

Supplementary material: Late-Spring and Summertime Tropospheric Ozone and NO₂ in Western Siberia and the Russian Arctic: Regional Model Evaluation and Sensitivities.

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Supplementary Table 1 - WRF-Chem model setup for all simulations.

Model Parameter	WRF-Chem Option
Horizontal Resolution	30 km x 30 km (140 x 140 grid)
Vertical Levels	27 vertical levels. Model top at 10 hPa.
Projection & Domain	Polar Stereographic Projection. Domain = 44-84° North, 7-153° East
Gas Phase Chemistry	Model of Ozone and Related Chemical Tracers (MOZART) V4
Aerosol Scheme	Model for Simulating Aerosol Interactions and Chemistry (MOSAIC) 4-Bin
Mineral Dust	GOCART dust emissions with AFWA modifications
Photolysis Scheme	Madronich Fast Tropospheric Ultraviolet-Visible (FTUV)
Biogenic Emissions	Model of Emissions of Gases and Aerosols from Nature (MEGAN)
Biomass Burning Emissions	Fire Inventory from NCAR (FINN)

Planetary Boundary Layer Scheme	Mellor-Yamada Nakanishi and Niino Level 2.5 PBL
Longwave Radiation Scheme	RRTM-G (Rapid Radiative Transfer Model for GCMs)
Shortwave Radiation Scheme	RRTM-G (Rapid Radiative Transfer Model for GCMs)
Land Surface Model	Noah
Cloud Microphysics Scheme	Thompson et al. New scheme suitable for ice, snow and graupel processes at high resolution
Convective Parametrisation	Grell 3D
Initial Meteorological Boundary Conditions	NCEP GFS, supplemented with NCEP FNL
Initial Chemical Boundary Conditions	MOZART 4

