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Is there a (multi-) decadal variability in the number of sudden stratospheric warmings?

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The goal of this study is to assess the variability of sudden stratospheric warmings (SSWs) on time scales longer than 10 years using the EGMAM model. EGMAM is a middle atmosphere version of ECHO-G with 39 vertical levels (top level 0.01 hPa) and a better representation of the middle atmosphere dynamics. Three long control simulations (750, 550 and 300 years) under constant pre-industrial or present day conditions are investigated to estimate the internal variability in the number of SSWs. Simulated variability in the number of warmings is compared to observations as far as possible with the limited length of observational data.

In terms of decadal variability the model shows comparable characteristics to observations e.g. the number of events per decade varies from 0-9. Furthermore, simulations reveal evidence for enhanced variability on longer (multi-decadal) timescales which cannot be verified by observations due to the limited length of the data. Using running means the control simulations reveal frequencies in the number of SSWs of approximately 100 years. A time-scale that is not suspected for stratospheric variablity.
Different statistical approaches (as filter-techniques and auto-correlation) are realized to assess the significance of a multi-decadal variability of SSWs. The resulting frequencies in the model and a link to tropospheric variability will be discussed.