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Why does the IMF not penetrate into the Atmosphere of Venus?

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One of the intriguing findings of previous Venus missions was a zero magnetic field in the Venusian atmosphere, which indicates that Venus does not possess an own magnetic field. Still, one could expect the interplanetary magnetic (IMF) field penetration down to the planet's surface due to magnetic diffusion. The corresponding timescale would be determined by the ionospheric conductivity, not exceeding a few hours [Cloutier, JGR, Vol. 89, 2401, 1984; Phillips et al., JGR, Vol. 89, 10676, 1984]. However, the present observations do not indicate a magnetic field in the lower atmosphere of Venus, the altitude of the magnetization boundary varying from about 400 km under low solar wind dynamic pressure to about 150 km under high pressure [Luhman et al., JGR, Vol. 89, 362, 1984; Krymskii and Breus, JGR, Vol. 93, 8459, 1988]. It looks like the IMF is being ejected from the atmosphere. We hypothesize that such an IMF ejection could be associated with an upward flux of energized ions. A similar flux of about 10^8 $cm^{-2}s^{-1}$, named "polar wind", permanently exists in the Earth's ionosphere [e.g. Banks and Holzer, JGR, Vol. 73, 6846, 1968]. An upward flux of the order of about 10^6 cm^2 s^{-1}, has been reported for Mars [Lundin et al., Science, Vol. 305, 1933, 2004]. It is reasonable to expect larger upward fluxes for Venus, as it is located nearer to the Sun. The ions are heated, presumably, by the solar wind and UV radiation. The upward plasma flux must prevent the IMF diffusion into the atmosphere. Our first estimations show that the upward velocities of plasma from tens to

hundreds of m/s are sufficient for ejecting the IMF from the atmosphere. We discuss also that our hypothesis can be proven by ASPERA-4 ion and VEX-MAG magnetic field measurements obtained in the near future by ESA's Venus Express mission.