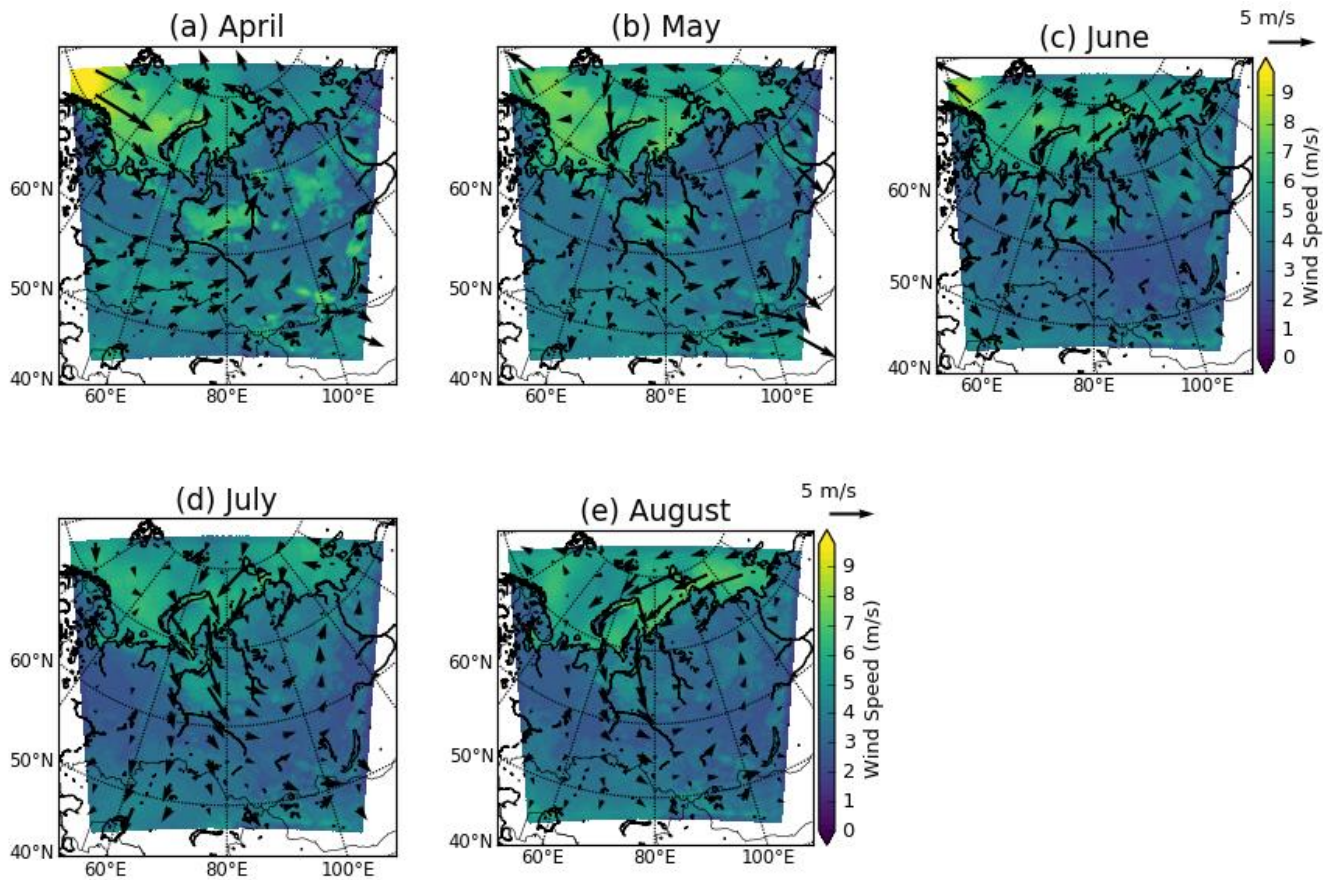
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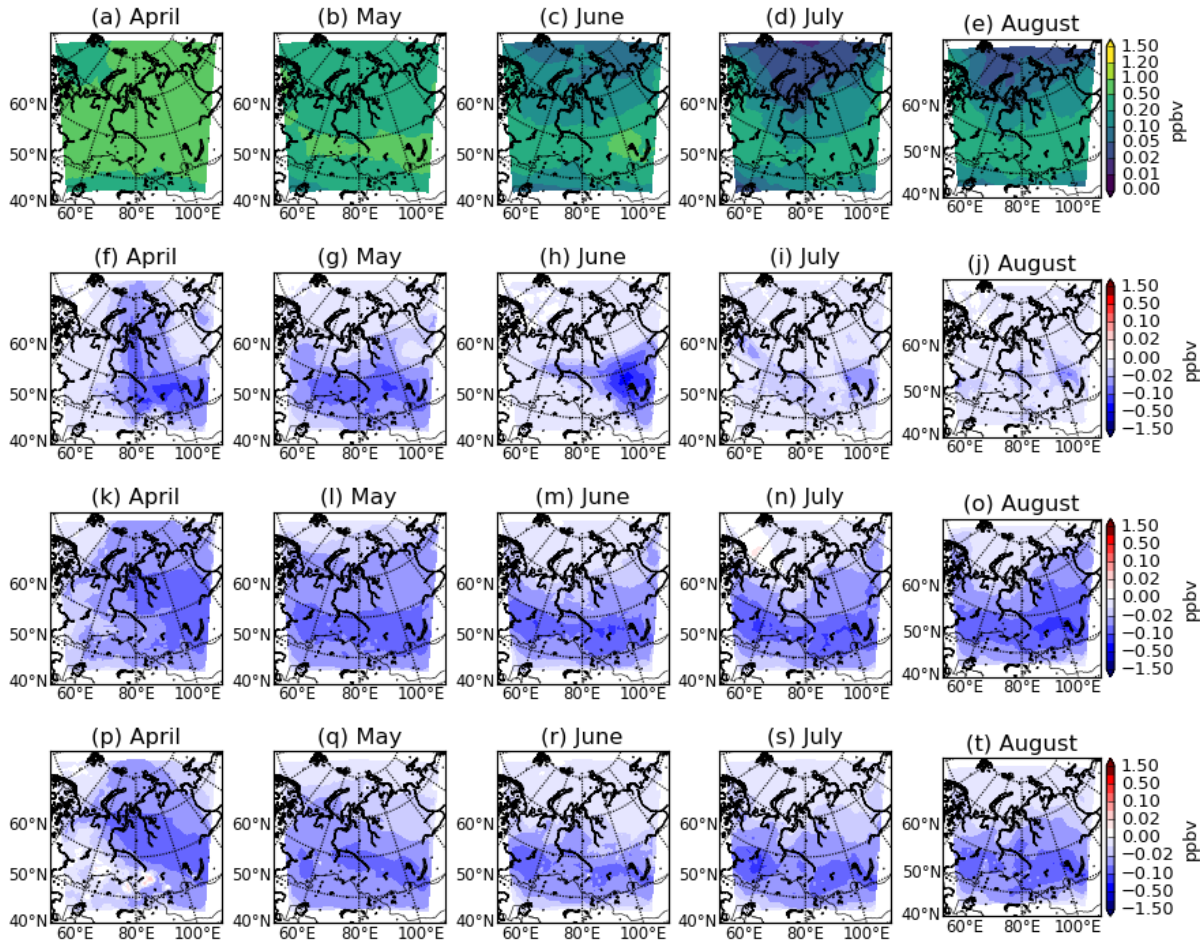
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Supplementary Figure 1 – Panels (a) – (e) show monthly means of WRF-Chem surface wind direction plotted on to wind speed.

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Supplementary Figure 2 – Simulated control and sensitivity run changes in surface PAN concentrations. Panels (a)–(e) show monthly means of WRF-Chem surface PAN concentrations for April–August. Panels (f)–(j) show monthly means of WRF-Chem surface PAN concentrations with all fire emissions switched off in domain (fires_off simulation) minus control simulation for April–August. Panels (k)–(o) show monthly means of WRF-Chem surface PAN concentrations with all transport emissions switched off in domain (trans_off) minus control simulation for April–August. Panels (p)–(t) show monthly means of WRF-Chem surface PAN concentrations with all energy emissions switched off in domain (ene_off) minus control simulation for April–August.