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The variations of geomagnetic energy and solar irradiance and their impacts on Earth's upper atmosphere[1]

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It is important to understand and estimate the energy inputs to the upper atmosphere, in order to provide accurate calculation and prediction of the thermospheric neutral density, which is important for satellite orbital determination. The primary energy sources of Earth's upper atmosphere are the solar irradiance and geomagnetic energy including Joule heating and particle precipitation. Various data (OMNI2, CHAMP, DMSP) and models (SOLAR2000, FISM, Weimer05, AMIE, NCAR TIE-GCM) are utilized to investigate the variations of energy inputs and their influences on the coupled thermosphere-ionosphere system, with focus on the wavelength dependence of solar irradiance enhancement during are events, the geomagnetic energy associated with high-speed solar wind streams, the altitudinal distribution of Joule heating in different solar conditions, and the variation of solar irradiance and geomagnetic energy inputs during last solar cycle.

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