Institute for Internal Combustion Engines and Thermodynamics - Section Traffic and Environment

TU Graz
Graz University of Technology



Developing a new high resolution emission data base (SLO/A) & WRF-Chem application

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PMinter

Das Land Steiermark

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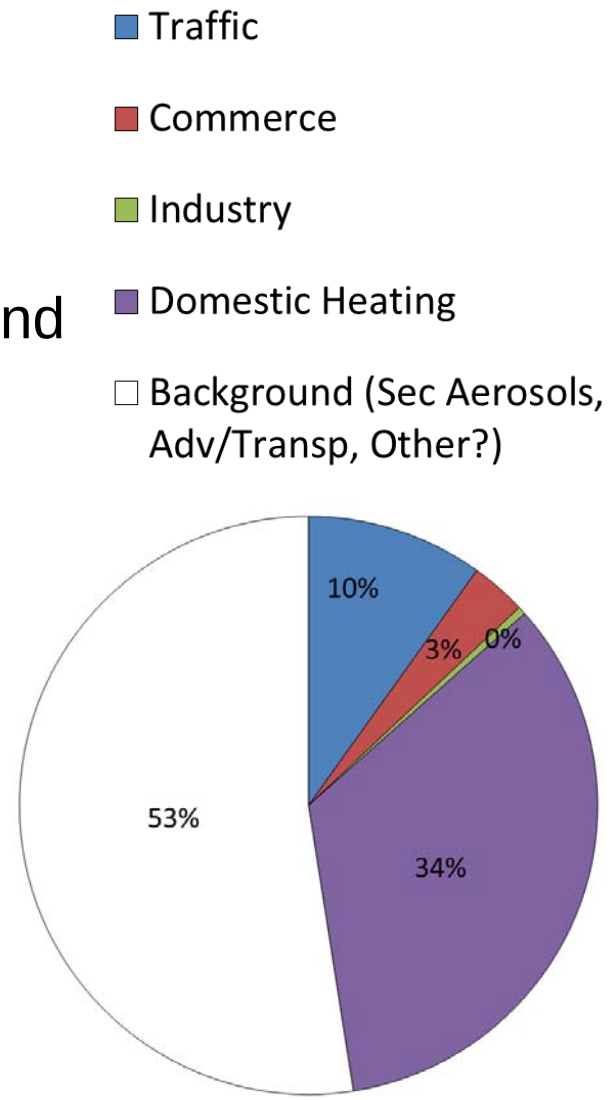
SI AT
EUROPEAN TERRITORIAL COOPERATION

Motivation

- The Project PMinter
  - Developing a high resolution emission database
  - Better specification of so called background and domestic heating
  - Bring together micro scale and regional scale



Emission Data Processing

- Aggregating data from different sources

  - Emission data for Styria, Carinthia, Slovenia
    - Industry, Commerce, Agriculture
    - from governments (resolution ~10 m – 1 km)
  - Road transport emissions
    - modelled with Network Emission Model (NEMO) by TUG
  - Domestic Heating
    - deducted from buildings information, intersected with emission factors, done by TUG
  - MACC emission dataset
    - from TNO for whole Europe (resolution: ~7km)

- PMinter dataset not complete for regional scale → filling missing data with MACC-data

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Emission Data Processing

- Different Coordinate Systems
- Different Resolutions
- Different Formats
- Different Emission Classifications
  - SNAP vs. “customized/model specific”

