

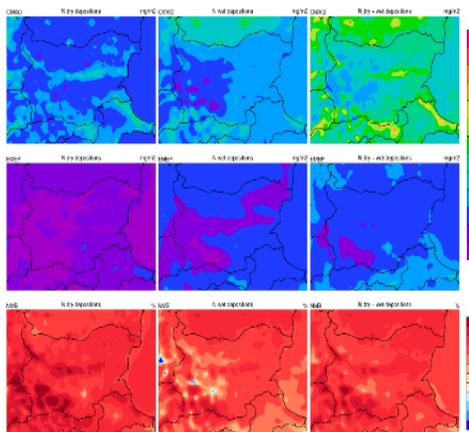
MODELLING OF DRY AND WET DEPOSITION PROCESSES FOR THE SULPHUR AND NITROGEN COMPOUNDS OVER BULGARIA

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The objective of that research is to study the differences in the high-resolution simulations with the CMAQ and the EMEP-MSC-W models of the Nitrogen (N) and Sulphur (S) dry and wet deposition processes for the territory of Bulgaria over the period 2008 - 2014.

METHODS

- Chemical-transport model – CMAQ
 - Horizontal resolution - 9 km
 - Emission Inventory - TNO emission database
 - Emission preprocessor – SMOKE
 - Input Meteorological data – NCEP Global Analysis Data, WRF ARW
 - Meteorology-Chemistry interface processor – MCIP3
- Chemical-transport model - EMEP-MSC-W
 - Horizontal resolution 0.1° x 0.1°
 - Emission inventory – different sources
 - Input Meteorological data - ECMWF-IFS Cycle36r1



Average daily dry CMAQ (first column, first row) and EMEP-MSC-W (first column, second row) Nitrogen winter depositions. Average daily wet CMAQ (second column, first row) and EMEP-MSC-W (second column, second row) Nitrogen winter depositions. Average daily total CMAQ (third column, first row) and EMEP-MSC-W (third column, second row) Nitrogen winter depositions. Normalized mean bias (third row) of the dry (first column), wet (second column) and total (third column) depositions.

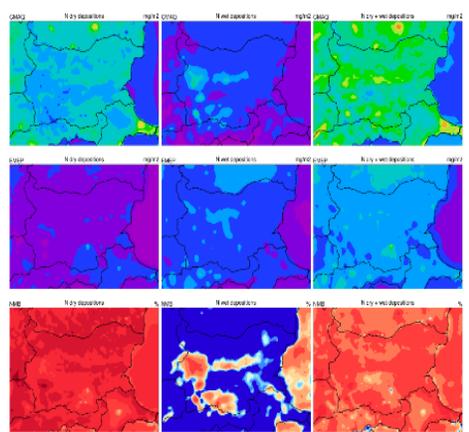


Fig. 2. Average daily dry CMAQ (first column, first row) and EMEP-MSC-W (first column, second row) Nitrogen summer depositions. Average daily wet CMAQ (second column, first row) and EMEP-MSC-W (second column, second row) Nitrogen summer depositions. Average daily total CMAQ (third column, first row) and EMEP-MSC-W (third column, second row) Nitrogen summer depositions. Normalized mean bias (third row) of the dry (first column), wet (second column) and total (third column) depositions.

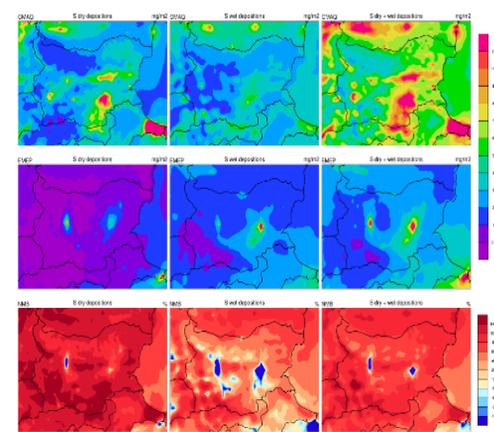


Fig. 3. Average daily dry CMAQ (first column, first row) and EMEP-MSC-W (first column, second row) Sulphur winter depositions. Average daily wet CMAQ (second column, first row) and EMEP-MSC-W (second column, second row) Sulphur winter depositions. Average daily total CMAQ (third column, first row) and EMEP-MSC-W (third column, second row) Sulphur winter depositions. Normalized mean bias (third row) of the dry (first column), wet (second column) and total (third column) depositions.

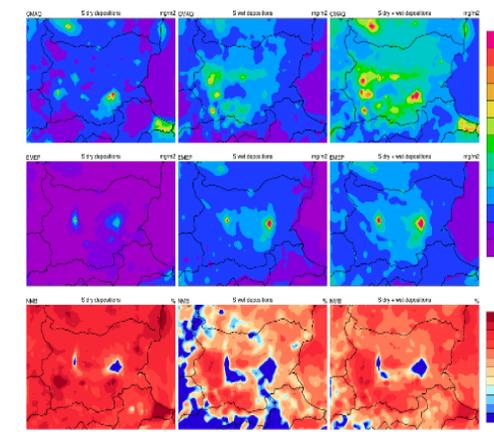


Fig. 4. Average daily dry CMAQ (first column, first row) and EMEP-MSC-W (first column, second row) Sulphur winter depositions. Average daily wet CMAQ (second column, first row) and EMEP-MSC-W (second column, second row) Sulphur winter depositions. Average daily total CMAQ (third column, first row) and EMEP-MSC-W (third column, second row) Sulphur winter depositions. Normalized mean bias (third row) of the dry (first column), wet (second column) and total (third column) depositions.

CONCLUSION

The results show that the output Nitrogen and Sulphur dry depositions of the WRF-MCIP3-CMAQ configuration are higher than the ones from the EMEP-MSC-W model configuration. That statement is valid also for the wet depositions, but to a lesser extent. Three factors determine the simulated differences. The first one is the topography, as we the results shows. The second one is the emission inventory. It implies a difference in the initial conditions for the dry and wet depositions between the two systems. The other main factor is the different meteorology drivers used in the CMAQ and EMEP-MSC-W, which together with the topography features increase or decrease the wet depositions on more or less areas.

ACKNOWLEDGEMENTS

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