



Evaluation of CESM1 (WACCM) with Observations of Stratospheric Composition

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The Community Earth System Model version 1 (CESM1) Whole Atmosphere Community Climate Model (WACCM) is used in this study. CESM1 (WACCM) includes a detailed representation of tropospheric through lower thermospheric chemistry and physical processes. Simulations for this work were based on scenarios defined by the Chemistry Climate Model Initiative (CCMI). These scenarios included both free-running (FR) and specified-dynamics versions (SD) of CESM1 (WACCM). Comparisons were made with global monthly zonal mean stratospheric data records from satellite-based remote measurements created by the Global Ozone Chemistry and Related Trace gas Data Records for the Stratosphere (GOZCARDS) project. These data records were drawn from high quality measurements of stratospheric composition starting in 1979 for ozone and in the early 1990s for other species. We discuss stratospheric variability and trends through analyses of observed time series of ozone (O_3), hydrogen chloride (HCl), nitrous oxide (N_2O), nitric acid (HNO_3), and water vapor (H_2O), and we contrast the fits from the FR and SD model versions. Conclusions from this work have aided in the development of a new version of CESM (WACCM) that will be used in the next Intergovernmental Panel on Climate Change (IPCC) Coupled Model Intercomparison Project Phase 6 (CMIP6) assessment.