

Modelling the effects of climate change on air quality over Central and Eastern Europe: concept, evaluation and projections

Katarzyna Juda-Rezler^{1,*}, Magdalena Reizer¹, Peter Huszar², Bernd C. Krüger³, Prodromos Zanis⁴, Dimiter Syrakov⁵, Eleni Katragkou⁶, Wojciech Trapp⁷, Dimitris Melas⁶, Hristo Chervenkov⁸, Ioannis Tegoulas⁴, Tomas Halenka²

¹Faculty of Environmental Engineering, Warsaw University of Technology, 00-653 Warsaw, Poland

²Department of Meteorology and Environment Protection, Charles University, 180 00 Prague, Czech Republic

³Institute of Meteorology, University of Natural Resources and Life Sciences, 1190 Vienna, Austria

⁴Department of Meteorology and Climatology, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece

⁵Department of Air and Water Pollution, National Institute of Meteorology and Hydrology, 1784 Sofia, Bulgaria

⁶Laboratory of Atmospheric Physics, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece

⁷Air Protection Unit of Ekometria, 80-299 Gdańsk, Poland

⁸National Institute of Meteorology and Hydrology, Branch Plovdiv, 4000 Plovdiv, Bulgaria

*Corresponding author. Email: katarzyna.juda-rezler@is.pw.edu.pl

Climate Research 53: 179–203 (2012)

Supplement 1. Table S1 gives an overview of the applied modelling systems set-up structure, applied Regional Climate Model/Chemical Transport Model (RCM/CTM) couple and its configuration, driving Global Climate Model (GCM), boundary conditions, emission invoked and name of the author(s) responsible for contributing results.

Table S1. The overview of the modelling systems set-up structure. BCs indicate boundary conditions

Modelling set-up\System	European	Czech	Polish	Hungarian	Bulgarian
Coordinates of domain's centre	13.0°E, 50.0°N	15.8°E, 49.0°N	19.3°E, 52.0°N	18.5°E, 47.5°N	25°E, 42.5°N,
Domain size (number of grid cells in x and y directions)	94 × 102	192 × 182	118 × 107	118 × 98	54 × 40 ALADIN domain (79 × 79)
Horizontal spatial resolution	50 km	10 km			
Plane geometry	Lambert projection				
Regional Climate Model	RegCM3	RegCM3-Beta			ALADIN-Climate
• Number of σ -levels	18	23	18	18	31
• Top level	50 hPa	70 hPa	50 hPa	50 hPa	10 hPa
• Temporal resolution	150 s	30 s			600 s

Meteorological BC	ERA40 for modelling system evaluation, ECHAM5 for control and future time slices, double nested through 25 km RegCM3 runs performed in ICTP				ERA40 for modelling system evaluation ARPEGE4-Climate for control and future time slices, runs performed in Météo-France
IPCC SRES Scenario	A1B				
Time step of RCM-CTM coupling	6 h				
Spin-up time	1 yr				12 h
Chemical Transport Model	CAMx				CMAQ
• Number of levels	12				14
• Top level	450 hPa				200 hPa
First level height	~36 m				38 m
Lateral Chemical BC	Constant, see text	From European 50 km CAMx run hourly fields	From European 50 km CAMx run monthly fields	From European 50 km CAMx run hourly fields	From European 50 km CAMx run 2 h fields
Top Chemical BC	Constant, see text				Profile BCs included with the standard CMAQ model code
Emission: Biogenic	Isoprene & Monoterpenes calculated every 6 h by regcm2camx pre-processor				10 organics, CO and NO calculated by SMOKE model
Emission: Anthropogenic (2000)	Based on EMEP 50 km (downscaled to 5 km for CZ, AT, SK, HU)	Based on EMEP 50 km (downscaled to 5 km for CZ, AT, SK, HU)	Based on EMEP 50 km (downscaled to 5 km for CZ, AT, SK, HU) For Poland: based on EMIL model (1 km × 1 km inventory)	Based on EMEP 50 km (downscaled to 5 km for CZ, AT, SK, HU)	Based on TNO 0.25° × 0.125°
Large Combustion Plants	As area sources	As area sources	Individually	As area sources	SNAP specific fixed release height
Contact author (Institution)	B. C. Krüger, University of Natural Resources and Life Sciences, Vienna, Austria E. Katragkou, Aristotle University of Thessaloniki, Greece	P. Huszar, M. Belda, Charles University, Prague, Czech Republic	M. Reizer, Warsaw University of Technology, Poland	B. C. Krüger, University of Natural Resources and Life Sciences, Vienna, Austria	V. Spiridonov, D. Syrakov, National Institute of Meteorology and Hydrology, Sofia, Bulgaria