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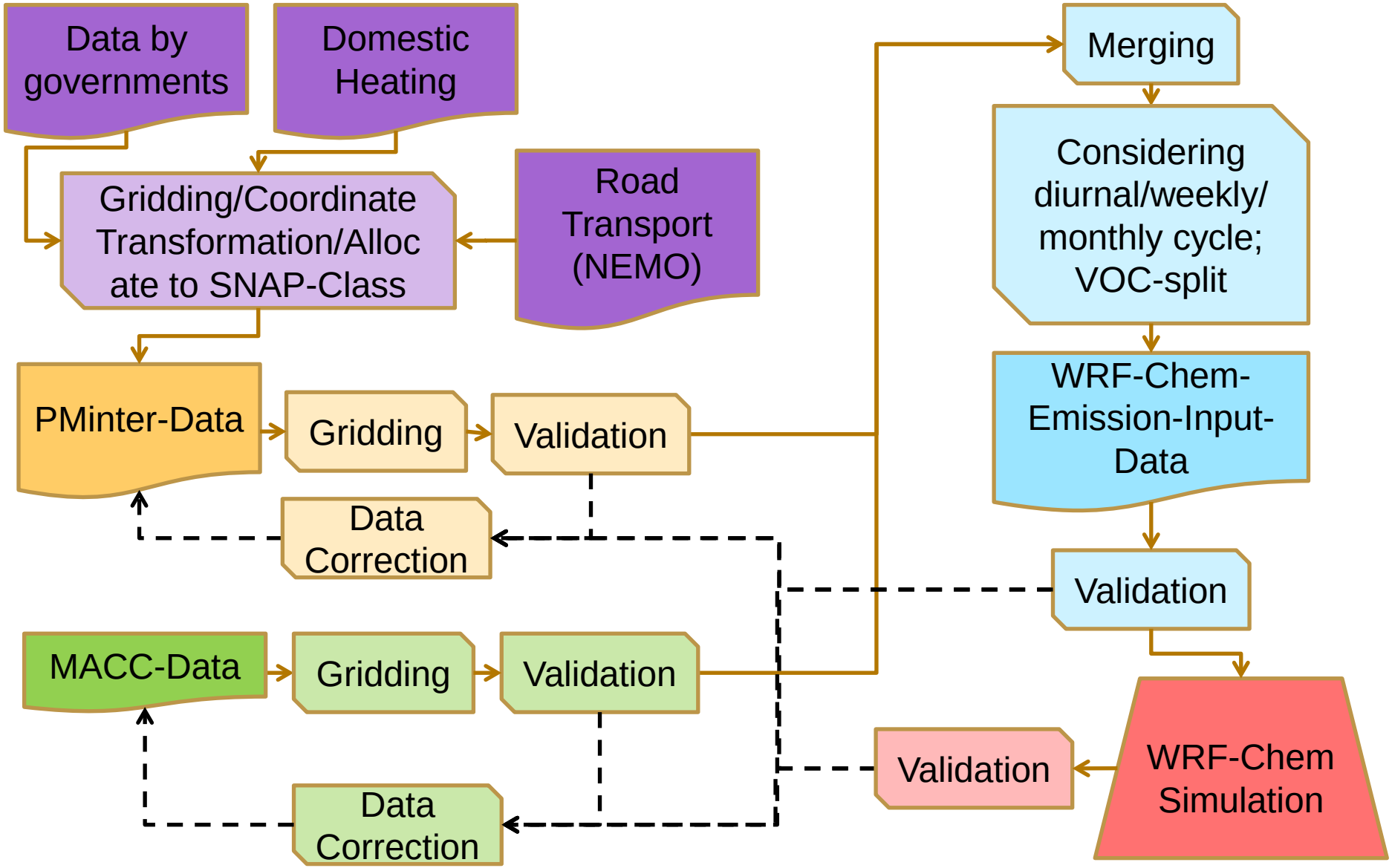
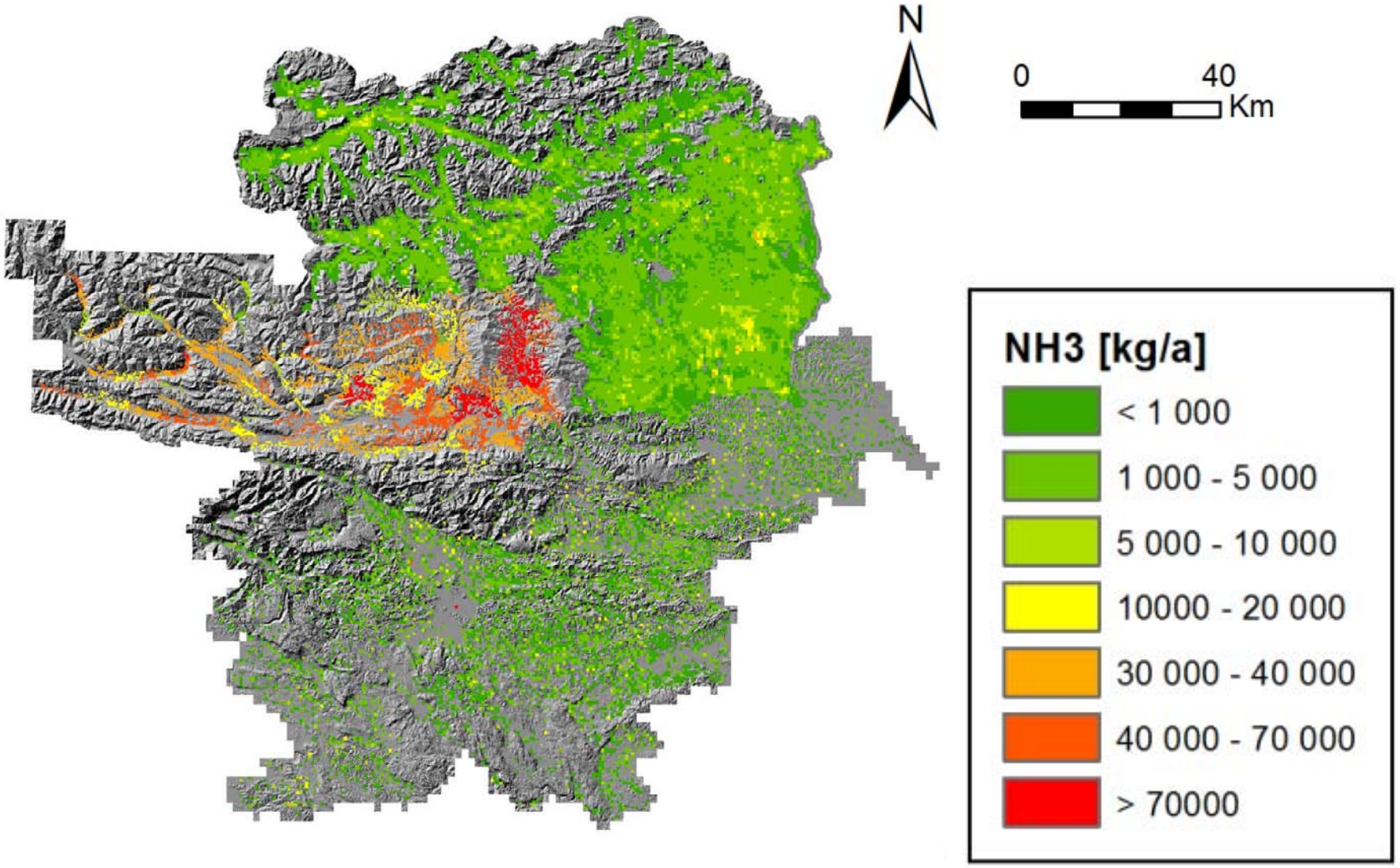
Emission Data Processing



