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Adiabatic versus diabatic transport contributions to the ozone budget in the northern hemispheric upper troposphere and lower stratosphere

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Table S1: List of submodels used for the EMAC simulation considered in this work

Name	Description[1]	Reference[2]
	MESSy infrastructure modules (always required)	
CHANNEL	Data exchange between submodels, control of output and restart files	Jöckel et al. (2010)
GRID	Grid definition and transformation	Kerkweg et al. (2018)
IMPORT	Data import from external files	Kerkweg et al. (2015)
QTIMER	Simulation wall-clock time and restart trigger	Jöckel et al. (2010)
TENDENCY	Tendency per process for prognostic variables	Eichinger and Jöckel (2014)
TIMER	Time and date control	Jöckel et al. (2010)
TRACER	Data and metadata handling for chemical species	Jöckel et al. (2008)
	Submodels	
AEROPT	Aerosol optical properties	Dietmüller et al. (2016)
AIRSEA	Emission and deposition over the ocean	Pozzer et al. (2006)
BIOBURN	Biomass burning emissions	Kaiser et al. (2012)
CLOUD	ECHAM5 cloud scheme	Roeckner et al. (2003)
CLOUDOPT	Cloud optical properties	Dietmüller et al. (2016)
CONVECT	ECHAM5 Tiedtke convection scheme with Nordeng closure	Roeckner et al. (2003)
CVTRANS	Convective tracer transport	Tost (2006)
DDEP	Dry deposition	Kerkweg et al. (2006a)
E5VDIFF	ECHAM5 Land-Atmosphere exchange (not for tracers) and vertical diffusion	Roeckner et al. (2003)
GMXE	Tropospheric aerosol microphysical processes	Pringle et al. (2010)
GWAVE	ECHAM5 non-orographic gravity wave scheme	Roeckner et al. (2003)
JVAL	Photolysis rate coefficients	Sander et al. (2014)
LNOX	NO_x production by lightning	Tost et al. (2007)
MECCA	Atmospheric chemistry	Sander et al. (2019)
MSBM	Heterogeneous reactions in polar stratospheric clouds and stratospheric background aerosols	Jöckel et al. (2010)
OFFEMIS	Tracer tendencies from offline emission files	Kerkweg et al. (2006b)
ONEMIS	Tracer tendencies from online calculated emissions	Kerkweg et al. (2006b)
ORBIT	Earth's orbit parameters	Dietmüller et al. (2016)
OROGW	ECHAM5 subgrid scale orographic wave drag parameterisation	Roeckner et al. (2003)
QBO	Assimilation of QBO zonal wind observations	Jöckel et al. (2006)
RAD	ECHAM5 radiation scheme with new features and extensions	Dietmüller et al. (2016)
SCALC	Online calculations	Jöckel et al. (2016)
SCAV	Wet deposition and liquid phase chemistry in precipitation	Tost et al. (2006)

▽

Table S1 (continued)

Name	Description[1]	Reference[2]
	△	
SEDI	Sedimentation scheme for aerosol particles	Kerkweg et al. (2006a)
SURFACE	ECHAM5 surface subroutines	Roeckner et al. (2003)
TBUDGET	Production cycles for tracers	Jöckel et al. (2016)
TNUDGE	Tracer nudging to defined fields	Kerkweg et al. (2006b)
TROPOP	Tropopause diagnostics	Jöckel et al. (2006)
UBCNOX	Effect of energetic particles on NO_x	Funke et al. (2016)

[1] cf. overview of MESSy submodels at `https://messy-interface.org/messy/submodels/`

[2] reference labels provide hyperlinks to corresponding publications and therefore are not listed in the bibliography

