CO_2 Concentrations in SD-WACCM-X v2.1 Simulations

An issue pertaining to the use of existing SD-WACCM-X v2.1 simulations (https://doi.org/10.26024/5b58-nc53) has recently been brought to our attention. In the course of performing the simulations, occasional instabilities in the model necessitated restarting from an initial condition file. This inadvertently led to resetting CO_2 concentrations to year 2000 conditions in the atmosphere. This is illustrated in Figure 1, which shows the global average CO_2 at the surface (solid lines) and at 10^{-2} hPa (dashed lines) in the SD-WACCM-X v2.1 simulations (red) and a corresponding historical free run (blue). Occasional jumps in CO_2 concentrations are evident in the SD-WACCM-X v2.1 simulation at 10^{-2} hPa that correspond to times when the model was reinitialized. These do not occur at the surface where CO_2 concentration is specified or in the historical free-run which was not reinitialized at any point in the simulations.

Users of the SD-WACCM-X v2.1 simulations should be aware of the inaccurate CO_2 concentrations at higher altitudes. Caution is especially urged in the usage of the existing simulations for the study of long-term trends in the middle and upper atmosphere. An updated SD-WACCM-X simulation from 1980-present will be performed and released to the community following complete understanding of this issue.

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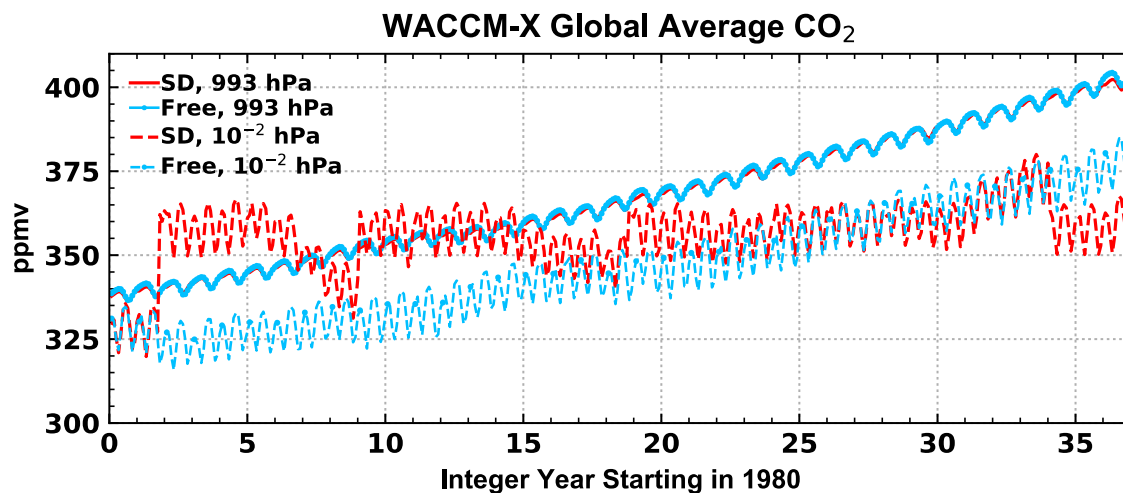

Figure 1. Global average CO_2 concentration in SD-WACCM-X v2.1 (red) and a corresponding historical free-run (blue) at the surface (solid) and 10^{-2} hPa (dashed). The periodic jumps in CO_2 concentration at 10^{-2} hPa are due to reinitialization of the model following the occurrence of numerical instabilities.