Raw NH_3 PMinter Emission Data



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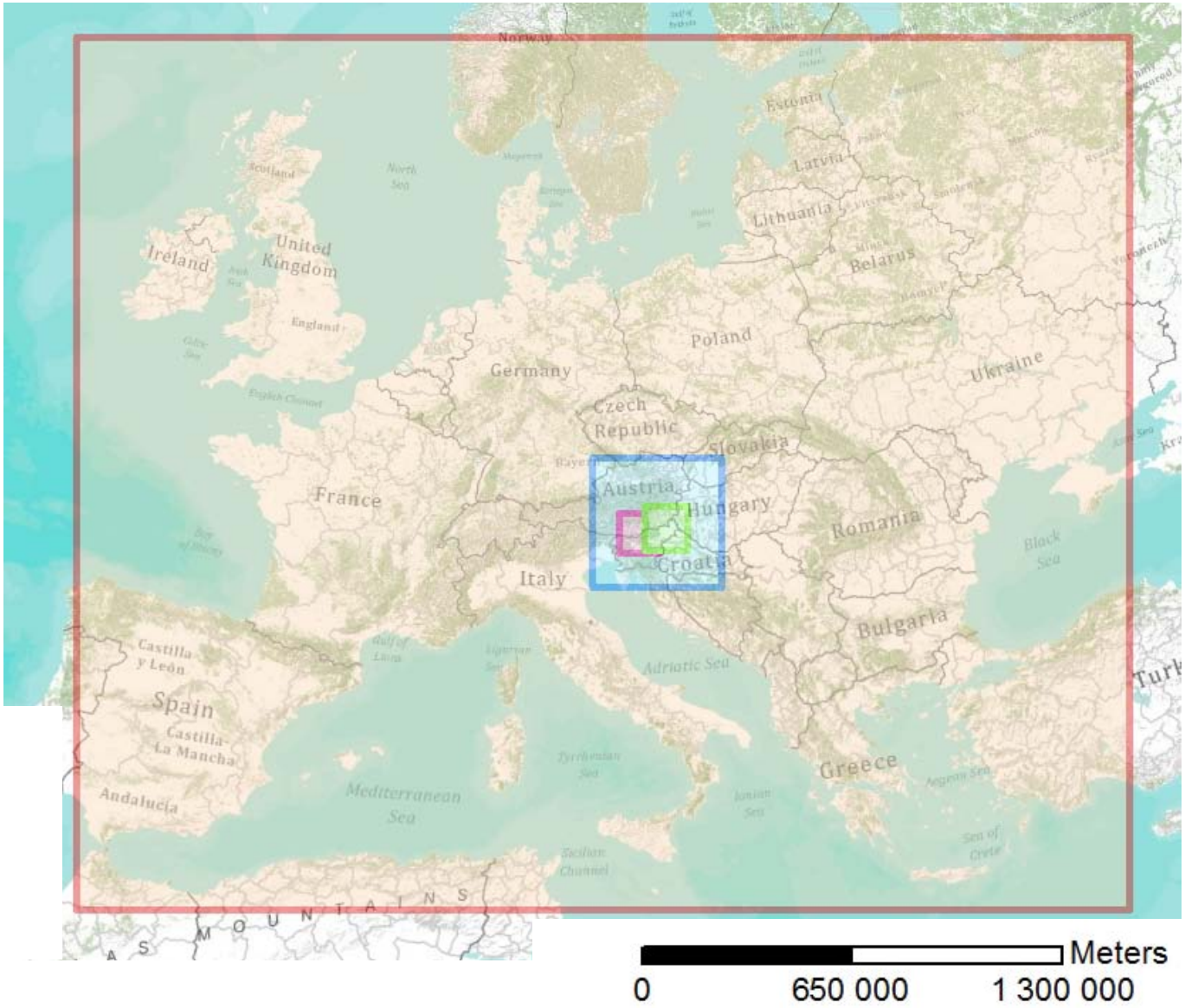
WRF-Chem Domains

