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Relative roles of different types of PSC to Antarctic ozone depletion in polar spring caused by chlorine activation and denitrification

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It is well known that heterogeneous reactions on the surfaces of PSC particles and denitrification of the stratosphere are the cause for Antarctic ozone depletion in polar spring, but the relative roles of different types of PSCs is an open question. We use multi-year simulations from 2005 to 2014 of the chemistry-climate model ECHAM5/MESSy Atmospheric chemistry (EMAC) to investigate the impact that various types of PSCs have on Antarctic ozone loss.

One standard and three sensitivity EMAC simulations (nudged with ERA-Interim) have been performed to evaluate the contribution of liquid, NAT and ice particles to ozone depletion in Antarctic winter and spring due to chlorine activation by heterogeneous chemistry on their surfaces. In the three sensitivity simulations, we changed the heterogeneous chemistry on PSC particles by switching on and off the chemistry on liquid, NAT and ice particles.

Further sensitivity simulations are performed to evaluate the contribution of NAT to Antarctic ozone depletion through denitrification of the stratosphere.

With the help of these different EMAC simulations we will show the significance of liquid, NAT and ice particles to Antarctic ozone depletion caused by chlorine activation and denitrification.