

revision and data assimilation of a whole atmosphere-ionosphere model GAIA

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Temporal and spatial variations in the ionospheric electron density and thermospheric mass density can have significant impacts on radio communications between ground and space, GNSS navigations, satellites' orbit and attitude and so on. In order to nowcast and forecast upper atmospheric variations and disturbances, a whole atmospheric model, GAIA, has been developed. Since 2011, when the initial version of GAIA was developed, we have revised it several times so that it can better reproduce upper atmospheric states. Recent updates include more rigorous treatments of ion and electron energetics, ion compositions and chemical reactions, solar radiation effects, and so on. Those updates lead to smaller RMSEs by up to several tens of percents for climatological ionospheric parameters. Data assimilation technique is also being implemented into the model using global ionospheric observations. We will show results from these revisions and assimilation of GAIA, and discuss future directions.

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