- 4 Domains
  - D01: 25 km
  - D02: 5 km
  - D03: 1 km
  - D04: 1 km



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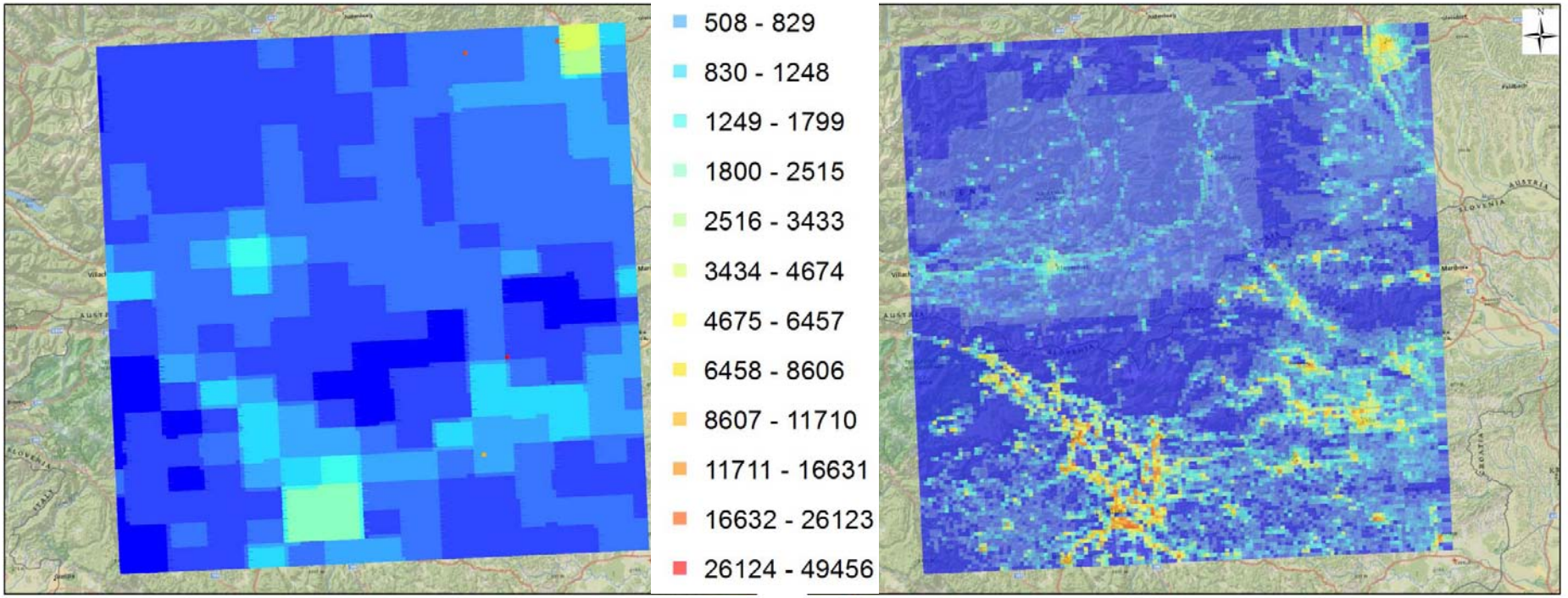
Comparison of Processed Emission Data from different Data Sources

