Introduction of long-term whole atmosphere-ionosphere simulation database and future update

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The origins of upper atmospheric variations do not only come from the solar activities and rotation, but also from the Earth's lower atmosphere. In order to now-cast and forecast the upper atmospheric disturbances and variations, we have developed a whole atmosphere-ionosphere coupled model called GAIA. The model incorporates the Japanese meteorological reanalysis (JRA) into its lower atmospheric part as well as the daily F10.7 index, in order to reproduce the effects of realistic forcing both from the lower atmosphere and solar irradiance. We have carried out such simulation for the period from 1996 to 2014. The result shows that the model can reproduce major features of the observed ionosphere and thermosphere, including solar activity and rotation dependences, seasonal variations, shorter periodic variations, and effects of lower atmospheric disturbances such as stratospheric sudden warming [Jin et al., 2012; Liu et al., 2013, 2014]. We will show the comparison of the database and observations. We also introduce future update of the model, especially improvement of model accuracy using data assimilation technique.

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