***Further Evidence of Solar Cycle Variability in Middle Atmospheric Ozone and the Importance of Incorporating Solar Spectral Irradiance in Atmospheric Modeling***

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SIM and SOLSTICE monitored the descending phase of solar cycle 23 and are now continuing observations in the rising phase of cycle 24. The SORCE observations show rotational modulation of spectral irradiance due to the passage of active regions, but also indicate slower evolutionary trends in solar spectral irradiance over longer time periods that are both in and out of phase with the TSI. To estimate the atmospheric response to the solar variability implied by these observations, quiet sun and active solar reference spectra were created as input into the Whole Atmosphere Community Climate Model (WACCM). The model output using these observations produces a very different ozone response relative to standard semi-empirical models of SSI, indicating the importance of understanding the implications of incorporating SSI observations into atmospheric chemistry models. WACCM with SORCE irradiance observations predicts an ozone increase in the lower mesosphere at solar minimum conditions. The atmospheric structure predicted by the model is commensurate with contemporaneous observations of ozone from TIMED SABER, which covers 12 years of the solar cycle (2002-2013). In addition, reanalysis of ozone from the Solar Mesospheric Explorer (SME) indicates that the mesospheric response is out-of-phase in the descending part of solar cycle 21 (1982-1986) commensurate with SABER observations in the descending part of solar cycle 23. The UV variability measured with the SME solar spectrometer over the descending phase of solar cycle 21 is on the same order as that measured by SORCE over the descending phase of solar cycle 23.