Domain03 - Klagenfurt
Horizontal resolution: 1 km



MACC input resolution: ~7 km

PMinter input resolution: 1 km

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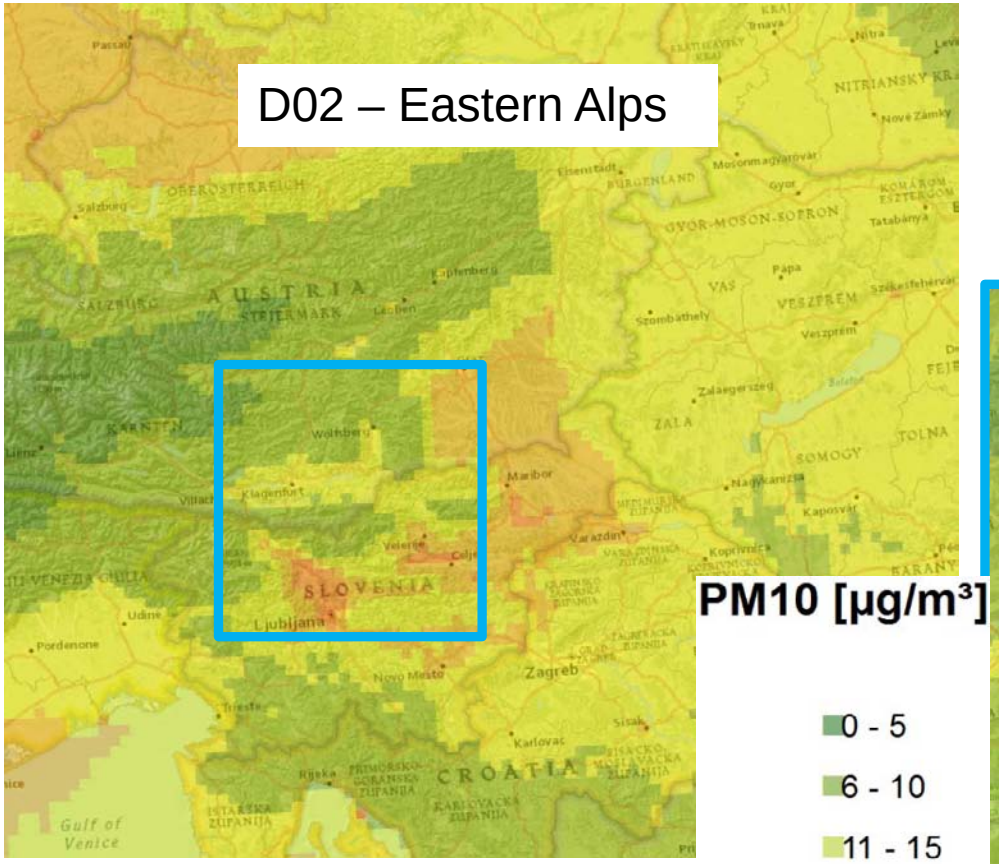
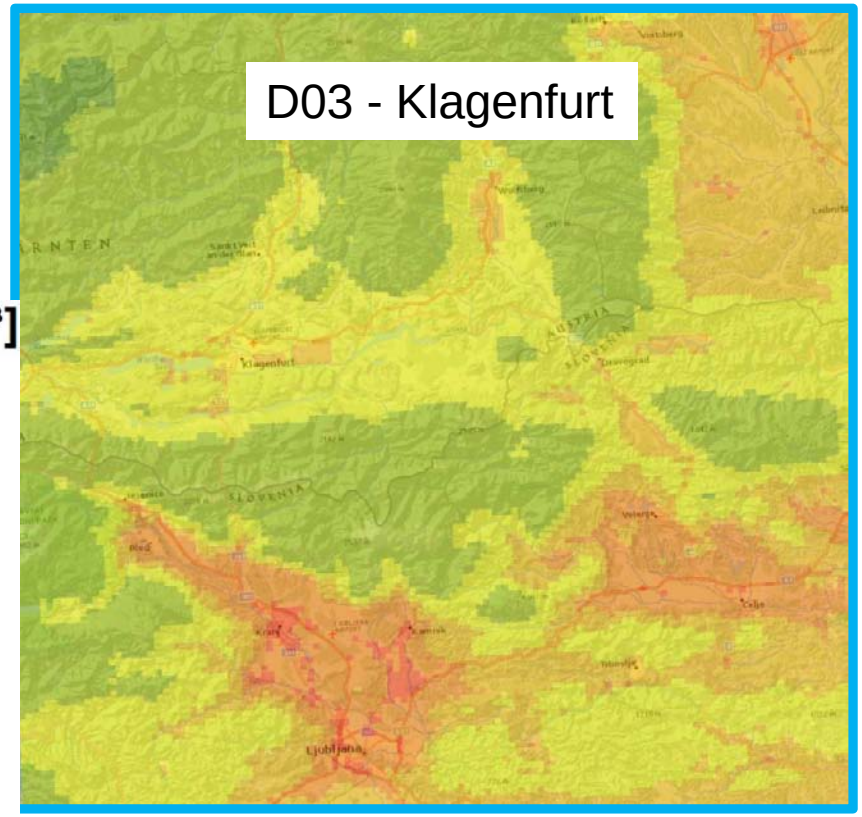
WRF-Chem Results



PM_{10} Mean Values
for January 2010 [µg/m³]
Horizontal resolution D02: 5 km
Horizontal resolution D03: 1 km



PM10 [µg/m³]

- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 35
- 36 - 60

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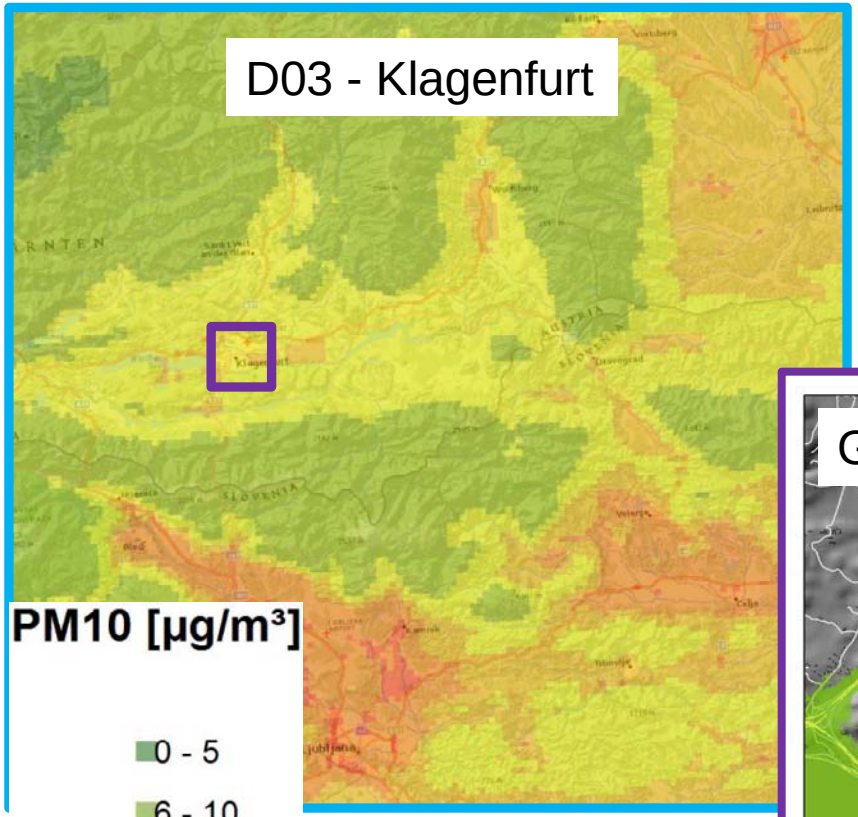
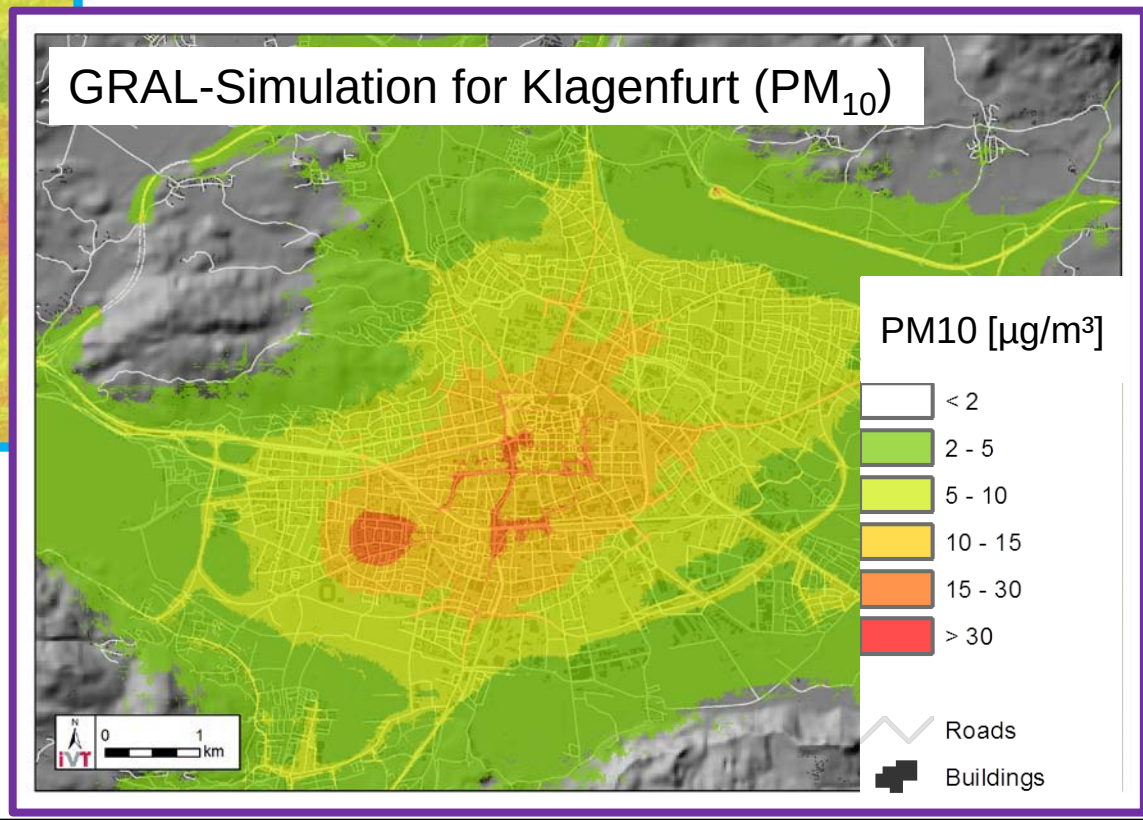
WRF-Chem – GRAL Results

