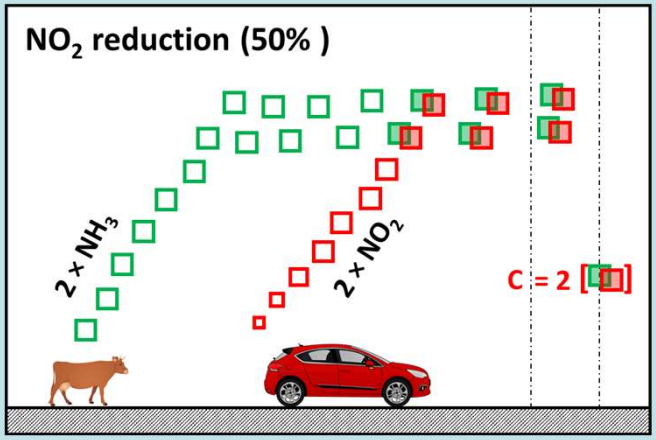




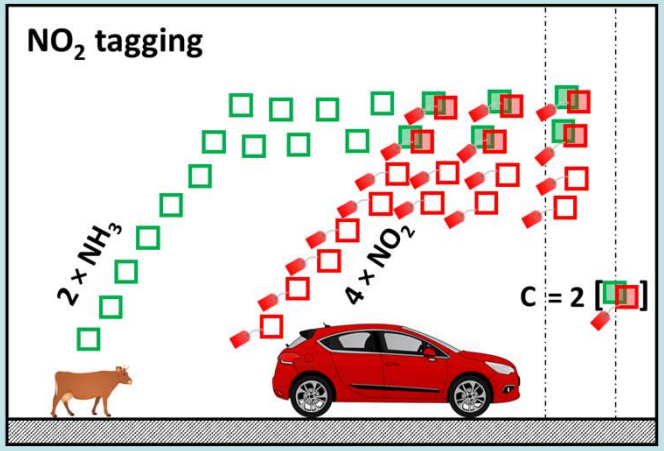
Contributions vs. Impacts

$NH_3 + NO_2 \rightarrow PM[NH_4NO_3]$





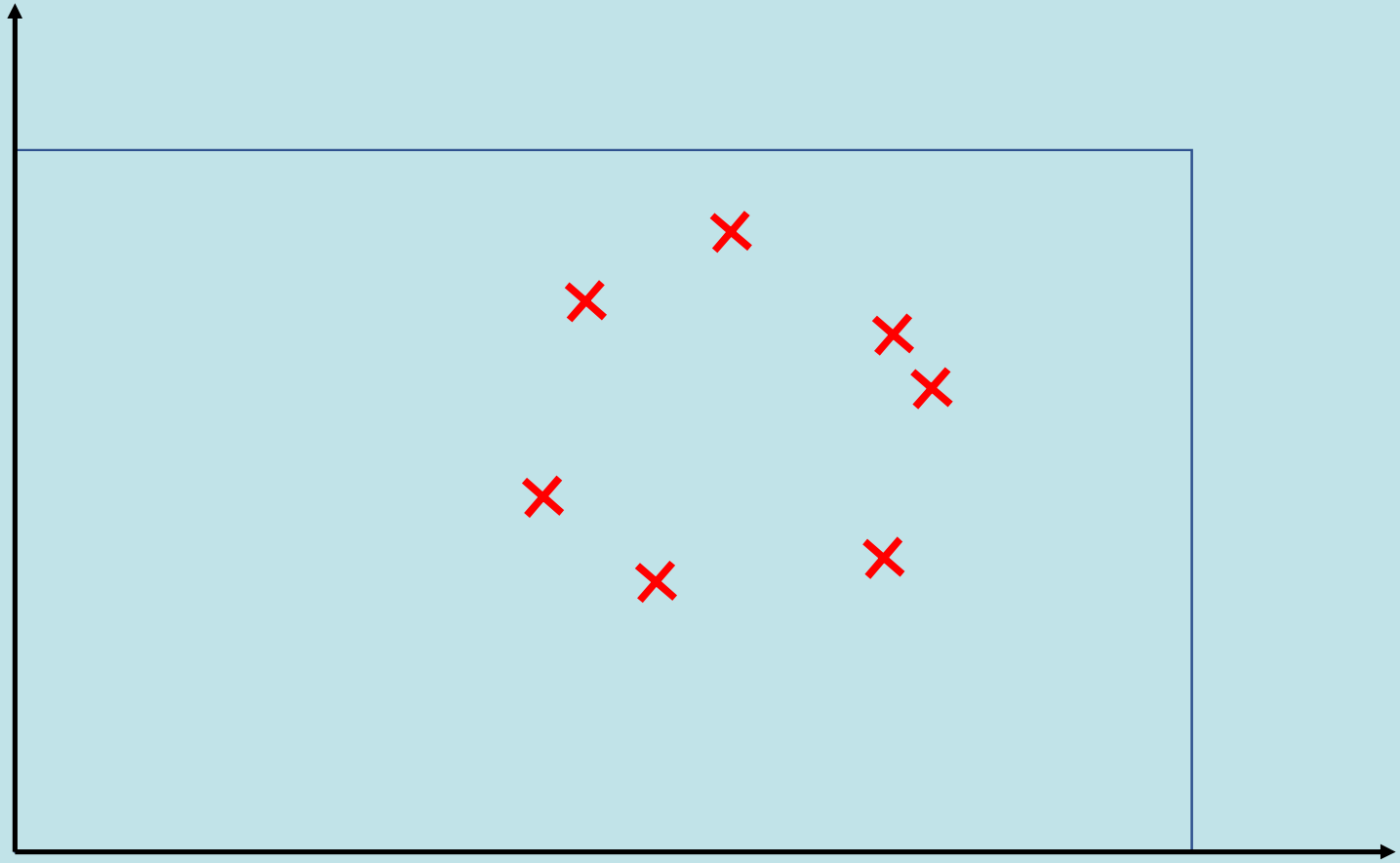
Potential impact (NO_2) = $\frac{C - C}{0.5} = \frac{0\ [\ ]}{0.5} = 0\ [\ ]$



