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LONG-TERM TREND OF THE THERMOSPHERE CAUSED BY ANTHROPOGENIC INCREASES OF GREENHOUSE GASSES SIMULATED BY THE GAIA

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Using a numerical model, the global cooling due to anthropogenic increase of greenhouse gases in the upper atmosphere is examined. The model used in this study is an atmosphere-ionosphere coupled model (GAIA), in which a whole atmosphere general circulation model, an ionosphere model and an electrodynamics model are integrated. In the lower atmosphere of the GAIA, the meteorological reanalysis data (JRA) are incorporated. We performed numerical experiments with increasing the concentration of CO₂. We focus our attention on long-term trend in the thermosphere under the solar minimum condition during the period from 1980 to 2010. Comparing these simulation results, we investigate effects of the increase of CO₂ concentration on the general circulation in the thermosphere-ionosphere system. In particular, we estimate thermospheric cooling due to the increase of CO₂ concentration. Changes of behaviors of the upward propagating tides and their influences on the general circulation in the upper atmosphere are also studied.