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Polar ozone depletion and trends as represented by the Whole Atmospheric Community Climate Model (WACCM)

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The Whole Atmosphere Community Climate Model, Version 4 (WACCM4) is a comprehensive numerical model, spanning the range of altitude from the Earth's surface to the lower thermosphere [Garcia et al., JGR, 2007; Kinnison et al., JGR, 2007; Marsh et al., J. of Climate, 2013]. WACCM4 is based on the framework of the NCAR Community Atmosphere Model, version 4 (CAM4), and includes all of the physical parameterizations of CAM4 and a finite volume dynamical core for the tracer advection. This version has a detailed representation of tropospheric and middle atmosphere chemical and physical processes. Simulations completed for the SPARC Chemistry Climate Model Initiative (CCMI), REFC1, REFC2, SENSC2, and REFC1SD scenarios are examined (see Eyring et al., SPARC Newsletter, 2013). Recent improvements in model representation of orographic gravity wave processes strongly impact temperature and therefore polar ozone depletion as well as its subsequent recovery. Model representation of volcanic events will also be shown to be important for ozone loss. Evaluation of polar ozone depletion processes (e.g., dehydration, denitrification, chemical activation) with key observations will be performed and the impact on future ozone recovery will be identified.