Atmospheric density variations of the orbit altitudes of ‘SZ’ spacecraft

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Three “SZ” atmospheric density detectors were on board of spacecraft “SZ-2”, “SZ-3” and “SZ-4” orbital cabins and launched on January 10,2001, March 26,2002 and December 31, 2002 separately. A lot of thermospheric density data in the altitude range of 330-410 Km were measured during their working in orbits. From analyzing these measurements we deduced the following results. During the period without evident solar and geomagnetic disturbances, one of the principal thermospheric density variations is the rise and fall corresponding to the sunshine and shade area with a rise to fall ratio ranging form 1.4 to 3, in addition, the ratio is correlated with the level of solar activity and geomagnetic activity. During geomagnetic disturbances, a global thermospheric density enhancement occurred, and on abnormal density disturbance with an un-symmetric feature for the south and north hemisphere of the earth were measured in the peak period of geomagnetic disturbances. For a strong geomagnetic disturbance, the biggest enhancement magnitude of the thermorpheric density reached about 60% and the responding processes were 6-7 hours late after the geomagnetic disturbance started off. In situ measurements also show that a positive correlation between the thermospheric density and the solar activity level is existed.