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Climate signals in stratosphere, troposphere and ocean through changing radiative forcing by zonal asymmetries in ozone

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We use three simulations with the coupled atmosphere ocean general circulation model COSMOS to investigate the influence of changes in the radiative forcing caused by zonal asymmetries in ozone on the stratosphere-troposphere-ocean-system. One 60 year reference equilibrium simulation is forced with a zonally symmetric ozone climatology. In the two other 60 year simulations the monthly mean zonally asymmetric ozone concentration as derived from ERA 40 reanalyses is used in the northern hemispheric extratropics from 500 hPa to 2 hPa and in the upper stratosphere, between 10 hPa and 2 hPa respectively. The tropospheric response to the asymmetric ozone forcing can be identified as an intensification of the Aleutian low over the North Pacific and a weakening of the Icelandic low over the North Atlantic, shifting the system towards a negative phase of the North Atlantic Oscillation. In the North Pacific we find a significant warming of surface water and a corresponding retreat of sea ice in January. These signals are much stronger in the simulation with only upper stratosphere asymmetric forcing. Fluxes of stationary waves following Plumb are analysed. Changes in the wind fields and the increase in the number of sudden stratospheric warmings are presented.