

INTER-ANNUAL VARIABILITY AND AERONOMIC IMPLICATIONS OF NONMIGRATING TIDES FORCED BY TROPICAL CONVECTION

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Current observations and models demonstrate unequivocally that non-Sun-synchronous (nonmigrating) tides due to deep tropical convection produce large longitudinal and local time variations in bulk ITM properties, i.e., temperature, wind, composition and plasma density, to name a few. We thus stand at an exciting research frontier: understanding how persistent, large-scale tropospheric weather systems affect Earth's upper atmosphere and geospace environment. Among the science challenge questions are the inter-annual variability of the nonmigrating tides and their implications for aeronomy.

This paper focuses on seasonal and quasi-biennial tidal variations presumably modulated by the QBO. Multiple years of satellite-borne tidal temperature and wind observations show considerable amplitude variations on these time-scales, from the MLT region (SABER and TIDI on TIMED) to the upper thermosphere (CHAMP and GRACE). The dynamical observations are interpreted using an empirical fit model and connected to longitudinal variations in nitric oxide volume emission rates observed by SABER. Possible implications for the thermospheric energy budget are discussed.

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