



Improved equatorial stratospheric variabilities of NASA GEOS5 GCM

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The equatorial stratosphere is characterized by strong variabilities, and the quasi-biennial and semiannual oscillations (QBO and SAO) are the most prominent features in the variabilities. Nonetheless, only a few GCMs have been successful in producing such equatorial variabilities reasonably well. Recently, variability of the equatorial stratosphere of NASA GEOS5 GCM has been improved by modifying column-based Lindzen-type gravity wave parameterization (GWP). From climate simulations, it is found that GEOS5 GCM with the modified GWP can produce QBO-like signals and the observed climatologies of the SAO reasonably well. Major modifications in the GWP are three-fold: (1) the modification of the latitudinal structure of wave momentum at launch so that the structure can roughly mimic that of climatological zonal-mean precipitation, (2) the reduction of effective horizontal wave number for nonorographic GWs, and (3) the conservation of column-integrated energy and angular momentum. Using the model results with enhanced variability, we investigate roles of resolved and parameterized waves in the generation of the enhanced variability. Also, we evaluate effects of the energy and momentum conservation on the enhanced variabilities.