The dependence of deep-nightside Martian ionosphere TEC on crustal magnetic field

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It has been clear that the main cause of Martian deep-nightside ionosphere is electron precipitation, which is dominated by Martian crustal magnetic field. In this research, the dependence of deep-nightside Martian ionosphere TEC (Total Electron Content) on crustal magnetic field was studied based on Martian ionospheric TEC data from MEX/MARSIS and 400km crustal magnetic field data from MGS. It is found that the strength and inclination of crustal magnetic field have great effects on Martian deep-nightside ionospheric TEC. This kind of effects are worth to be compared with the effects of crustal magnetic field on electron precipitation studied in previous researches (such as Lillis and Brain, 2013, Nightside electron precipitation at Mars: Geographic variability and dependence on solar wind conditions) to find out more about the formation of Martian deep-nightside ionosphere. It is also found that, in a Martian crustal magnetic field cusp region, the observed deep-nightside ionospheric TECs in the center of the cusp are lower than those in the edge of the cusp, a phenomenon not noticed before. It indicates that there may be more precipitated electrons moving along the closed crustal magnetic lines than moving along open crustal magnetic lines, and these precipitated electrons in closed magnetic lines can be related to the energy processes in the nightside of Mars, such as magnetic reconnections.