Two models and two emission databases – evaluation of the PM10 and PM2.5 concentrations modelled with WRF-Chem and EMEP4PL

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Aims

Validation of PM10 and PM2.5 concentrations for Poland for:

- two different chemical transport models:
  - WRF-Chem
  - EMEP4PL

- two different emission databases:
  - a regional EMEP database,
  - a national database provided by the Chief Inspectorate of Environmental Pollution in Poland

Data and methods

- Chemical transport models:
  - WRF-Chem v. 3.9.1, chemical mechanisms: RADM2 + GOCART
  - EMEP4PL v. 4.17, chemical mechanisms: EmChem09
  - Two one-way nested domains: Europe at a 12 km×12 km grid and Poland at a 4 km×4 km

- Emissions: EMEP database for Europe, national database for Poland (GIOS)

- Verification by comparison with observations
  - 1 hourly concentrations
  - 46 stations for PM2.5
  - 123 stations for PM10
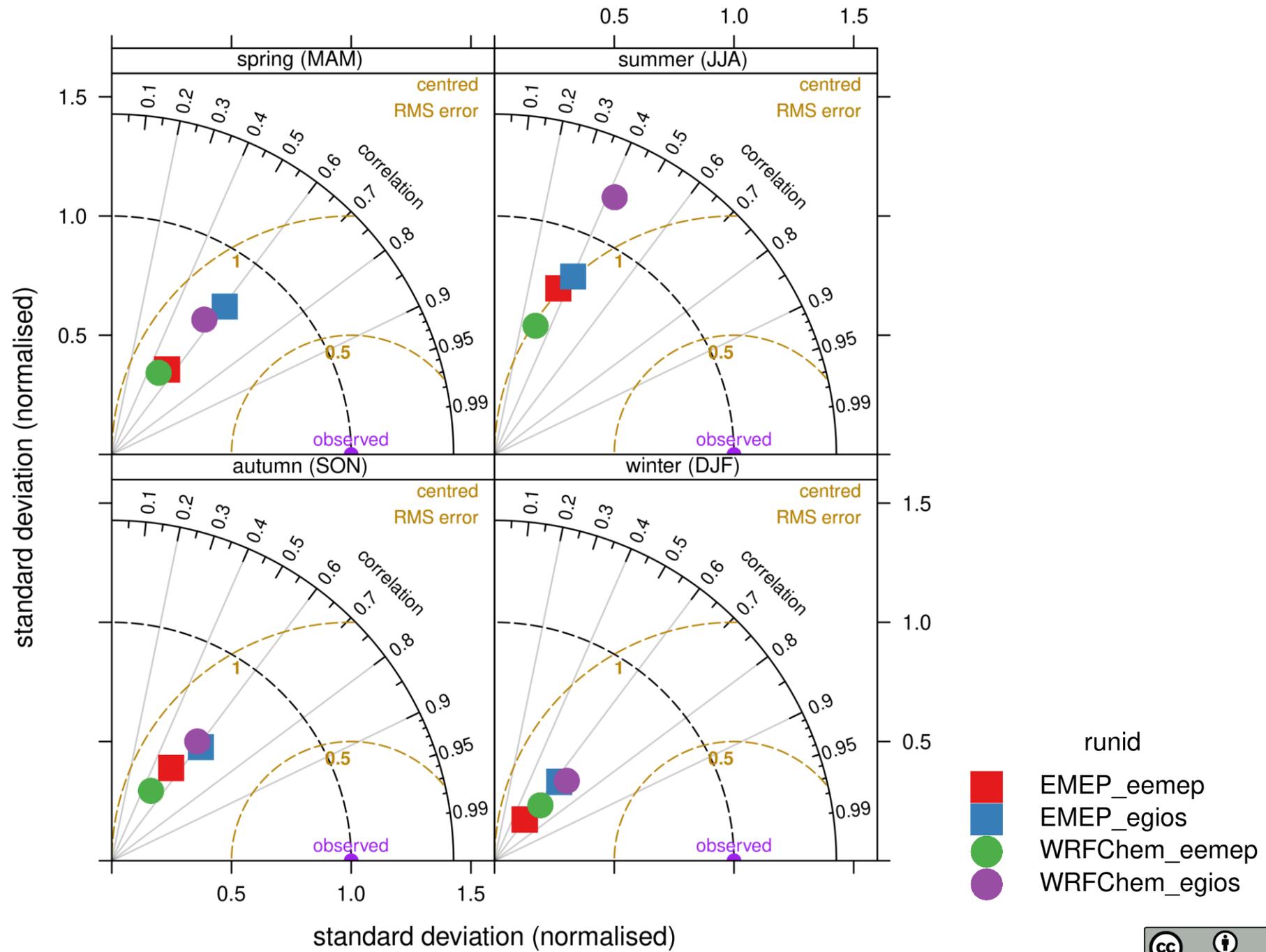
Data and methods