Contribution (NO_2) = 2 [ ]

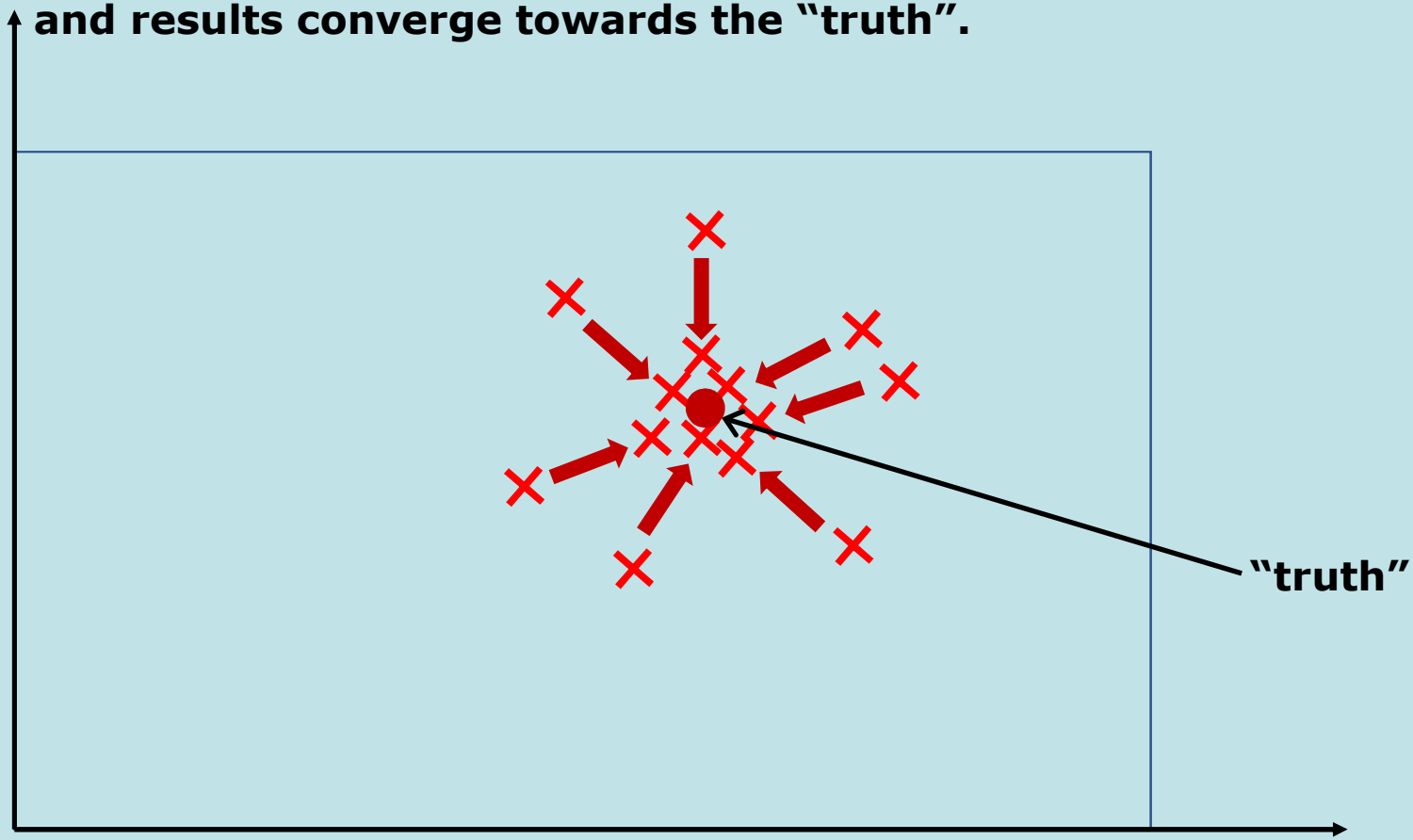
Uncertainties vs. Bias

Results obtained with different models and data sets.

