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IMF influence on Saturn's aurora: Study of the HST and Cassini data in February 2008

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The dependence of Saturn's magnetospheric magnetic field structure on the interplanetary magnetic field (IMF), together with the corresponding variations of the open-closed field line boundary in the ionosphere is studied. We investigate the interval from 12 to 15 February 2008, when UV images of Saturn's southern aurora were obtained by the Hubble Space Telescope (HST), and simultaneous IMF measurements were provided by the Cassini spacecraft located in the solar wind near the kronian subsolar bow shock. Using the paraboloid model of Saturn's magnetosphere, we calculate the magnetospheric magnetic field structure and ionospheric open-closed field line boundary for several averaged IMF vectors corresponding to chosen obtained HST images. Assuming that magnetospheric model parameters were constant for the studied period, we explain the variations in the shape and area of the open field line region in the ionosphere by the IMF fluctuations. The results of our study support the assumption that the open-closed field line boundary in the noon ionosphere is closed to the poleward boundary of Saturn's auroral oval.