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Chlorine activation in the dark polar vortices

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Simulations of polar stratospheric chemistry have been performed with the state-of-the-art Lagrangian Chemistry Transport Model CLaMS for both Antarctic and Arctic winters. The simulations include the most recent Arctic winter (2015/16) that showed the maximum polar ozone loss in late winter observed in the Arctic so far. CLaMS includes a Lagrangian sedimentation scheme that is able to successfully simulate the vertical NO_y redistribution due to the sedimentation of large NAT particles. In general, observations of stratospheric trace species are very well reproduced by the model. However, at the time of the onset of chlorine activation, the simulations significantly overestimate the HCl mixing ratios inside the polar vortex in polar night. This discrepancy is seen in both hemispheres and points to some unknown process in stratospheric chemistry. Since the discrepancy is mainly seen during the beginning of the chlorine activation period where the ozone loss rates are low, the impact on the overall ozone loss over the course of winter and spring is rather low. Possible reasons for this discrepancy in chlorine activation will be discussed.