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Chemical and dynamical response of the terrestrial atmosphere to the decadal scale solar variability

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Recently, investigations of the solar variability contribution to the climate change gained a new impetus, because it is of great societal importance to know what part of the observed warming might be due to the solar variability. In this talk the effects of solar activity changes on the chemistry, temperature and dynamics of the atmosphere from the ground up to the mesopause simulated with Chemistry-Climate Model (CCM) SOCOL in steady state (perpetual solar maximum/minimum) and transient (time evolving solar forcing) modes will be considered. An annual mean solar signal in a number of simulated quantities and its seasonal behavior, which shows the evolution of the solar signal in time, will be presented and compared to the available estimations of the solar signal obtained from different observational data sets. The comparison of the effects of solar irradiance variability in ultraviolet and visible part of the spectrum will be also presented. The effects of solar irradiance variability will be compared with the effects of Joule heating induced by the solar wind and NO_y source due to electron precipitation: two other mechanisms potentially important for Sun-Earth connections. The possible ways of model improvement and future activities aimed to study solar-climate links will be discussed.

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