

Study of climatological characteristics of gravity waves in the troposphere and lower stratosphere using GPS satellite measurements

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Theoretical and observational studies have confirmed the importance of gravity waves and their associated momentum and energy transports in the large- and small-scale dynamics of the atmosphere. A wide variety of observational techniques have been used for the study of atmospheric gravity waves. They include rocketsonde, radiosonde, aircraft, radar, lidar, and satellite observations etc. Global Positioning System (GPS) measurements continue to play a unique role in deriving the global climatology of gravity wave. In the present study, we have used the CHAMP (CHALLENGING Minisatellite Payload) and SAC-C (Satellite de Aplicaciones Cientificas-C) datasets to analyze the gravity waves in the troposphere and stratosphere. The sampled CHAMP data cover a period of 54 months that begins from May 2001 to December 2005, and the SAC-C dataset is for a period of 40 months from July 2001 to December 2004. We have found seasonal and latitudinal variations of potential energy (E_p) at 10-30 km. E_p values are highly enhanced near the equator. Comparison of the GPS-derived potential energy and the global radiosonde observations shows very good agreement. Monthly mean potential energies of GPS-CHAMP are maximum in Northern winter and minimum in Northern summer.