Supplement of

Arctic tropospheric ozone: assessment of current knowledge and model performance

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Table S1. Emissions and meteorology used in the models

| Model name | Biogenic emissions | Forest fire emissions | Meteorology | |
|-----------------|---|---|---|--|
| CESM2.0 | MEGANv2.1 | CMIP6 | Fully interactive with prescribed SST and SIC | |
| СМАМ | None | CMIP6 | Nudged to ERA-Interim reanalysis | |
| DEHM | MEGANv2 | GFAS | Nudged to ERA-Interim reanalysis | |
| EMEP MSC- W | EMEP scheme (Simpson et al., 2012) | FINN (based on Wiedinmyer et al., 2011) | Driven by 3-hourly data from the Integrated Forecast System (IFS) at ECMWF | |
| GEOS-Chem | MEGANv2.1 with update from Guenther et al (2012) | GFEDv4.1 | Driven by the GEOS meteorology from the NASA data assimilation office | |
| GISS-E2.1 | Isoprene:Guenther et al. (2015); Terpenes: ORCHIDEE; Online DMS, Sea-salt and dust | CMIP6 | Nudged to NCEP reanalysis | |
| MATCH | MEGANv2 | CMIP6 | ERA-Interim reanalysis 6-hourly | |
| MATCH- SALSA | MEGANv2 | CMIP6 | RCA4 | |
| MRI-ESM2 | Monthly climatological biogenic VOC emissions are from Horowitz et al. (2003) | CMIP6 | Nudged to the 6-hourly Japanese 55-year Reanalysis (JRA55) | |
| OsloCTM | MEGAN-MACC constant at 2010 level | GFEDv4.1 | Driven by 3-hourly data from the Integrated Forecast System (IFS) at ECMWF | |
| UKESM1 | Isoprene and monoterpenes interactive with land surface vegetation scheme | Prescribed from CMIP6 dataset | Nudged to ERA-Interim reanalysis | |
| WRF-Chem | MEGAN2.1 | GFED | Nudged to NCEP Final Analysis (FNL) | |

Table S.2: Stations with ozone sonde data used in the study. Number of soundings per year that was used is indicated. Data were retrieved from The World Ozone and Ultraviolet Radiation Data Centre (WOUDC), woudc.org and from Network for the Detection of Atmospheric Composition Change (NDACC), www.ndacc.org

| Station name and country | Latitude | Longitude | 2014 | 2015 |
|--------------------------|----------|-----------|------|------|
| Alert (CA) | 82.5 N | 62.3 W | 52 | 27 |
| Eureka (CA) | 80.1 N | 86.4 W | 68 | 46 |
| Ny Ålesund (DE) | 78.9 N | 11.9 E | 85 | 82 |
| Resolute (CA) | 74.7 N | 95.0 W | 52 | 36 |
| Scoresbysund (DK) | 70.5 N | 22.0 W | 48 | 44 |
| Sodankylä (FI) | 67.4 N | 26.7 E | 57 | 42 |

Resolute:



Figure S.1(a): Same as Figure 8 in the main paper, but for the other ozonesonde Arctic locations (Resolute).

Alert:



Figure S.1(b & c): Same as Figure 8 in the main paper, but for the other ozonesonde Arctic locations (Alert and Scoresbysund).

Sodankyla:



Figure S.1(d & e): Same as Figure 8 in the main paper, but for the other ozonesonde Arctic locations (Sodankyla and Ny Alesund).



Figure S.2: Comparison between observed and AMAP models' ozone seasonal averages for 2014-15 at Alert, NV, Canada. Similar to Alert in Figure S.1, but these use 3-hourly model output instead of monthly average model output. Despite that difference, the patterns in model bias are the same.