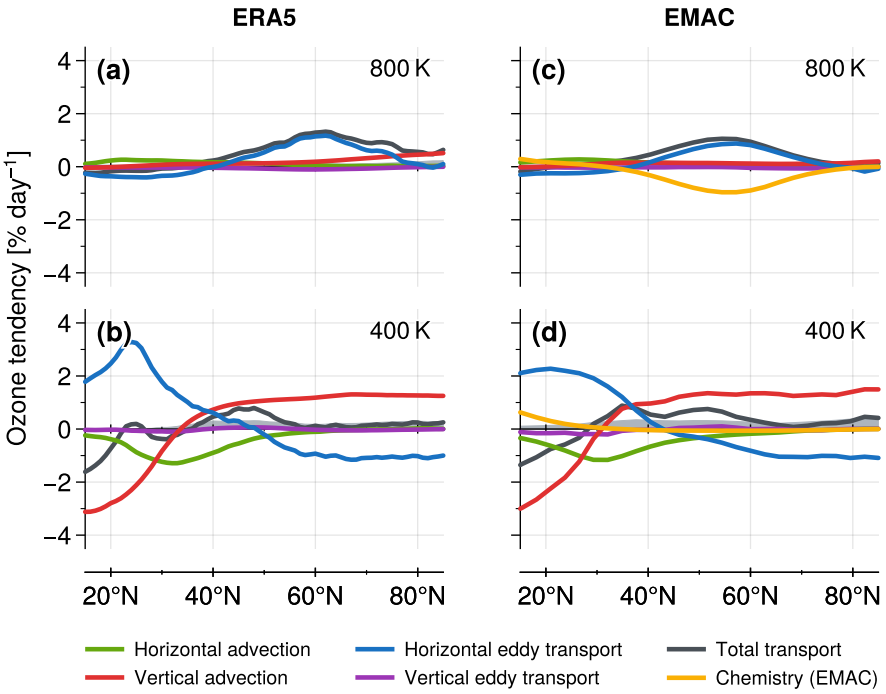

Figure S1: Same as Fig. 3 but for 400 K and 800 K, respectively.

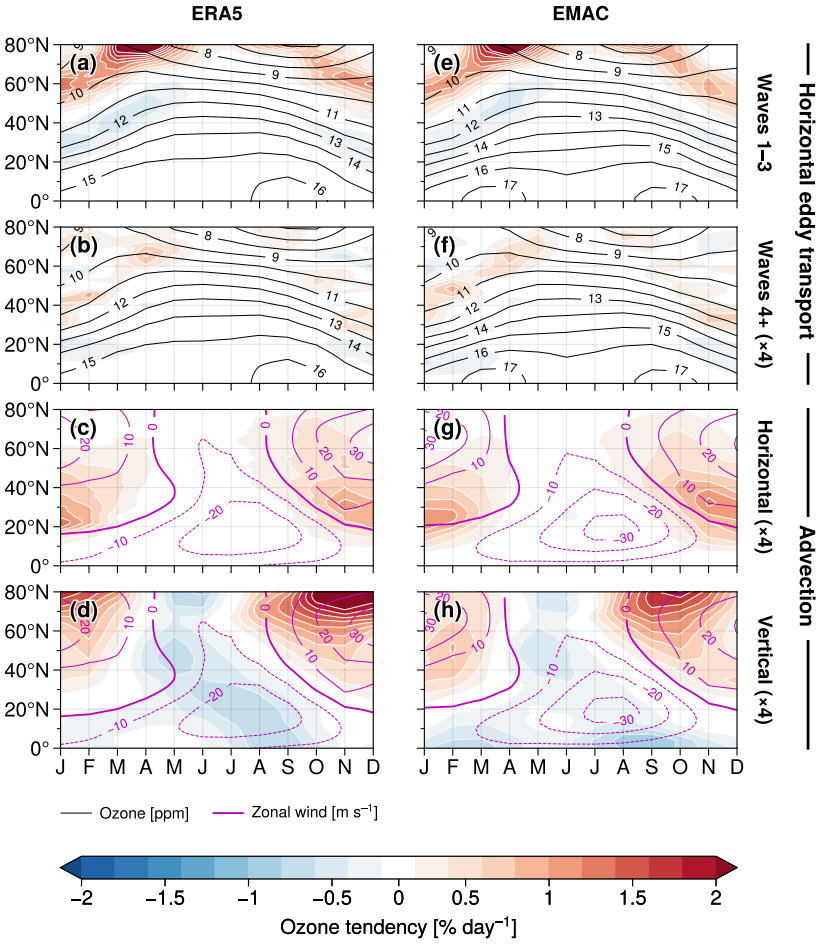

Figure S2: Same as Fig. 5 but for 800 K. Note that the climatologies in the second to fourth row have been scaled by a factor of 4 for plotting.