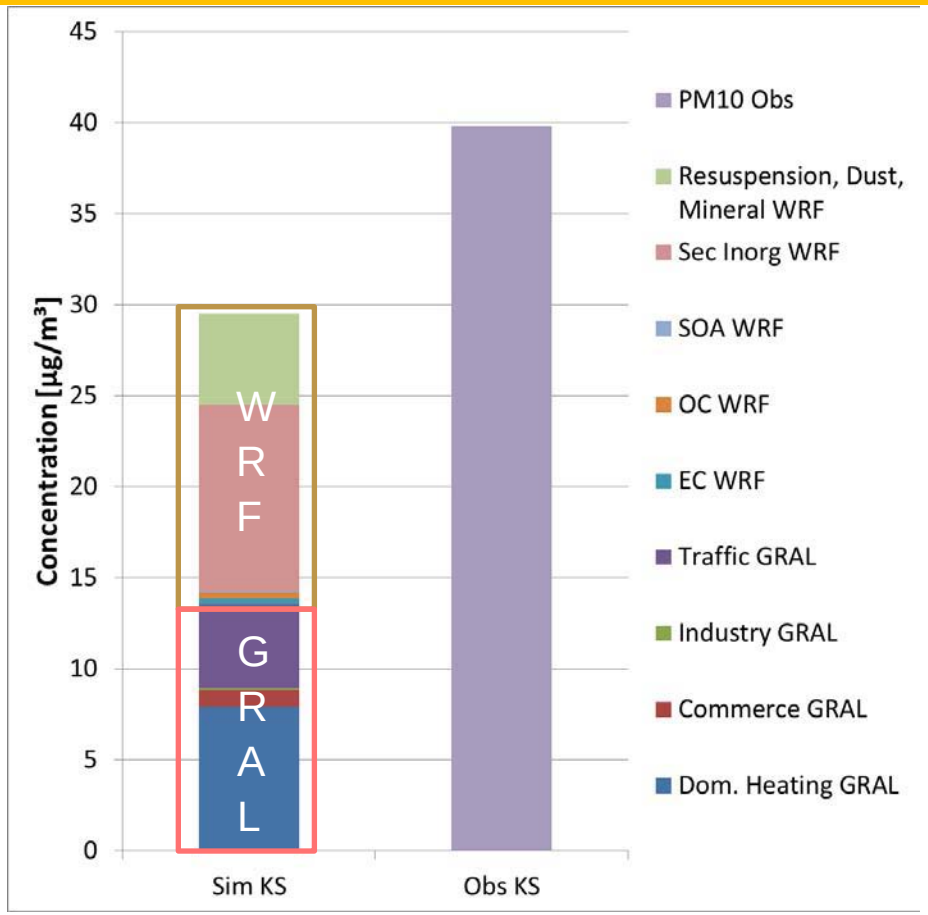


PM_{10} Mean Values
for January 2010 [µg/m³]
Horizontal resolution D03: 1 km
Horizontal resolution GRAL: 10 m



WRF-GRAL Results - PM_{10} [µg/m³] – K

PM_{10} Mean Values for Simulation Period (Jan 2010)



PM_{10} [µg/m³]	GRAL-WRF	Observation	Sim-Obs
Koschatstraße	30	40	***-10***
Völkermarkterstraße	39	49	***-10***

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Summary/Conclusion

- Difficult to bring together datasets from different sources
- PMinter emission dataset incomplete - relevant sources processed
- PMinter emission dataset (1 km) shows realistic distribution of main sources (typically concentrated in small valleys)
- First simulations showing promising results, tendency underestimation PM; model setup needs modifications