Simulations run for the entire year 2017 with both models and both emission data bases:

- **EMEP_eemep** – model EMEP4PL, EMEP emission
- **EMEP_egios** – model EMEP4PL, GIOS emission
- **WRFChem_eemp** – model WRF-Chem, EMEP emission
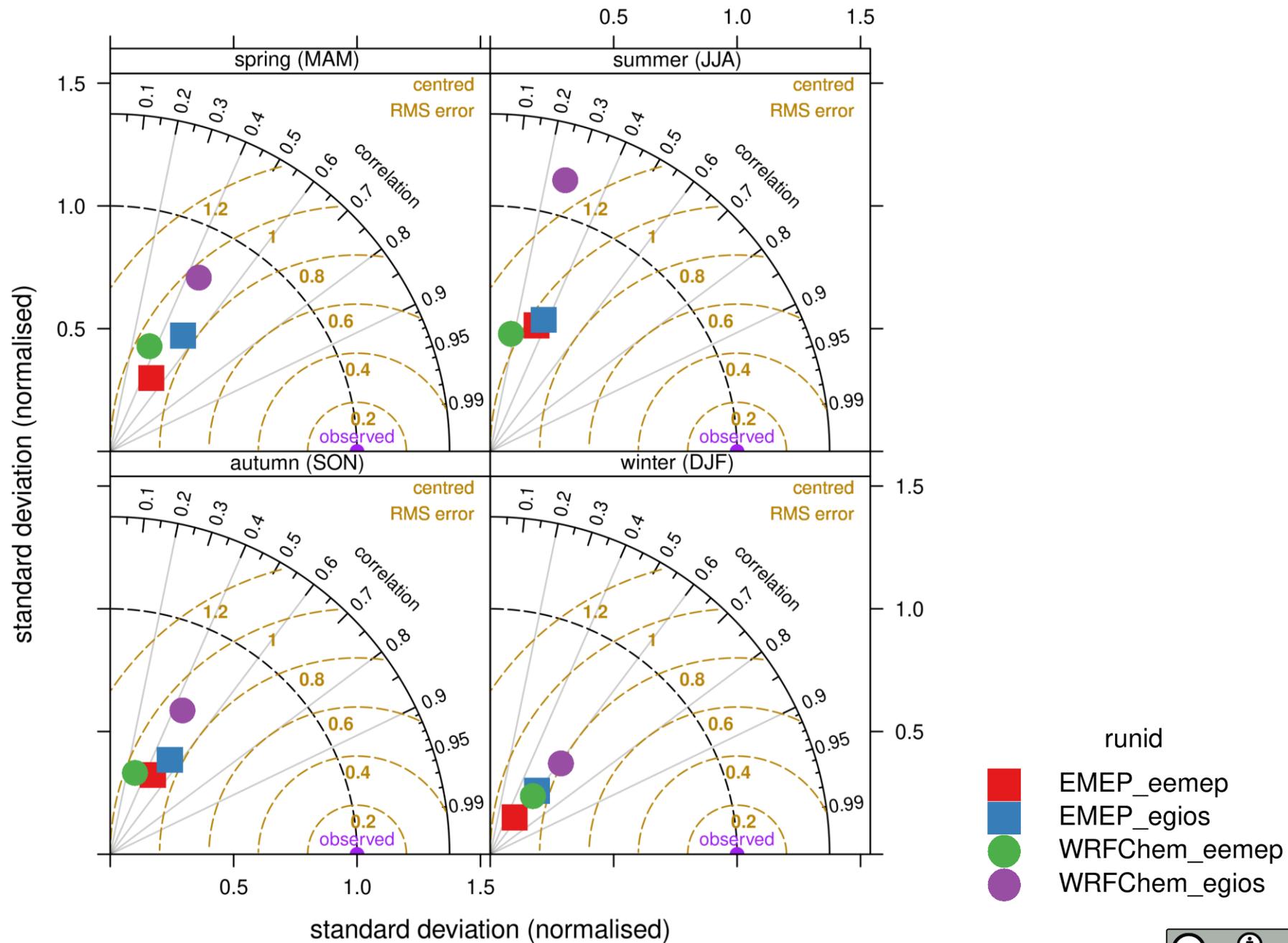- **WRFChem_egios** – model WRF-Chem, GIOS emission