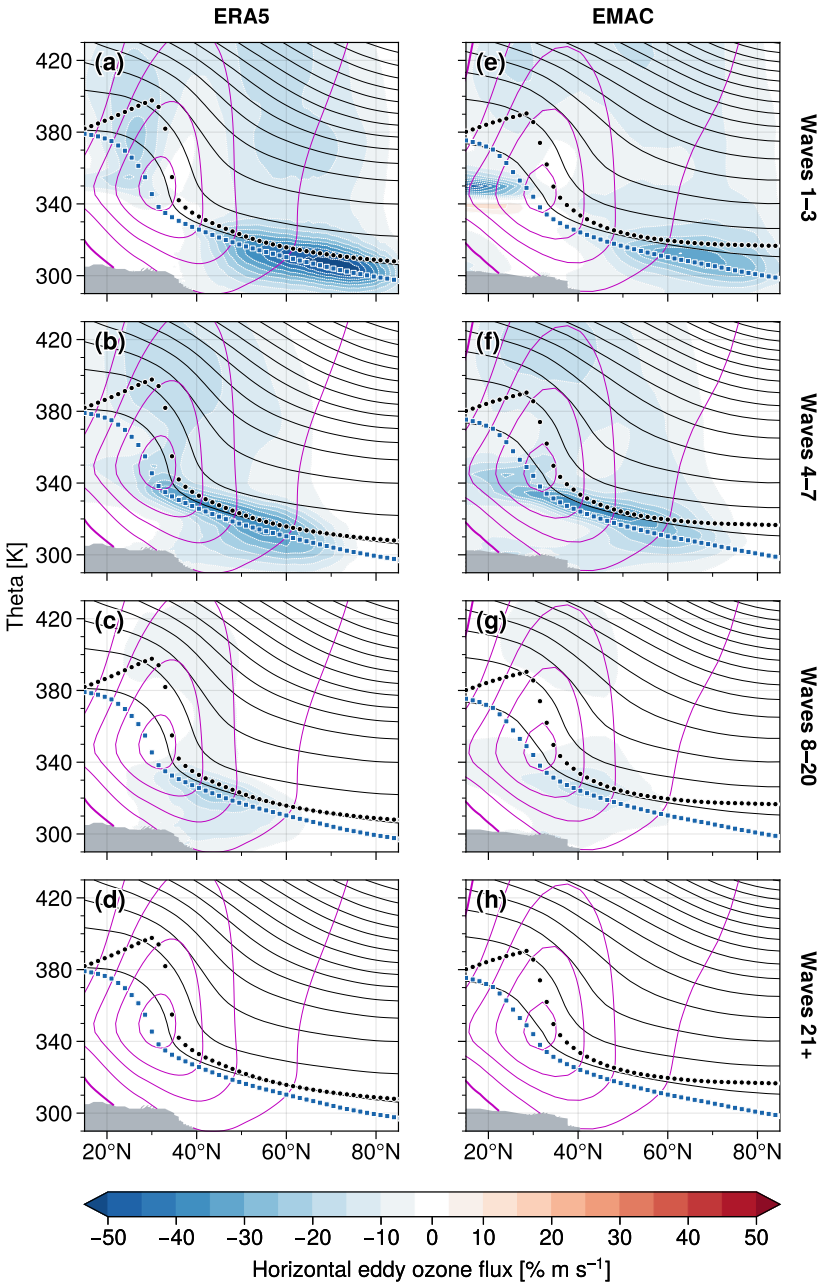

Figure S3: Same as Fig. 6 but showing the contributions associated with zonal wave numbers 4–7, 8–20 and 21+ separately.