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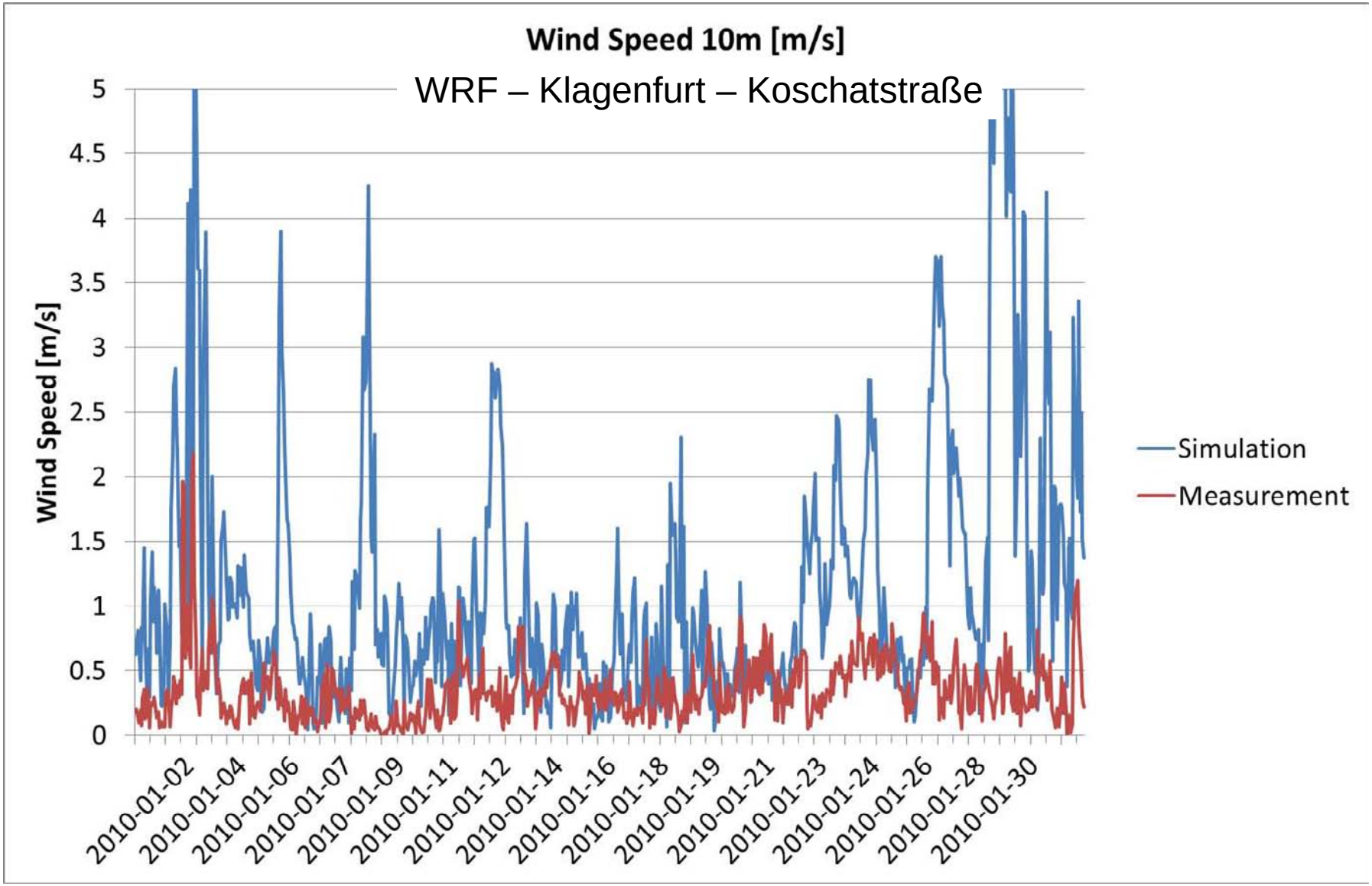
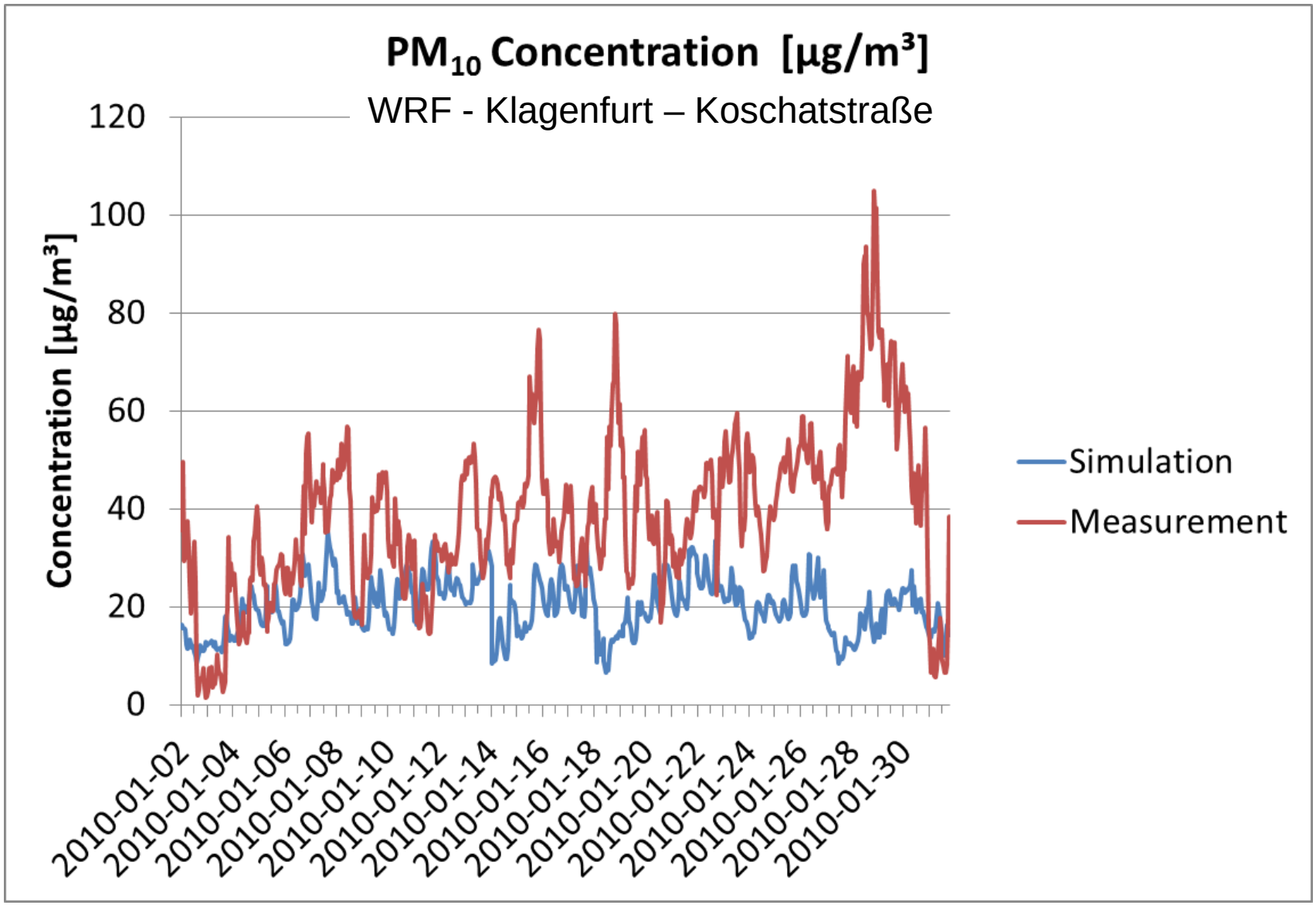
WRF-Discussion



WRF-Discussion



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Thank you for your attention!
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