

REMOTE SENSING OF ATMOSPHERIC EFFECTS PRODUCED BY MAGNETOSHEATH JETS

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We report ionospheric and magnetospheric effects related to the interaction of fast magnetosheath plasma streams, so-called jets, with the dayside magnetopause. The jets were observed by THEMIS mission in the dayside magnetosphere during a quiet day on 12 July 2009. It was found that the jet interaction was accompanied by strong localized compression and penetration of suprathermal magnetosheath plasma inside the dayside magnetosphere. The compression caused prominent magnetic variations with amplitudes up to 100 nT observed by ground-based magnetic networks SuperMAG and CARISMA. The magnetic variations were also visible in the geomagnetic Dst and AE indices. In addition, the jets resulted in intense precipitation of the suprathermal ions with energies < 10 keV and energetic electrons with energies > 30 keV observed by low-altitude NOAA/POES satellites in a wide longitudinal range. The GNSS-based technique of global ionospheric maps allows revealing of increases in ionization with an amplitude of ~ 1 TECU ($\sim 30\%$ in relative units), which is produced by the particle precipitations. The increases are related to intensifications of the ionospheric E and F1 layers as revealed from radio-occultation technique in the FORMOSAT-3/COSMIC mission. These results provide new insight into the contribution of magnetospheric forcing to day-to-day ionospheric variability.

Keywords: magnetosheath plasma jets, magnetosphere-ionosphere coupling, ionospheric day-by-day variability