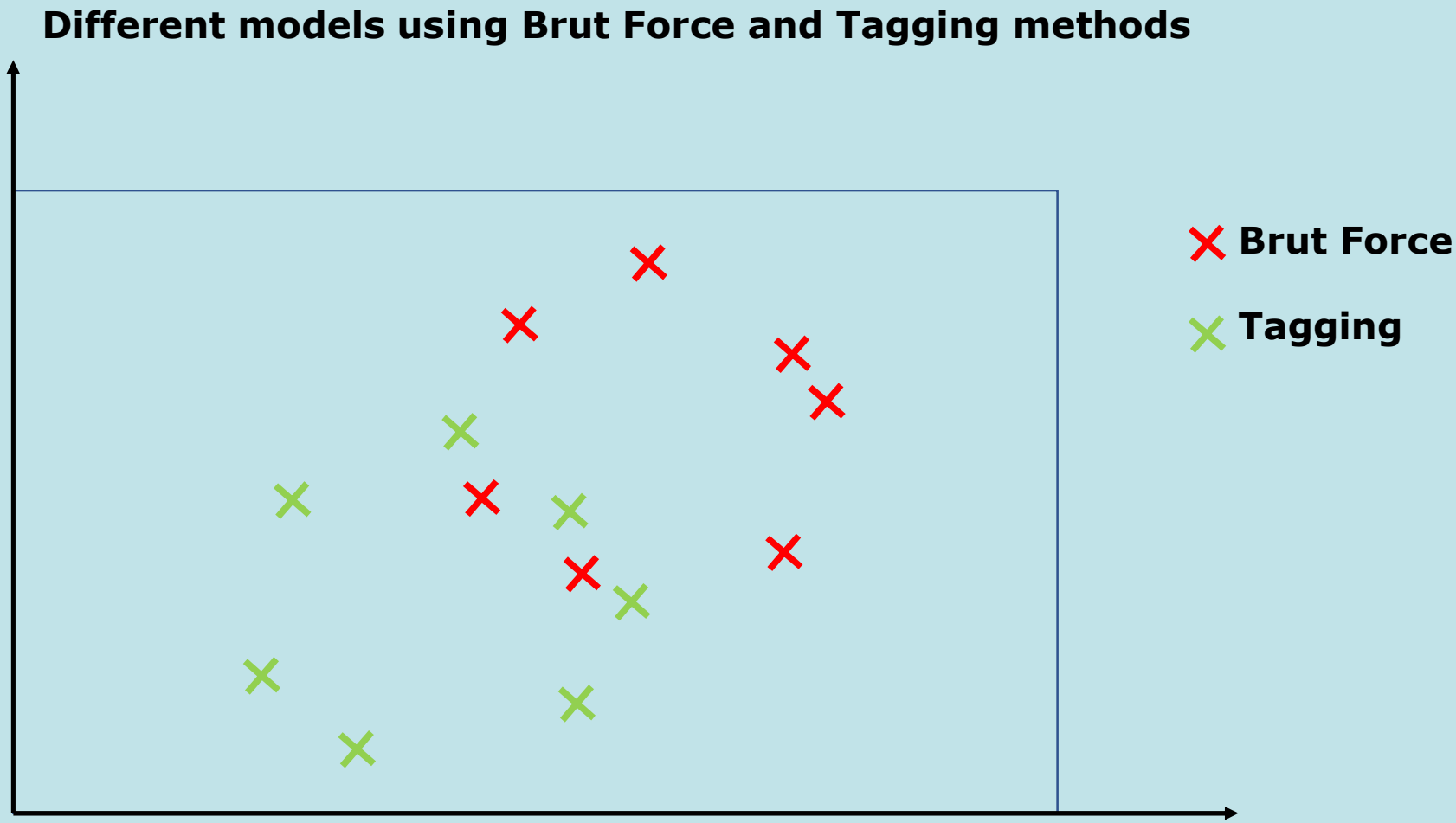


Uncertainties vs. Bias

As the accuracy of methods and models increases, the uncertainties decrease and results converge towards the "truth".