Model performance for the entire year
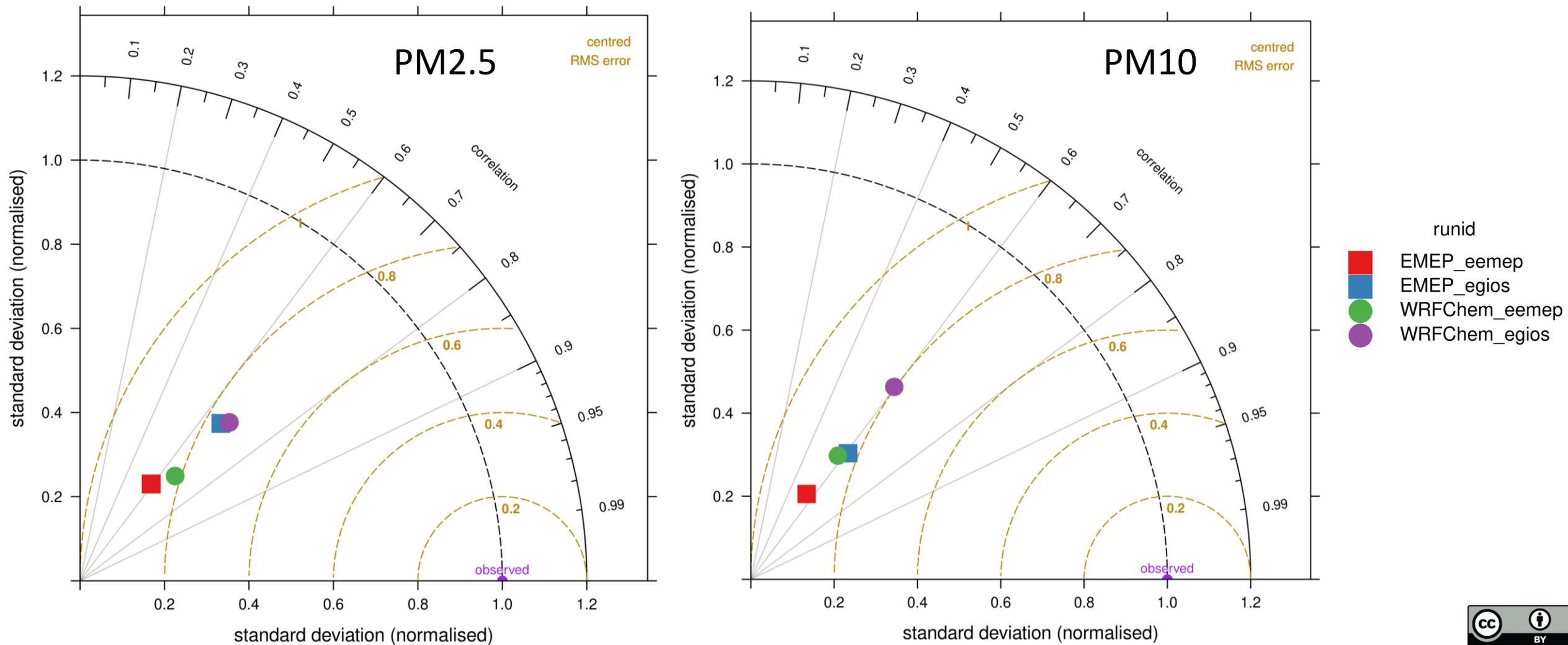
PM2.5 - model performance according to seasons

PM10 - model performance according to seasons

Summary

- EMEP4PL and WRF-Chem with two emission databases (EMEP and GIOS national) were run for the year 2017 and validated against PM2.5 and PM10 observations.

- For both models and both pollution better correlations are for the winter period than for summer.

- A significant positive impact on modelled results after including national emissions for both models and for PM10 and PM2.5

- Change of emission has bigger impact on the EMEP4PL simulations than on WRF-Chem.

Acknowledgement