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Effects of the 11-year Solar Cycle including Medium-Energy Electron Precipitation in WACCM decadal climate predictions

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There is an ongoing discussion whether the lagged surface impact of the 11-year solar cycle, which peaks 2-4 years after solar maximum, may be contributed by the North Atlantic Oscillation (NAO) coupling to the ocean. Several studies have suggested that this atmosphere-ocean feedback is involving annual re-emergence of anomalous ocean temperatures stored below the mixed layer. Energetic Electron precipitation effects also lag the solar maximum by a few years, peaking in the declining phase of the solar cycle. While recent studies have incorporated the stratospheric UV radiation component of the solar forcing, the importance of the effect from precipitating medium-to-high energy electrons (MEE), which are able to significantly disturb the stratospheric chemical composition, is not fully addressed, partly due to lack of realistic forcing in current Earth System Models. In this study, we use the high-top atmospheric model WACCM coupled to the MICOM ocean model and adopt a state-of-the-art MEE forcing data set. Results will be presented from two decadal ensemble experiments with solar cycle induced forcings, one with UV and one with UV and MEE. The anomalous forcing from MEE precipitation is studied in relation to patterns of Northern Hemispheric atmospheric variability modes.