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Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Effects of zonal asymmetries in stratospheric ozone on water temperature and sea ice extent in the North Atlantic and North Pacific

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The influence of zonally asymmetric ozone forcing on the stratosphere-troposphere-ocean-system is investigated with the coupled atmosphere ocean general circulation model COSMOS under present day conditions. The uppermost level of the 90-layer atmosphere is 1 Pa.
One of the three 60 year equilibrium simulations is forced with a zonally symmetric ozone climatology, the reference experiment. In the two other simulations the monthly mean zonally asymmetric ozone concentration as derived from ERA 40 reanalyses is used in the northern hemispheric extratropics. In one simulation from 500 hPa to 2 hPa and in the other only in the upper stratosphere, between 10 hPa and 2 hPa.

The tropospheric response to the additional 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. Near the surface we find a significant warming of surface water and a retreat of sea ice in January in the North Pacific. These signals are much stronger in the simulation with only upper stratosphere asymmetrically forcing. Fluxes of stationary waves following Plumb are analysed during the strong and the weak polar vortex phase. Significant changes are found during a weak polar vortex.