

Comparison between GAIA model and COSMIC-TIMED/SABER observations: stratospheric warming event in 2009

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We compare results from a whole atmosphere-ionosphere coupled model, GAIA, and from the COSMIC and TIMED/SABER observations during 2008/2009 northern winter season. The GAIA model has assimilated meteorological reanalysis data by a nudging method. The comparison shows excellent agreements in the major features from the stratosphere to the ionosphere including the growth and decay of the major stratospheric sudden warming (SSW) event in 2009. During the major SSW period, a pronounced semidiurnal variation in TEC and its local-time phase shift similar to the previous observations are reproduced by the model and COSMIC observation. The model suggests that the TEC variation is caused by an enhanced semidiurnal variation in the EXB drift, which is probably related to an amplified semidiurnal migrating tide (SW2) in the lower thermosphere. The model and TIMED/SABER observation show that the SW2 tide amplifies at low latitudes from the stratosphere to the thermosphere as well as the phase variation. Possible mechanisms are discussed.

Keywords: simulation, ionosphere, atmosphere, stratospheric sudden warming, atmospheric wave, satellite observation