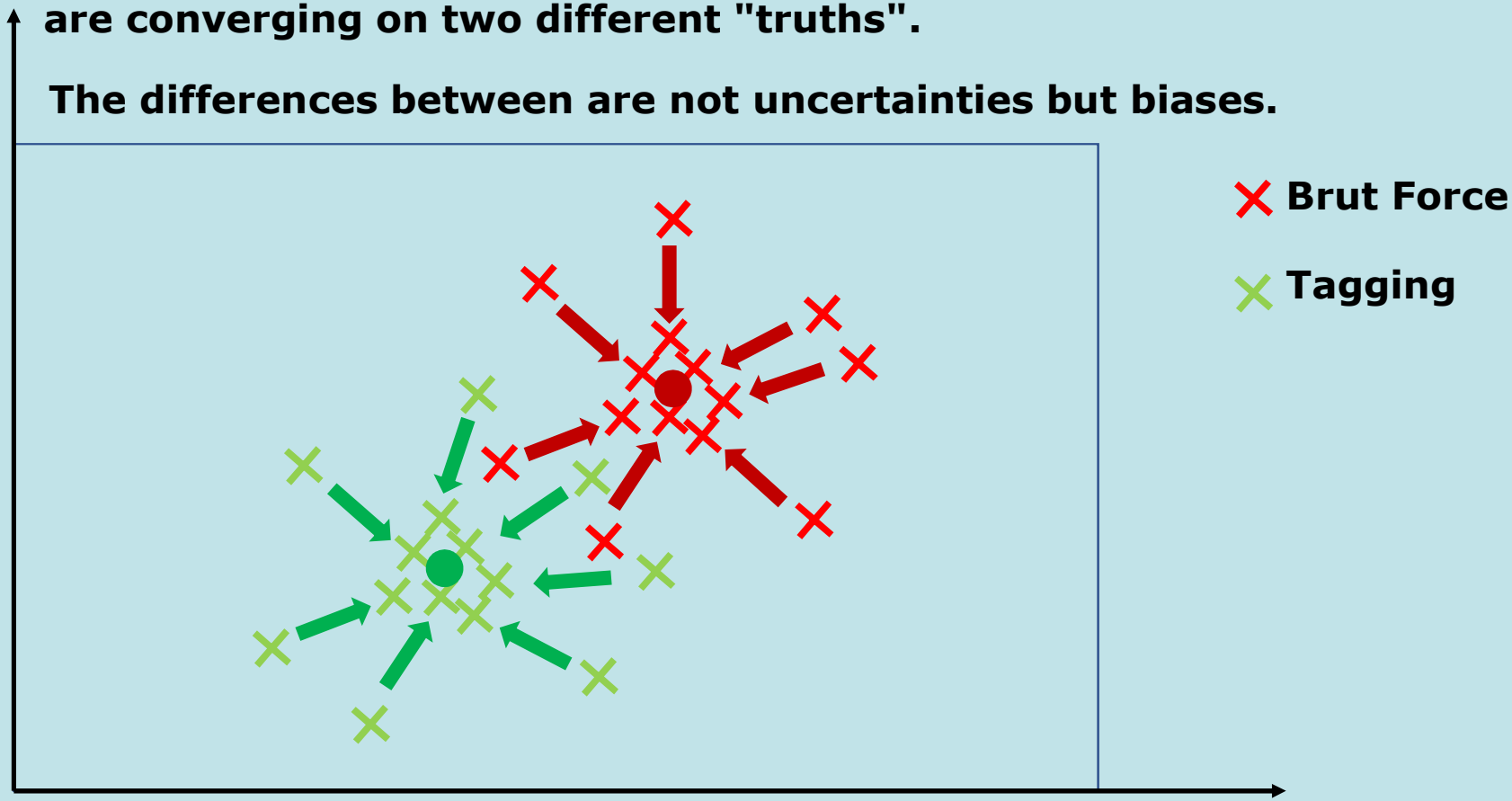
Uncertainties vs. Bias



Uncertainties vs. Bias

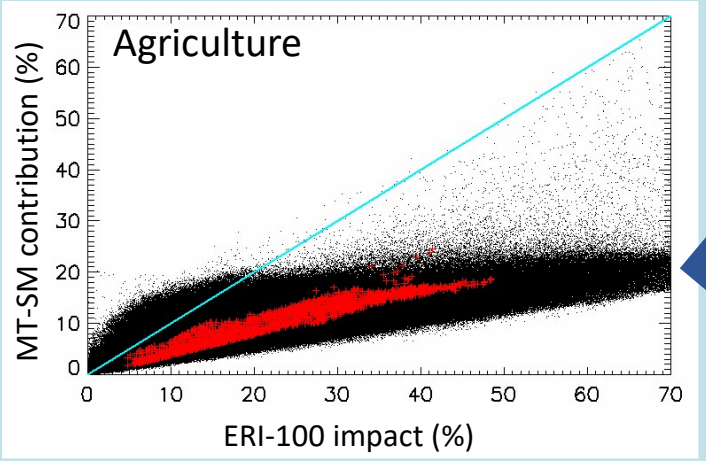
The simple examples show us that the Brut Force and Tagging methods are converging on two different "truths".

The differences between are not uncertainties but biases.



Contributions vs. Impacts

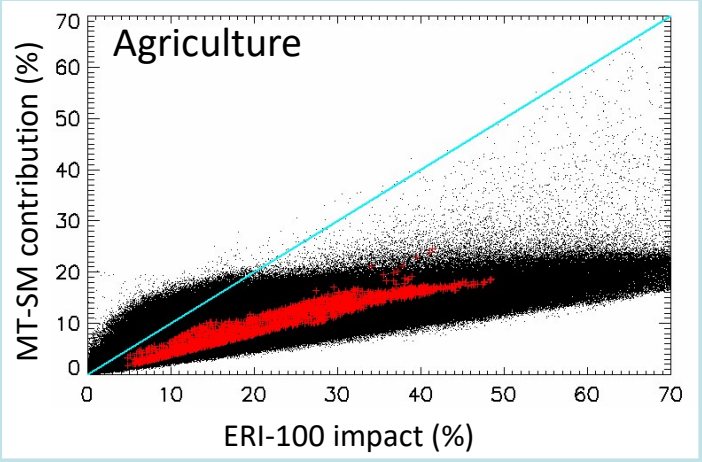
Simulation of the Po Valley with CAMx model

