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The auroral oval expansion caused by a solar wind pressure increase

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Global ultraviolet auroral images from the IMAGE satellite were used to investigate the displacement of the nightside equatorial auroral oval boundary during 30 minutes after a sudden impulse in the solar wind pressure. Typically after an abrupt pressure increase from 2 to 6 nPa, the boundary was moving equatorward with an averaged speed of the order of 7 km/min, so that the displacement during the first 30 min was of the order of 2 deg. in latitude. This displacement is explained by the reconfiguration of the magnetospheric cross-tail electric current in such a way that the Earth-ward edge of this current appears closer to the Earth. In its turn, the displacement of the current edge is due to a difference in the displacements of the magnetopause and the magnetospheric plasma adjacent the magnetopause.