



A comparison of the ionospheric dynamo current of Mars above the landing sites of InSight and Zhurong: modeling and observations

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Previous observational studies suggest that the surface time-varying magnetic field of Mars originates in large part from the dynamo currents in the Martian ionosphere^[1,2,3,4]. However, it needs further study whether there are significant differences in the strength, the configuration, and the diurnal and seasonal variation of the dynamo current in different regions of the Martian upper atmosphere. This study compares the similarities and differences between the wind driven dynamo current over the InSight landing site (4.50° N, 135.62° E) and the Zhurong rover (25.07° N, 109.90° E)^[5]. The results show that the dynamo current as well as its magnetic signal at around perihelion on surface at Zhurong is smaller than that at InSight due to weaker magnetic field in the ionosphere. This study also indicates that the seasonal effect, or the solar zenith angle (SZA), would affect the plasma density which should be included when dealing with off-equatorial locations. The direction and strength of the magnetic field and neutral wind, along with SZA, impact the intensity of the dynamo currents at Zhurong. The study provides a reference in an attempt to promote the understanding of the solar wind – Mars induced magnetosphere – ionosphere – Mars surface coupling process.

References

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