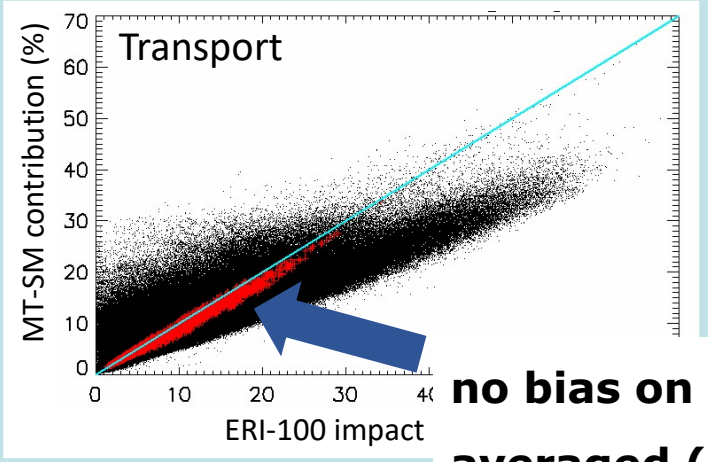


clear bias on the yearly averaged (red) as well on the daily values (black)

Contributions vs. Impacts

Simulation of the Po Valley with CAMx model

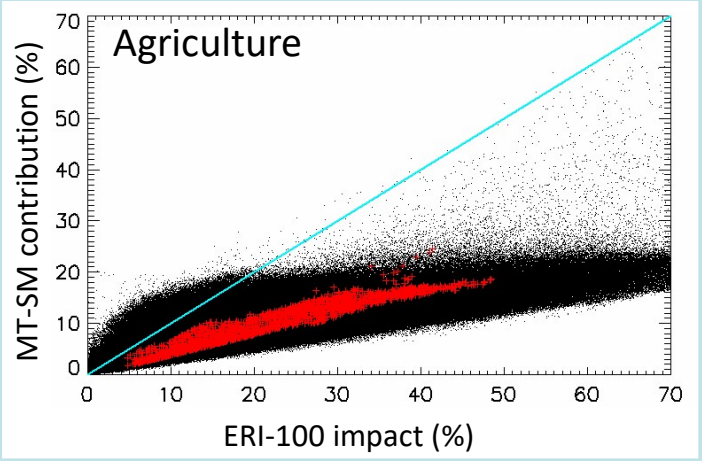


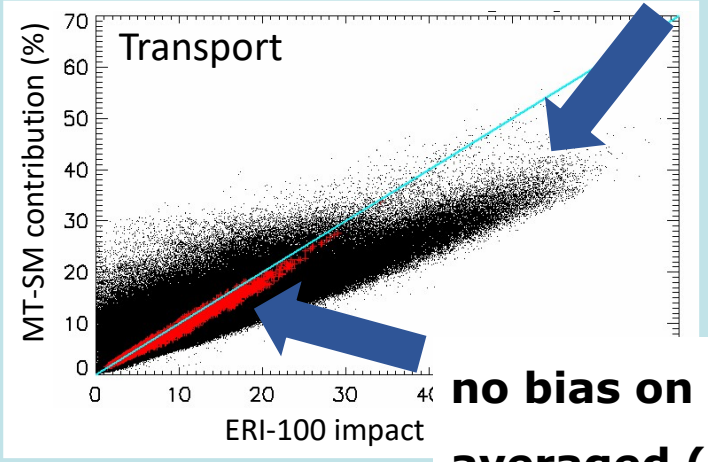


no bias on the yearly averaged (red)

Contributions vs. Impacts

Simulation of the Po Valley with CAMx model





Bias on the daily values (black)

no bias on the yearly averaged (red)

Conclusions

- **Differences between Brut Force and Tagging are not uncertainties but biases.**
- **Averages can be misleading**
- **Complex situations with a lot of different sources mixing primary and secondary PM can also be also be misleading to design air quality plans (except for primaries alone…)**

then, how the tagging can be used is not clear yet ?

Current CT1 work items

- **Source apportionment for NO_2,**
- **Preparation of a guide for receptor models (CMB, PMF),**
- **Evaluate the possible complementarities between the Brute Force (impacts) and Tagging (contributions) methods.**

Thank-you