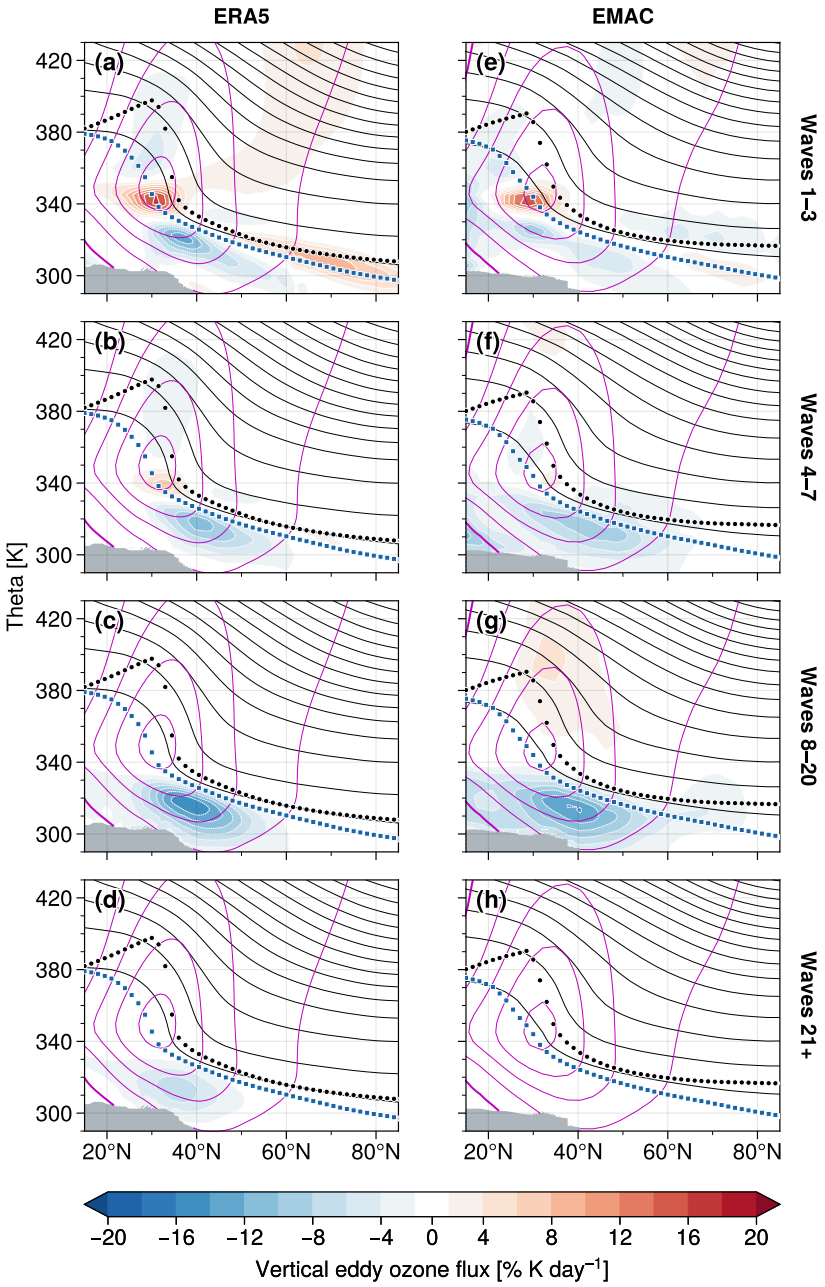

Figure S4: Same as Fig. 7 but showing the contributions associated with zonal wave numbers 4–7, 8–20 and 21+ separately.

