Mars and Venus Solar Wind Interactions – Role of the Solar Cycle

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Mars and Venus continue to reveal details of their solar wind interactions as Mars Express and Venus Express obtain further information on the involved processes beyond MGS and PVO. As might be expected, with such information comes a greater appreciation of the complications and unknowns. In particular, the role of solar cycle variations in both the ionospheres and the interplanetary conditions has becomes especially apparent during the recent extraordinarily quiet solar minimum. For example, while the newer results provide a much more detailed picture of pickup ions in the vicinity of these planets, the debate continues regarding the importance of various components of the local electric fields, the rates of escape and their dependences on external and ionospheric parameters, and their evolutionary significance. Similarly, the so-called 'bulk removal' ion escape processes are widely discussed but not well-constrained by observations. We offer outstanding questions, suggested analyses that can further constrain the descriptions of the solar wind interactions, and the potential of upcoming observations from MEX, VEX and the still-to-be-launched MAVEN missions.