

GAIA モデルを用いた、二酸化炭素増加による F2 ピークの変動

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The variation of F2-peak due to CO₂ increase: experiment with GAIA model

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In recent years, the upper atmosphere has been cooling because of long-term increase of carbon dioxide. The ionosphere also contracts due to CO₂ cooling. Trends in the E- and F₁-region have been revealed by previous studies, with a consistent increase of the peak density, but drop in peak height. The trends of F₂-peak (NmF₂, hmF₂), however, has been found to vary from location to location and no consensus view has been reached. This is mainly due to the fact that trend caused by CO₂ in F₂-peak is weak compared to the strong solar and geomagnetic activity, and thus difficult to be separated from observations. Therefore here we investigate the effects of CO₂ cooling on F₂-peak with the GAIA model containing from surface to the ionosphere.

The results show that the response of NmF₂ depends strongly on season and local time, with both positive and negative changes. On the other hand, such dependence in hmF₂ is small, with hmF₂ decreasing globally. The atmospheric composition (O/N₂) shows a similar perturbation pattern to hmF₂. This indicates that the response of NmF₂ evolves more complicated processes than hmF₂. In particular, we investigate various plasma transport processes.