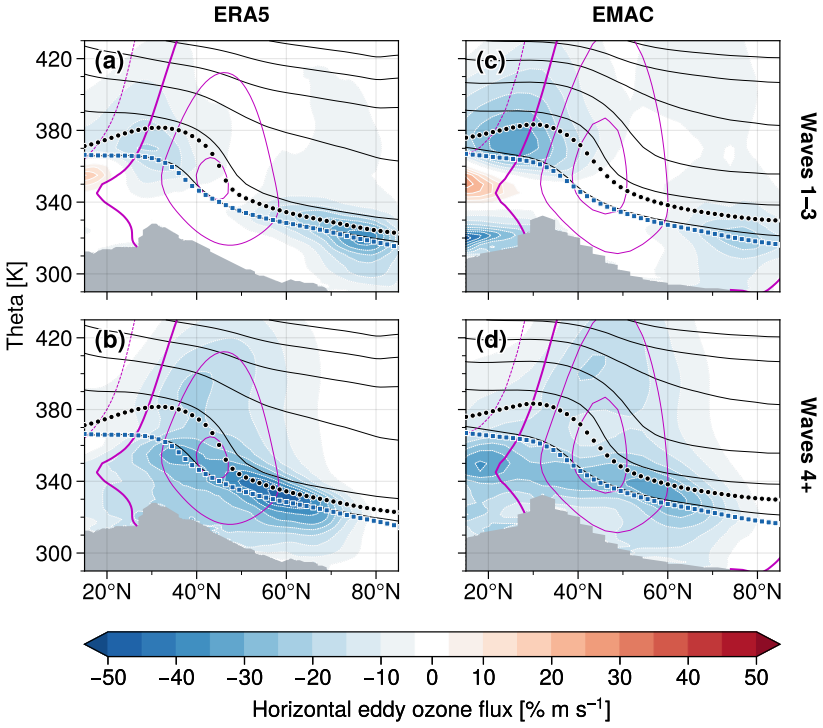

Figure S5: Same as Fig. 6 but for Boreal summer (June–August).

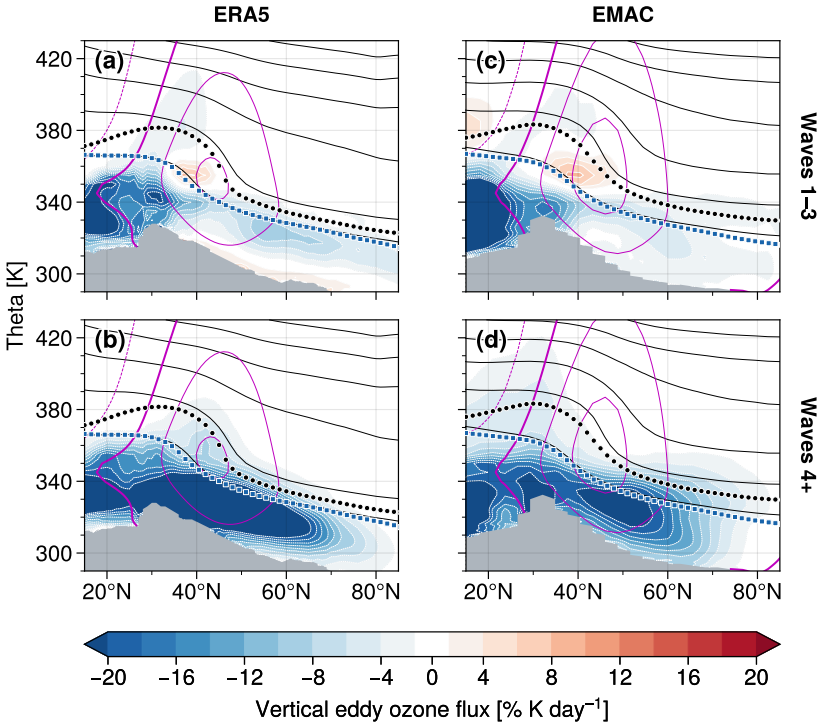

Figure S6: Same as Fig. 7 but for Boreal summer (June–August).

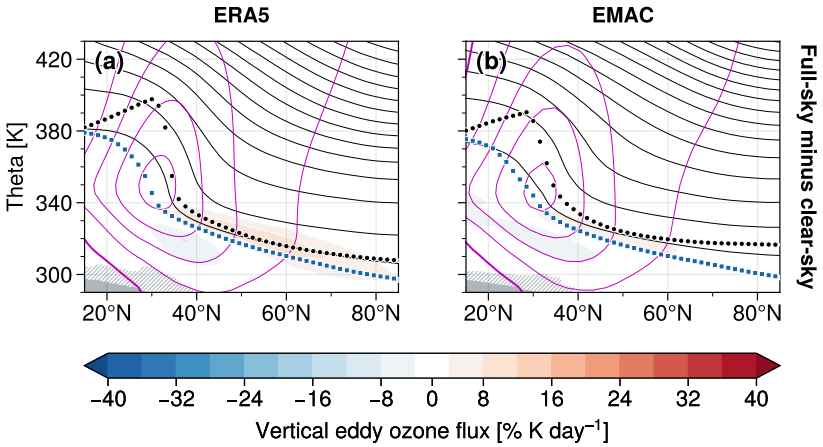

Figure S7: Extension of Fig. 8.