

Dependence of solar wind on magnetic field, electron density and temperature in the Venus ionosphere

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Ionosphere of the Venus interacts with the solar wind directly because the Venus doesn't have intrinsic magnetic field. Therefore the ionosphere is sensitive to the solar wind condition. We define that a solar wind magnetic (SWM) coordinate system and investigated magnetic field, electron density and temperature in the Venus ionosphere from the data (orbit 1-600) obtained by Pioneer Venus Orbiter (PVO). Magnetic longitude is defined as angle from X axis.

In the ionosphere, the direction of magnetic field line is almost horizontal in the day side and connected to solar wind in the magnetic longitude of 160 and 200 degree. For low solar wind dynamic pressure, the magnetic field slipping over the pole is observed in the magnetic longitude of 180 degree. For high solar wind dynamic pressure, the magnetic field is looped in the magnetic longitude of 180 degree at 600-800 km altitudes near equator. The slipping field is observed but the looped field is not observed in the middle latitude in the magnetic longitude of 180 degree. Our result may suggest that the magnetic reconnection exists in the nightside ionosphere.

For low solar wind dynamic pressure, electron temperature (T_e) does not depend on magnetic longitude. Central tail ray is observed in the magnetic longitude of 180 degree. For high solar wind dynamic pressure, we found plasma depletion over the looped magnetic field. T_e in the region is higher than T_e of ambient ionosphere. Low T_e region exists under the looped magnetic field. The plasma depletion is not found for the low dynamic pressure. Higher heat flux is required in the high T_e region because T_e is determined by heat flux in the nightside ionosphere. The magnetic field line in the high T_e region is connected to interplanetary magnetic field (IMF) and the looped magnetic field line is separated from IMF.