The Community Earth System Model: Evaluation and CMIP5 simulations. Activities of the Whole Atmosphere Working Group

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The Whole Atmosphere Working Group (WAWG) was formed to facilitate continued development of the Whole Atmosphere Community Climate Model (WACCM) as part of the Community Earth System Model (CESM), and to use WACCM to understand the couplings between atmospheric layers, the role of chemical and physical processes in defining these couplings, and the interaction between the Earth's atmosphere and the Sun. The current version of WACCM (see http://waccm.acd.ucar.edu/) spans the range of altitude from the Earth's surface to the lower thermosphere (~140 km) and is based on CESM1. WACCM is used to predict the evolution of ozone and other radiatively active species in the middle and upper atmosphere; to study effects of the stratosphere on tropospheric climate, including the response to increased greenhouse gases; and for independent investigations. We have used WACCM to simulate the Earth's climate from pre-industrial conditions to the end of the 21st Century in several experiments following the Coupled Model Intercomparison Project Phase 5 (CMIP5) protocols. We present preliminary analysis of these coupled experiments, highlighting the effects of chemistry and physics above the troposphere on climate.