The response of the ionosphere to increase of CO$_2$: simulation results with GAIA model

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We investigated the influence of increasing CO$_2$ on the ionosphere by conducting two simulations with the atmosphere-ionospheric model of GAIA. This model indicated that trends of $F_2$ peak ($N_{mF_2}$ and $H_{mF_2}$) are negative in most locations under the CO$_2$ cooling effect. The global averaged magnitude of $N_{mF_2}$ negative effect is about -0.7%, but a number of positive locations cannot negligible. Trends of $N_{mF_2}$ are seasonally asymmetry; winter hemisphere tend to have positive trends while summer hemisphere tend to have negative trends during 12LT and 0LT. The trends of $H_{mF_2}$ are also negative in many locations, which global averaged magnitude is about -0.7km. Trends of $H_{mF_2}$ have positive only near geomagnetic dip equator.

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